

## ADDENDUM NO. 3

TO: PLANS AND SPECIFICATIONS FOR STATE OF MISSOURI

Upgrade Cave Electric  
Onondaga Cave State Park  
Leasburg, Missouri  
PROJECT NO.: X2212-01

Bid Opening Date: 1:30 PM, Thursday, August 31, 2023 (UNCHANGED)

**Revised Unit Prices Form is attached. Bidders must use the Unit Prices Form marked REVISED PER ADDENDUM #3 to bid this project.**

Bidders are hereby informed that the construction Plans and/or Specifications are modified as follows:

### **SPECIFICATION CHANGES:**

1. Section 004322 – UNIT PRICES FORM
  - a. Unit Price No. 1 was revised and Unit Price No. 2 and Unit Price No. 3 were added. **Bidders must use the attached Unit Prices Form marked REVISED PER ADDENDUM #3 to bid this project.**
2. Section 011000 – SUMMARY OF WORK
  - a. Paragraph 1.2 C.1.d: ADD “automatic transfer switch” immediately after “temporary mobile generator”.
3. Section 012200 – UNIT PRICES
  - a. Paragraph 3.1 A.3: CHANGE the base bid quantity for Unit Price No. 1 from “Forty-two (42)” TO “Forty (40)”.
  - b. ADD Paragraph 3.1 B as follows:
    - B. Unit Price No. 2:
      1. Description: Type T cave guardrail LED strip lighting fixture.
      2. Unit of Measurement: One (1) lineal foot
      3. Base Bid Quantity: Two-thousand nine-hundred seventy-eight (2,978) lineal feet plus eighty (80) lineal feet of attic stock
  - c. ADD Paragraph 3.1 C as follows:
    - C. Unit Price No. 3:

1. Description: 4" cable sleeve for cables crossing walking trail in accordance with Detail 204 on Drawing E-502.
2. Unit of Measurement: Each (EA)
3. Base Bid Quantity: Six (6)

4. Section 012300 – ALTERNATES

- a. Paragraph 3.1 A.1: CHANGE "400A MLO" TO "**600A MLO**".
- b. Paragraph 3.1 A.2: CHANGE "400A/2P" TO "**600A/2P**".
- c. Paragraph 3.1 A.3: CHANGE "230A/2P" TO "230A**3P**".
- d. Paragraph 3.1 A.4: CHANGE "400A/2P" TO "**600A/3P**".

5. Section 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

- a. Paragraph 3.2 B: CHANGE "Panelboard G" TO "**existing Panelboard I**".

6. Section 260500 – COMMON WORK RESULTS FOR ELECTRICAL

- a. Paragraph 3.6 C.1.a: CHANGE "200-400A" TO "200-**600A**".
- b. Paragraph 3.6 C.5.a: CHANGE "200-400A" TO "200-**600A**".

7. Section 260519 – LOW-VOLTAGE ELECTRICAL CONDUCTORS AND CABLES

- a. Paragraph 1.4 A.5: REPLACE with the following:
  - 1.4 A.5. Cable gland connectors
- b. Paragraph 2.3 A.2: REPLACE with the following:
  - 2.3 A.2. Conductors: ASTM B3 and ASTM B8, Class B stranded annealed copper conductor, size 12 AWG minimum. Provide cable with 50% rated equipment ground (3 equipment grounding conductors) where indicated on the Drawings.
- c. Paragraph 2.3 B.2: REPLACE with the following:
  - 2.3 B.2. Connectors shall be of stainless steel or galvanized malleable iron and shall be a compression type IP68/NEMA 6P rated connector with a locknut for PVC jacketed metal clad cable.
- d. ADD Paragraph 2.3 B.3 as follows:
  - 2.3 B.3. Provide PVC coated fittings if available from the factory as a UL listed product.
- e. Paragraph 2.5 B: REPLACE with the following:



2.5 B. Connectors shall be stainless steel for cables with stainless steel armor and galvanized malleable iron for cables with galvanized steel armor and shall be a compression type IP68/NEMA 6P rated connector with a locknut for PVC jacketed metal clad multi-conductor control cable.

f. Article 2.6: REPLACE with the following:

## **2.6 CABLE GLAND FITTINGS**

A. Utilize cable gland fittings to provide watertight connection of lighting fixture factory cables to IP68 rated enclosures for power supply units and drivers.

1. Five-piece consisting of a lock nut, washer, body, inner seal and domed sealing nut
2. Material: PA (Nylon), UL 94
3. Hermetic seal: NBR
4. Protection degree: IP68, 5 Bar, IP69K
5. Working temperature: -40°C to 100°C in static state  
-20°C to 80°C in dynamic state
6. Color: Black
7. UL Listed

## **8. Section 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL EQUIPMENT**

a. ADD Paragraph 3.2 J as follows:

3.2 J. There shall be no aluminum or carbon steel materials installed inside the cave.

## **9. Section 260533.16 – BOXES FOR ELECTRICAL SYSTEMS**

a. Paragraph 1.4 A.3: REPLACE with the following:

1.4 A.3. Enclosures for cave feature lighting fixture power supply units, cave guardrail LED strip lighting fixture drivers, cave bear bones box LED strip lighting fixture driver and junction boxes located inside the cave.

b. Paragraph 2.2 F: ADD the following to the end of the paragraph:

“Catalog numbers for cave feature lighting fixture PSUs, cave guardrail LED strip lighting fixture drivers and cave bear bones box LED strip lighting fixture driver shall be as indicated in Section 265613 – Cave Lighting Fixtures, Power Supply Units and Drivers.”

to the end of the paragraph.

## **10. Section 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS**

a. Paragraph 2.6 C: REPLACE with the following:

2.6 C. The directory card shall be typewritten or printer generated to identify the load fed by each circuit for compliance with NED 408-4 and then laminated with clear plastic to protect it from moisture.

b. ADD Paragraph 3.2 C as follows:

3.2 C. Nameplates for all items that are to be located within the cave shall be applied to the item in a clean, dry and well lite location and not inside the cave to ensure proper adhesion of the nameplates to the equipment.

c. ADD Paragraph 3.5 D as follows:

3.5 D. Arc flash warning labels for all items that are to be located within the cave shall be applied to the item in a clean, dry and well lite location and not inside the cave to ensure proper adhesion of the labels to the equipment.

11. Section 260573 – PROTECTIVE DEVICE COORDINATION AND ARC FLASH RISK ASSESSMENT

a. Paragraph 1.11 E: DELETE Items 1 and 2.

12. Section 260943.23 – RELAY-BASED LIGHTING CONTROLS

a. Paragraph 2.1 H: REPLACE with the following:

2.1 H. *Control Relays*: Provide control relays to interface between lighting control push buttons and the lighting contactors as required to implement the lighting control design specified herein and as shown on the Drawings. Control relays shall be plug-in style DPDT, 3PDT or 4PDT, as required, with 10-amp (minimum), 120-volt rated silver-cadmium oxide (AgCdO) contacts, 24VAC or 120VAC coils, as required, and LED pilot light to indicate when the relay coil is energized. Control relays shall be manufactured by ABB, Allen-Bradley, Eaton, Potter & Brumfield, Schneider Electric or Siemens. Provide manufacturer's recommended DIN rail mounting base for relays.

b. Paragraph 2.1 L: REPLACE "Type SIS panel wire" WITH "Type **MTW or THHN** panel wire, **per the requirements of UL 508A**".

c. Paragraphs 2.1 L through Paragraph 2.1 HH: CHANGE to Paragraphs 2.1 M through Paragraph 2.1 II.

d. ADD new Paragraph 2.1 L as follows:

2.1 L: *Enclosure lighting fixture*: LED strip lighting fixture with prismatic lens, 1200 to 1500 lumens, 4000K CCT, 120VAC, 12 watt maximum, with plastic or aluminum housing and mounting bracket for securing in top of enclosure. Manufacturer shall be same as enclosure manufacturer or by Rittal. Provide with flexible power pigtail and door switch for automatic

operation with door opening and closing. Fixture shall be mounted to provide illumination of the entire interior of the control enclosure with door switch mounted on the door of the enclosure that provides access to the power panel.

13. Section 262416 – PANELBOARDS

a. Paragraph 2.1 Q: REPLACE with the following:

2.1 Q. Circuit breakers shall have a minimum short-circuit interrupting capacity of 10 kA RMS symmetrical amperes.

b. Paragraph 2.2 Q: REPLACE with the following:

2.1 Q. Circuit breakers shall have a minimum short-circuit interrupting capacity of 25 kA RMS symmetrical amperes.

14. Section 262816.13 – ENCLOSED CIRCUIT BREAKERS

a. Paragraph 2.1 A: REPLACE with the following:

2.1 A. The main circuit breaker for new electrical service shall have the following ratings:

1. Type: Molded case thermal magnetic
2. Frame size: 600A
3. Rating plug: 600A
4. Continuous current rating: 80%
5. Electronic trip unit: Long time, short time and instantaneous trip settings
6. Short circuit rating: 25kA

b. Paragraph 2.1 B: CHANGE “one (1) 500 kcmil conductor” TO “**two (2) 350 kcmil copper** conductors”.

c. Paragraph 2.1 C: CHANGE “one (1) 500 kcmil copper incoming and one (1) 500 kcmil outgoing neutral conductor” TO “**two (2) 350 kcmil copper** incoming and **two (2) 350 kcmil copper** outgoing neutral conductors”.

d. Paragraph 2.1 D: REPLACE with the following:

2.1 D. Provide 200A rated copper equipment ground bus within the circuit breaker enclosure, bonded to the enclosure, with lugs for connection of one (1) incoming and one (1) outgoing 4/0 copper equipment grounding conductor, a 3/0 copper main bonding jumper and a 3/0 copper grounding electrode conductor.

e. Paragraph 2.1 J: CHANGE “(1) 500 KCM” TO “**two (2) 350 kcmil copper**”.

f. Paragraph 2.1 O.1: REPLACE with the following:

- 2.1 O.1. Square D PowerPact P Frame with Micrologic 5.0 electronic trip unit (Basis of Design)

15. Section 263213.13 – DIESEL-ENGINE-DRIVEN GENERATOR SET

- a. Paragraph 2.3 A: CHANGE “400A” TO “**600A**”.
- b. Paragraph 3.4 G.1: CHANGE “400A” TO “**600A**”.

16. Section 263236 – RESISTIVE LOAD BANKS

- a. Paragraph 2.6 D: CHANGE “400A ATS” at the end of the paragraph TO “**600A** ATS”.

17. Section 263613 – NON-AUTOMATIC TRANSFER SWITCHES

- a. Paragraph 2.2 A: CHANGE “2 pole” TO “**3** pole”.
- b. Paragraph 2.2 E: REPLACE with the following:
  - 2.2 E. The minimum UL listed Withstand and Closing Rating of the NTS shall be 22,000 RMS symmetrical amperes at 240 volts, 60 Hz for 3 cycles. Before ordering the NTS or the diesel engine-generator set, verify with NTS manufacturer that the generator output circuit breaker provided with the diesel-engine-driven generator set specified in Section 263213.13 – Diesel-Engine-Driven Generator Set will provide the required 22 kA RMS symmetrical withstand and closing rating for the NTS.

18. Section 263233 – AUTOMATIC TRANSFER SWITCHES

- a. Paragraph 2.2 A: CHANGE “2 pole” TO “**3** pole”.
- b. Paragraph 2.2 E: CHANGE “22,000 RMS” TO “**25,000** RMS” in two locations.
- c. DELETE Paragraph 2.2 G.

19. Section 265113 – INTERIOR LIGHTING FIXTURES, LAMPS AND DRIVERS

- a. Paragraph 1.6 D: REPLACE with the following:
  - 1.6 D. No spare parts, other than lamps, are required for the Type G and Type W lighting fixtures.
- b. Paragraph 2.3 B: REPLACE with the following:
  - 2.3 B. LED Screw Base A19 Lamps:
    1. Correlated color temperature (CCT): 3000K
    2. Operating voltage: 120VAC, 60 Hz
    3. Color rendering index (CRI): ≥ 80
    4. Lamp wattage: ≤ 8

5. Power factor:  $\geq 0.9$
6. Lumens:  $\geq 800$
7. Rated life:  $L70 \geq 25,000$  hours
8. Lamp shape: A19
9. Base: E26
10. Minimum starting temperature:  $\leq -20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ )
11. Maximum operating temperature:  $\geq 40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ )
12. UL Listed for damp locations
13. Suitable for use in totally enclosed lighting fixtures
14. Omni-directional beam spread:  $\geq 240^{\circ}$
15. Dimmable to 10%
16. Manufacturer: Eiko Cat. No. L8WA19/830PF/D/E26 or approved equal by Satco, TCP, Inc., or Westinghouse

20. Section 265613 – CAVE LIGHTING FIXTURES, POWER SUPPLY UNITS AND DRIVERS

- a. DELETE Paragraph 1.4 A.3.
- b. Article 1.5: REPLACE with the following:

**1.5 SUBSTITUTIONS**

- A. The manufacturers and catalog numbers specified herein and shown on the “New Lighting Fixture Schedule” on the Drawings for the Type T, BB, B, C, D, and DS lighting fixtures are the only lighting fixtures approved for use on this project. No substitutions for the cave feature and LED linear lighting fixtures will be allowed.

- c. Paragraph 1.6 A.1.d: REPLACE with the following:

- 1.6 A 1.d. Provide 10% spare (minimum of 1) of each Type T lighting fixture length that has a minimum quantity of 10 used on this project. Spare Type T fixtures shall have a 2/C#18 Type SJTW cable, black jacket with stranded copper leads, potted to the lighting fixture body on each end (36” long on one end and 96” long on the other end) to allow splicing to the existing fixture on either side of the one being replaced using Owner furnished IP68 splice boxes.

- d. ADD Paragraph 2.1 H as follows:

- 2.1 H. There shall be no aluminum or carbon steel materials, including hardware and accessories, used on any lighting fixture that is to be located within the cave.

- e. Paragraph 2.2 D.18: REPLACE with the following:

- 2.2 D.18. Control: DMX via separate power supply unit  
(NOTE: While the lighting fixtures are to have DMX control capability, there is no DMX control on this project. Lighting fixtures are static white with ON/OFF control via the relay-based lighting control system)

specified under Section 260943.23 – Relay-Based Lighting Control System.)

- f. Paragraph 2.2 D.21: CHANGE “(as indicated in the “New Lighting Fixture Schedule” on the Drawings):” TO “(as indicated in the “New Lighting Fixture Schedule” on the Drawings **and the thirteen (13) cave electrical plan drawings**):”.
- g. Paragraph 2.2 D.22.j: REPLACE with the following:
  - 2.2 D.22.j Control: DMX via removable multi-pin terminal blocks or XLR connectors  
(NOTE: While the lighting fixture PSUs are to have DMX control capability, there is no DMX control on this project. Lighting fixtures are static white with ON/OFF control via the relay-based lighting control system specified under Section 260943.23 – Relay-Based Lighting Control System.)
- h. Paragraph 2.2 D.24: REPLACE with the following:
  - 2.2 D.24. Other requirements, including accessories, as indicated in the “New Lighting Fixture Schedule” and the lighting fixture details on the Drawings.
- i. Paragraph 2.4 C: CHANGE “as indicated in the “New Lighting Fixture Schedule” on the Drawings.” TO “as indicated in the “New Lighting Fixture Schedule” on the Drawings **and the thirteen (13) cave electrical plan drawings**.”.
- j. Paragraph 2.4 D.7: CHANGE “60 per foot” TO “**120 per meter**”.
- k. Paragraph 2.4 D.18.a: REPLACE with the following:
  - 2.4 D.18.a. Driver Connection: 2/C#18 Type SJTW, black jacket with stranded copper leads, 96”, potted to lighting fixture body to maintain submersible, IP69 rating
- l. Paragraph 2.4 D.18.b: REPLACE with the following:
  - 2.4 D.18.b. Fixture to Fixture Jumpers: 2/C#18 Type SJTW, black jacket with stranded copper leads, length as ordered (approximately 15 to 36 inches), potted to lighting fixture bodies to maintain submersible, IP69 rating
- m. Paragraph 2.4 D.19.b: CHANGE “Spin Channel” TO “**Spine** Channel”.
- n. Paragraph 2.4 D.19.c: REPLACE with the following:
  - 2.4 D.19.c. Guardrail Tube Mounting Clamps: Type 304 stainless steel Type H conduit clamp, sized to fit the nominal 1-1/2” Schedule 40 Type 304 stainless steel guardrail horizontal tubes. Provide with Type 304 stainless steel clamp bolt and acorn nut.

(NOTE: The guardrail tube mounting clamps are to be furnished by the lighting fixture manufacturer as part of the fixture mounting hardware.)

- o. Paragraph 2.4 D.21.a: REPLACE with the following:
  - 2.4 D.21.a. 120VAC or 240VAC (as indicated on the Drawings), 47 to 63Hz
- p. Paragraph 2.4 D.21.d: REPLACE with the following:
  - 2.4 D.21.d. Power Factor: Power Factor:  $\geq 0.99$  from minimum load to full load @ 120VAC
- q. Paragraph 2.4 D.21.e: REPLACE with the following:
  - 2.4 D.21.e. Efficiency:  $\geq 89.8\%$  from minimum load to full load @ 120VAC
- r. Paragraph 2.4 D.21.n: REPLACE with the following:
  - 2.4 D.21.n. Environment: Indoor / Damp, IP20 rated case with silicone-based potting (to be installed in an IP68 submersible enclosure by Contractor)
- s. DELETE Paragraph 2.4 D.21.o.
- t. Paragraphs 2.4 D.9 through Paragraph 2.4 D.22: CHANGE to Paragraphs 2.4 D.11 through Paragraph 2.4 D.24.
- u. ADD new Paragraph 2.4 D.9 as follows:
  - 2.4 D.9. Diffuse (frosted) lens
- v. ADD new Paragraph 2.4 D.10 as follows:
  - 2.4 D.10. 3D bending
- w. Paragraph 2.4 E.1: REPLACE with the following:
  - 2.4 E.1. DiodeLED DI-SO-24V-3D-AT-PD-20-30-Length (2" to 192")
- x. Paragraph 2.4 F.1: REPLACE with the following:
  - 2.4 F.1. DiodeLED VLM100W-24 for 120VAC input or VLM100W-24E for 240VAC input
- y. ADD Article 2.5 as follows:

## **2.5 CAVE BEAR BONES BOX LED LINEAR LIGHTING FIXTURES**

- A. Lighting fixtures for illumination of the two (2) bear bones boxes inside the cave shall be LED linear type.

- B. Provide all required system components including, but not limited to, LED lamp modules, drivers, heat sinks, power supply units, controllers, cables, connectors, mounting accessories and glare shields for a complete and operational system.
- C. Bear bones box lighting fixtures, Type BB, shall be provided as indicated in the "New Lighting Fixture Schedule" on the Drawings.
- D. Bear bones box lighting fixtures shall meet the following minimum requirements:
  - 1. LEDs binned to within 3 Macadam ellipses
  - 2. Correlated Color Temperature (CCT): 3000K
  - 3. CRI:  $\geq 90$
  - 4. Lumen Output: 123 Lm/ft
  - 5. Wattage: 1.8 W/ft
  - 6. Max Continuous (Single Piece) Length: 26.25 lineal feet
  - 7. LED Chips: 72 per foot
  - 8. LED Chip Beam Angle:  $120^\circ$
  - 9. Diffuse (frosted) lens
  - 10. Top bending
  - 11. Luminous Efficacy (lm/W): 68.33 lm/W
  - 12. Lumen Maintenance (L70):  $>50,000$  hours
  - 13. Construction: UV/IR protected thermoplastic polyurethane (TPU) flame retardant outer jacket with flexible copper PCB, V-0 rated, UL rated
  - 14. Operating Voltage: 24VDC constant
  - 15. Approved Use: IP69 submersible rating
  - 16. UL Listing: UL 2108 low voltage lighting system
  - 17. Ambient Temperature:  $-4^\circ\text{F}$  ( $-20^\circ\text{C}$ ) to  $122^\circ\text{F}$  ( $50^\circ\text{C}$ )
  - 18. Constant output
  - 19. Driver Connection: Driver Connection: 2/C#18 Type SJTW, black jacket with stranded copper leads, 25' long, potted to lighting fixture body to maintain submersible, IP69 rating
  - 20. Mounting Hardware: Straight PVC mounting channel, silver/gray color
  - 21. Warranty: 5 years
  - 22. Drivers:
    - a. Input Voltage/Frequency: 120VAC or 240VAC (as indicated on the Drawings, 47 to 63Hz)
    - b. Maximum Input Current (Full Load): 1.16A @ 120VAC
    - c. Maximum Inrush Current: 33.6A, 720  $\mu\text{s}$  @ 120VAC
    - d. Power Factor:  $\geq 0.99$  from minimum load to full load @ 120VAC
    - e. Efficiency:  $\geq 89.8\%$  from minimum load to full load @ 120VAC
    - f. Maximum Output Power: 96W
    - g. Maximum Output Current (Full Load): 4.0A
    - h. Output Voltage: 24VDC  $\pm 5\%$



- i. Protections: Auto reset breakers for short circuit, overload and over temperature
- j. Surge Protection:  $\geq 3$  kV
- k. Ambient Temperature:  $-22^{\circ}\text{F}$  ( $-30^{\circ}\text{C}$ ) to  $158^{\circ}\text{F}$  ( $70^{\circ}\text{C}$ )
- l. Operating Temperature:  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ) to  $122^{\circ}\text{F}$  ( $50^{\circ}\text{C}$ )
- m. Humidity: 5 – 95% RH, non-condensing
- n. Environment: Indoor / Damp, IP20 rated case with silicone-based potting (to be installed in an IP68 submersible enclosure by Contractor)
- o. Cooling: Free-air convection
- p. Total Harmonic Distortion (THD):  $< 10\%$
- q. Certifications: UL Listed and Labeled, Class 2, Class P
- r. Control: Constant voltage
- s. Primary Leads: UL 1015 2#18AWG stranded copper, AC/L (Black), AC/N (White)
- t. Secondary Leads: UL 1007 2#18AWG stranded copper, V+(Red), V-(Blue)
- u. Warranty: 5 years

23. Indicating Silica Gel, Moisture Absorbing, Reusable Desiccant Canisters:

- a. To be field installed in the IP68 enclosure for the driver.
- b. 40 grams of cobalt chloride-free, non-toxic and odorless desiccant gel beads.
- c. Non-metallic or aluminum enclosure with removeable lid to provide access to desiccant beads for drying or replacement and with viewing window to allow bead color to be observed.
- d. Orange gel beads shall turn dark green when saturated with moisture to indicate reactivating (drying) or replacement is required.
- e. Gel beads shall be able to absorb 40% of their weight in water vapor
- f. Include user manual with instruction for drying moisture saturated desiccant beads

E. Approved manufacturers for LED linear lighting:

- 1. DiodeLED DI-24V-TE-ATX-130-30-84" (Bear Bones Box 1) (NOTE: Contractor shall field verify length required prior to ordering the fixture.)
- 2. DiodeLED DI-24V-TE-ATX-130-30-68" (Bear Bones Box 2) (NOTE: Contractor shall field verify length required prior to ordering the fixture.)
- 3. No approved equals

F. Approved manufacturers for LED linear lighting driver:

- 1. DiodeLED VLM100W-24 for 120VAC input or VLM100W-24E for 240VAC input
- 2. No approved equals

z. ADD Paragraph 3.1 C as follows:

3.1 C. Provide 600V, 20A, 2-pole, Wago, or approved equal, luminaire disconnect connector at the input power connection to each PSU and driver, inside each IP68 rated PSU/driver enclosure.

aa. Paragraph 3.3 C: REPLACE with the following:

3.3 C. Output Cable Connections: Provide one (1) to four (4) (as required for Type A PSUs) and five (5) to eight (8) (as required for Type B PSUs) IP68 straight nylon cable gland fittings in each PSU enclosure in accordance with Paragraph 2.6 of Section 260519 – Low-Voltage Electrical Power Conductors and Cables.

bb. Paragraph 3.3 D: REPLACE with the following:

3.3 D. Installation of the PSUs to the inner back panel of the IP68 enclosures and installation of incoming power PVC jacketed Type MC power IP68 cable connector(s) and output lighting fixture IP68 cable gland fitting(s) shall be completed by the Contractor in a clean, dry and well lite location and not inside the cave.

cc. DELETE Paragraph 3.3 H.

dd. Paragraph 3.4 A: REPLACE with the following:

3.4 A. Cave guardrail LED linear lighting fixtures must be ordered to the correct length using the manufacturer's order sheet. Lighting fixture segments cannot be field cut to fit or otherwise modified after shipment from the factory.

ee. Paragraph 3.4 C: REPLACE with the following:

3.4 C. Installation of the drivers to the inner back panel of the IP68 enclosures and installation of incoming power PVC jacketed Type MC power IP68 cable connector(s) and output lighting fixture IP68 cable gland fitting(s) shall be completed by the Contractor in a clean, dry and well lite location and not inside the cave.

ff. Paragraph 3.4 G: REPLACE with the following:

3.4 G. Cave guardrail LED linear lighting fixture drivers shall be installed within a NEMA Type 6P/IP68 submersible non-metallic junction box mounted to the backside of a guardrail vertical post in accordance with the detail on the Drawings. Driver enclosures shall not be fastened directly to the cave.

gg. Paragraphs 3.4 H and 3.4I: CHANGE to Paragraphs 3.4 J and 3.4 K.

hh. ADD new Paragraph 3.4 H as follows:

- 3.4 H. Driver enclosures shall be Stahlin Catalog No. PC806 with BP86FG fiberglass inner back panel. Driver junction boxes shall be provided in accordance with Section 260533.13 – Boxes for Electrical Systems.
- ii. ADD new Paragraph 3.4 I as follows:
- 3.4 I. Output Cable Connections: Provide one (1) or two (2) (as required) IP68 straight nylon cable gland fittings in each driver enclosure in accordance with Paragraph 2.6 of Section 260519 – Low-Voltage Electrical Power Conductors and Cables.
- jj. ADD Paragraph 3.4 L as follows:
- 3.4 L. Take care in making wiring terminations so as not to drop wire trimmings, insulation or other debris into the driver enclosure. Thoroughly clean the inside of all driver enclosures before inserting the desiccant canister and securing the enclosure door.
- kk. Paragraph 3.5 B.3: CHANGE “confirm that the factory warranty is in effect” TO “**provide written confirmation** that the factory warranty is in effect.”
- ll. ADD Paragraph 3.5 C as follows:
- 3.5 C. The cave guardrail LED linear lighting fixture manufacturer shall provide a factory authorized field services technician to provide startup and commissioning of the guardrail lighting system in conjunction with the work specified in Paragraph 3.5 A. Include (2) consecutive 8-hour days on site and all transportation and subsistence costs to perform the following services:
1. Inspect installation for compliance with cave guardrail LED linear lighting fixture manufacturer’s requirements.
  2. Measure the foot-candle level at a minimum of 50 points throughout the cave at the center of the walking trail to confirm the designed 1fc average illumination was achieved. Document fc levels and locations on the cave electrical plans.
  3. Verify proper operation of all cave guardrail lighting equipment and provide written confirmation that the factory warranty is in effect.
- mm. Articles 3.5 FIELD STARTUP AND COMMISSIONING through 3.7 CLEANING AND ADJUSTING: CHANGE to Articles 3.6 FIELD STARTUP AND COMMISSIONING through 3.8 CLEANING AND ADJUSTING.
- nn. ADD new Article 3.5 as follows:
- 3.5 CAVE BEAR BONES BOX LED LINEAR LIGHTING FIXTURE INSTALLATION**

- A. Cave bear bones box LED linear lighting fixtures must be ordered to the correct length. Lighting fixtures cannot be field cut to fit or otherwise modified after shipment from the factory.
- B. Both bear bones box lighting fixtures shall be powered from a common driver. Install lighting fixtures, driver, and all lighting fixture accessories in strict accordance with the lighting fixture manufacturer's instructions and as indicated on the Drawings.
- C. Installation of the driver to the inner back panel of the IP68 enclosure and installation of incoming power PVC jacketed Type MC power IP68 cable connector(s) and output lighting fixture IP68 cable gland fittings shall be completed by the Contractor in a clean, dry and well lite location and not inside the cave.
- D. Bolt the driver enclosure to the side of the outside of the concrete wall opposite the walking trail (so it cannot be seen from the trail) of one of the two bear bones boxes.
- E. Mount the LED linear lighting fixture to the inside of the bear bones box concrete wall closest to the walking trail, 2" down from the top edge, in accordance with the manufacturer's installation instructions.
- F. Driver enclosure shall be Stahlin Catalog No. PC806 with BP86FG fiberglass inner back panel. Driver junction boxes shall be provided in accordance with Section 260533.13 – Boxes for Electrical Systems.
- G. Output Cable Connections: Provide two (2) IP68 straight nylon cable gland fittings in the driver enclosure in accordance with Paragraph 2.6 of Section 260519 – Low-Voltage Electrical Power Conductors and Cables.
- H. Take care in making wiring terminations so as not to drop wire trimmings, insulation or other debris into the driver enclosure. Thoroughly clean the inside of all driver enclosures before inserting the desiccant canister and securing the enclosure door.

**DRAWING CHANGES:**

1. Sheet ES-101

- a. REVISE per attached Revision A, dated 08-25-2023.

2. Sheet ES-102

- a. REPLACE General Note G with the following:

- G. BOND ALL METAL EQUIPMENT INCLUDING, BUT NOT LIMITED TO, TRANSFORMERS, PANELBOARDS, MOUNTING SUPPORTS, HANDRAILS, ETC. , TO THE NEAREST PNLBD EQUIP GRD BUS AND/OR

PNLBD GRD LOOP CABLE WITH MIN SIZE #2 STRD CU GREEN  
INSULATED GRD WIRE.

b. REPLACE General Note L with the following:

L. NEW WIRING SHALL NOT BE RUN IN WATER EXCEPT CABLES FOR  
24VDC LIGHTING FIXTURES LOCATED IN POOLS AND THE MAIN FDR  
TO PNLBD F THRU THE SUBMARINE ROOM.

3. Sheet ES-401

a. REVISE per attached Revision A, dated 08-25-2023

4. Sheet ES-402

a. REVISE per attached Revision A, dated 08-25-2023

5. Sheet ED-101

a. REVISE per attached Revision A, dated 08-25-2023

6. Sheet ED-601

a. REVISE per attached Revision A, dated 08-25-2023.

7. Sheet E-101

a. REVISE per attached Revision A, dated 08-25-2023.

8. Sheet E-102

a. CHANGE callout on the field of the drawing for the rail light from "AA6T" TO  
"AA7T".

9. Sheet E-103

a. REVISE per attached Revision A, dated 08-25-2023.

10. Sheet E-104

a. REVISE per attached Revision A, dated 08-25-2023.

11. Sheet E-105

a. ADD new General Note E as follows:

E. 120VAC INPUT CABLES FOR PSUs & DRIVERS LONGER THAN 200'  
SHALL BE 10AWG.

12. Sheet E-106

- a. REVISE per attached Revision A, dated 08-25-2023.

13. Sheet E-107

- a. REVISE per attached Revision A, dated 08-25-2023.

14. Sheet E-108

- a. REVISE per attached Revision A, dated 08-25-2023.

15. Sheet E-109

- a. REVISE per attached Revision A, dated 08-25-2023.

16. Sheet E-110

- a. REVISE per attached Revision A, dated 08-25-2023.

17. Sheet E-111

- a. REVISE per attached Revision A, dated 08-25-2023.

18. Sheet E-113

- a. ADD new General Note F as follows:
  - F. 120VAC INPUT CABLES FOR PSUs & DRIVERS LONGER THAN 200' SHALL BE 10AWG.
- b. CHANGE "107/E-501" in Key Note 7 TO "108/E-501".
- c. CHANGE "104/E-501" in Key Note 8 TO "105/E-501".
- d. CHANGE the jacketed Type MC cable size for the feeder coming into the submarine room from Panelboard MDP in the callout on the field of the drawing from "3#2/0 & 3#6 GRD" TO "3#4/0 & 3#4 GRD".

19. Sheet E-501

- a. REVISE per attached Revision A, dated 08-25-2023.

20. Sheet E-601

- a. REVISE per attached Revision A, dated 08-25-2023.

21. Sheet E-602

- a. CHANGE the “PVC JACKETED TYP MC CABLE (3#2/0 & 3#6 GRD)” callout in five (5) locations on the field of the drawing TO “PVC JACKETED TYP MC CABLE (3#350KCM & 3#2 GRD)”.

22. Sheet E-603

- a. CHANGE the “PVC JACKETED TYP MC CABLE (3#2/0 & 3#6 GRD)” callout in five (5) locations on the field of the drawing TO “PVC JACKETED TYP MC CABLE (3#4/0 & 3#4 GRD)”.

23. Sheet E-604

- a. REVISE per attached Revision A, dated 08-25-2023.

24. Sheet E-605

- a. REVISE per attached Revision A, dated 08-25-2023.

25. Sheet E-606

- a. REVISE per attached Revision A, dated 08-25-2023.

26. Sheet E-607

- a. REVISE per attached Revision A, dated 08-25-2023.

27. Sheet E-608

- a. REVISE per attached Revision A, dated 08-25-2023.

**GENERAL COMMENTS:**

1. All lighting fixture PSUs and drivers are to be furnished by the lighting fixture manufacturers and installed in an IP68 rated non-metallic enclosure by the Contractor.
2. Please contact Mandy Roberson, Contract Specialist, at 573-522-0074 or [mandy.roberson@oa.mo.gov](mailto:mandy.roberson@oa.mo.gov) for questions about bidding procedures, MBE\WBE\SDVE Goals, and other submittal requirements.
3. The deadline for technical questions was Tuesday, August 22, 2023 at 5:00 PM.
4. Changes to, or clarification of, the bid documents are only made as issued in the addenda.
5. All correspondence with respect to this project must include the State of Missouri project number as indicated above.

6. Current Plan holders list available online at <https://www.oafmdcplanroom.com/jobs/2091/details/x2212-01-upgrade-cave-electric-onondaga-cave-state-park>
7. Prospective Bidders contact American Document Solutions, 1400 Forum Blvd Suite 1C, Columbia MO 65201, 573-446-7768 to order official plans and specifications.
8. **All bids shall be submitted on the bid form without additional terms and conditions, modifications, or stipulations. Each space on the bid form shall be properly filled including a bid amount for the alternate. Failure to do so will result in rejection of the bid.**
9. **MBE/WBE/SDVE participation requirements can be found in DIVISION 00. The MBE/WBE/SDVE participation goals are 10%/10%/3%, respectively. Only certified firms as of the bid opening date can be used to satisfy the MBE/WBE/SDVE participation goals for this project. If a bidder is unable to meet a participation goal, a Good Faith Effort Determination Form must be completed. Failure to complete this process will result in rejection of the bid.**
10. **The Contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations.** Bidders are to adhere to Prevailing Wage Hourly Rate of Wages and the Department of Labor and Industrial Relations can be contacted to determine the applicable wage rate for the work on this project.

**ATTACHMENTS:**

1. Revised Section 004322 – Unit Prices Form
2. Revised Sheets ES-101, ES-401, ES-402, ED-101, ED-601, E-101, E-103, E-104, E-106, E-107, E-108, E-109, E-110, E-111, E-501, E-601, E-604, E-605, E-606, E-607, E-608

**August 28, 2023**

**END OF ADDENDUM NO. 3**



**REVISED PER ADDENDUM #3**

**SECTION 004322 - UNIT PRICES FORM**

PROJECT NUMBER: X2212-01

**1.0 Description**

- A. For changing specified quantities of work from those indicated by the contract drawings and specifications, upon written instructions of Owner, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds of work called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than that shown on the drawings and called for in the specifications or included in the Base Bid. In the event of more or less units than so indicated or included during construction the total contract price shall be decreased as appropriate or increased by contract change in accordance with General Conditions Article 4.1.

**2.0 Unit Prices**

A. Unit Price No. 1:

- 1. Description: Type T lighting fixture drivers, including Stahlin PC806 NEMA 6P/IP68 polycarbonate hinged door enclosure and Stahlin BP86FG fiberglass inner back panel with two (2) nylon IP68 cable gland fittings sized as required for the Type T linear LED lighting fixture cable.
- 2. Unit of Measurement: Each
- 3. Base Bid Quantity: Forty (40)

\$ \_\_\_\_\_ each

B. Unit Price No. 2:

- 1. Description: Type T cave guardrail LED strip lighting fixture.
- 2. Unit of Measurement: Lineal Foot
- 3. Base Bid Quantity: Two-thousand nine-hundred seventy-eight (2,978) lineal feet plus eighty (80) lineal feet of attic stock.

\$ \_\_\_\_\_ per lineal foot

C. Unit Price No. 3:

- 1. Description: 4" cable sleeve for cables crossing walking trail in accordance with Detail 204 on Drawing E-502.
- 2. Unit of Measurement: Each
- 3. Base Bid Quantity: Six (6)

\$ \_\_\_\_\_ each



BARRY D. FREIMER  
Registered Professional Engineer  
State of Missouri  
Expires 12-31-2024

ROGERS-SCHMIDT  
ENGINEERING CO., P.C.  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106

MISSOURI STATE CERTIFICATE  
OF AUTHORITY #004408

OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY H  
LEASBURG, MO 65555

PROJECT # X221-01  
SITE # 5215  
ASSET # 7815215013

REVISION:	
DATE:	
BY:	
REVISION:	
DATE:	
BY:	
ISSUE DATE:	06-23-2023
DRAWN BY:	K.L.F./M.A.S.
CHECKED BY:	B.D.F.
DESIGNED BY:	B.D.F.

SHEET TITLE:  
ABOVE GROUND  
SITE PLAN

SHEET NUMBER:

ES-101

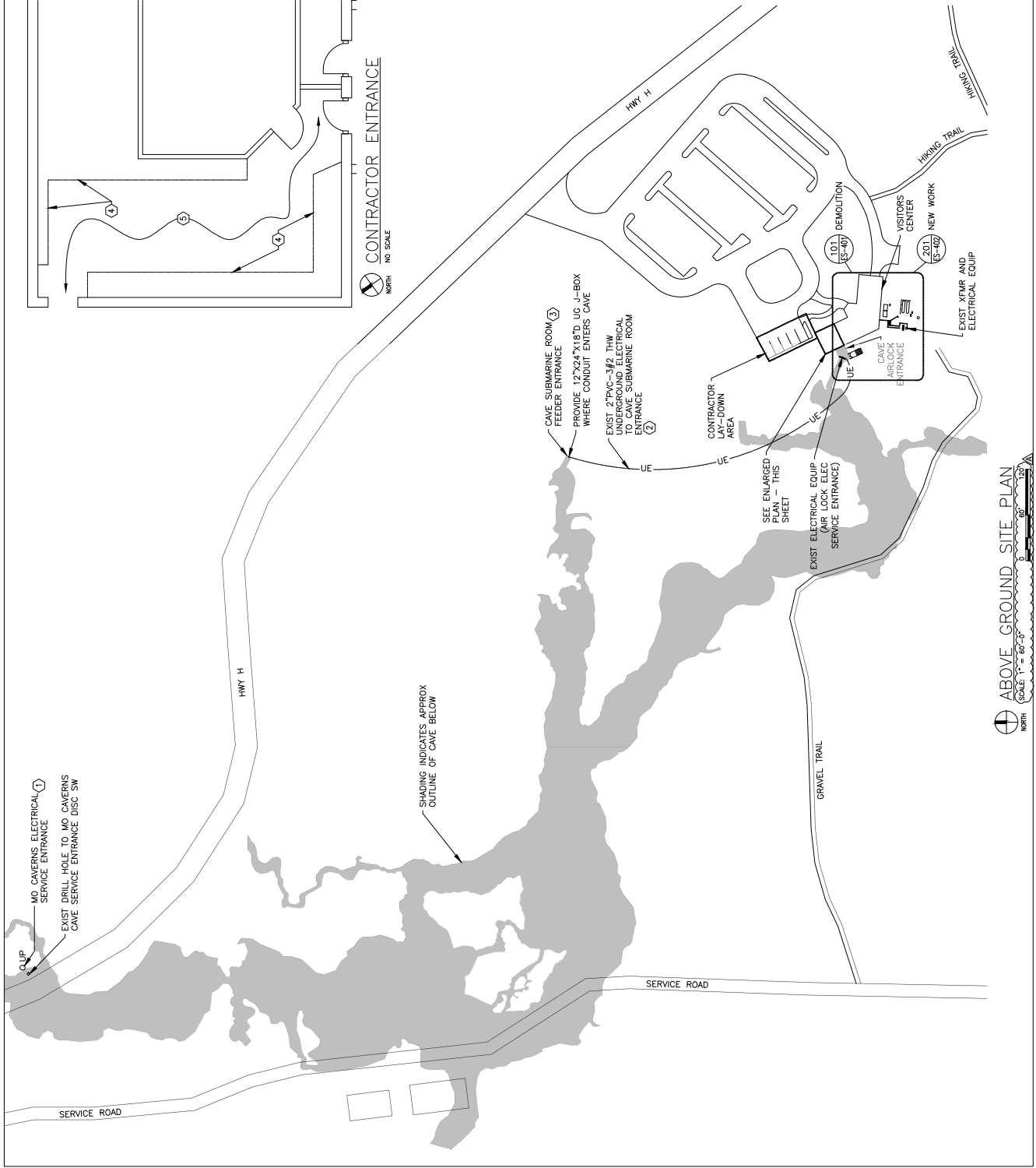
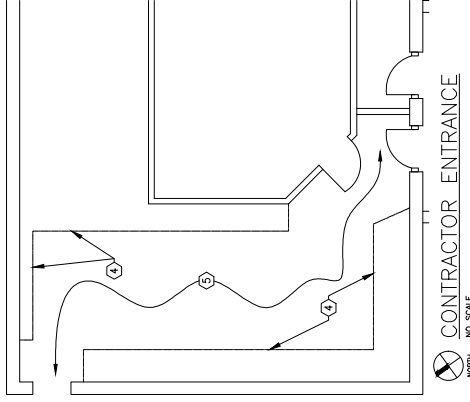
06 OF 50 SHEETS  
JUNE 23, 2023

GENERAL NOTE:

- A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.

KEY NOTES:

1. 3"GRG-3/0 AL TRIPLEX & (1) 3PR CABLE. REMOVE 3/0 AL TRIPLEX FROM SE DISC SW ON POLE TO DISC SW INSIDE CAVE. 3PR TELEPHONE CABLE TO REMAIN. SEE DWG ED-112.
2. REPLACE EXIST CONDUCTORS WITH NEW CONDUIT.
3. CONTRACTOR SHALL PUMP WATER OUT OF SUBMARINE RM. WHEN TEMP OUTSIDE CAVE IS  $\geq 40^{\circ}F$ . TO ALLOW ACCESS FOR REMOVAL OF EXIST CONDUCTORS AND INSTALLATION OF NEW PVC CABLE. SEE DWGS ED-113 & E-113.
4. PROVIDE 8' HIGH TEMP PLYWOOD WALLS TO PROTECT BLDG WALLS AND DISPLAY CASES.
5. PROVIDE PLYWOOD ON FLOOR TO PROTECT FLOOR TILES.









Barry D. FREINER  
Registered Professional Engineer  
License No. 12-31-2024

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DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
URGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
DATE: \_\_\_\_\_  
ISSUE DATE: 06-23-2023  
DRAWN BY: KJE  
CHECKED BY: BDE  
DESIGNED BY: BDE

SHEET TITLE:  
CAVE ELECTRICAL  
DEMOLITION PLAN  
- SECTION A

SHEET NUMBER:

ED-101

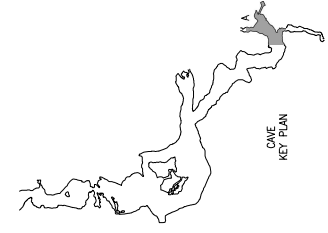
10 OF 50 SHEETS  
JUNE 23, 2023

**GENERAL NOTES:**

- A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
- B. REMOVE ALL EXIST LTG FIXTURES, INCL. SIGNS, UNLESS NOTED OTHERWISE. SEE DWG E-101 FOR NEW LTG FIXTURES.
- C. REMOVE ALL EXPOSED CONDUCTORS & GROUNDING DEVICES INCLUDING THOSE LYING IN POOLS OF WATER AND THE LOST RIVER. BURIED WIRING SHALL BE CUT OFF 6" BG AND ABANDONED IN PLACE.
- D. REMOVE ALL EXIST LIGHT SHIELDS SUBJECT TO APPROVAL BY PARK NATURALIST.

**KEY NOTES:**

1. SERVED FROM AIRLOCK ELECTRICAL SERVICE. SEE DWG ES-101.
2. REMOVE EXIST PNLBD, RELAY PNL AND ALL ASSOC PWR BRANCH CKT AND CNTRL CONDUITS AND CONDUCTORS. SEE DWG E-101 FOR NEW PNLBD LOCATION.
3. REMOVE EXIST BATTERY POWERED EMER LTG UNIT, INCL ASSOC SUPPORT POST, CONDUIT, WIRING AND FUSED DISC SW AT SOURCE PNLBD.
4. EXIST ITEM(S) TO BE REMOVED.
5. REMOVE CONDUCTORS FROM EXIST CONDUIT. CONDUIT TO REMAIN.



CAVE ELECTRICAL DEMOLITION PLAN - SECTION A  
SCALE: 1/4"=1'-0"  
NORTH

MATCH LINE  
SEE DWG ED-102

MATCH LINE  
SEE DWG ED-103



Barry D. FREINER  
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Expires 12-31-2024

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DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:	DATE:	BY:
REVISION:	DATE:	BY:
REVISION:	DATE:	BY:
ISSUE DATE:	06-23-2023	
DRAWN BY:	K. J. LAMAS	
CHECKED BY:	B. D. F.	
DESIGNED BY:	B. D. F.	

SHEET TITLE:  
ONE-LINE  
DIAGRAMS (EXIST  
CONDITION)

SHEET NUMBER:

ED-601

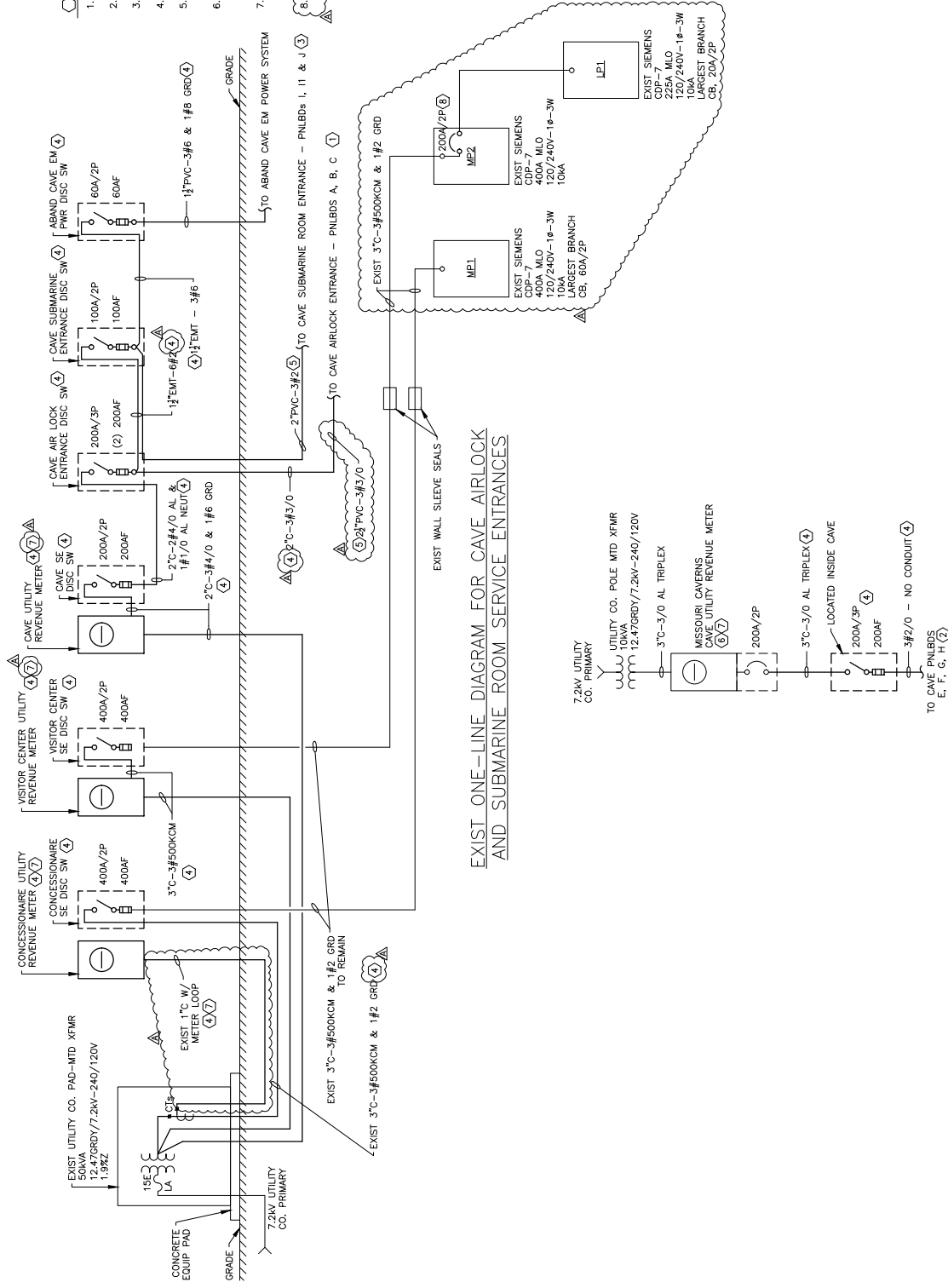
23 OF 50 SHEETS  
JUNE 23, 2023

GENERAL NOTE:

- A. ALL CONDUCTORS ARE STRO. CU UNLESS NOTED OTHERWISE.

KEY NOTES:

1. SEE DWG ED-602 FOR CONTINUATION.
2. SEE DWG ED-603 FOR CONTINUATION.
3. SEE DWG ED-604 FOR CONTINUATION.
4. EXIST ITEM(S) TO BE REMOVED.
5. REMOVE EXIST CONDUCTORS. CONDUIT TO REMAIN.
6. CRAWFORD ELECTRIC TO DISC. SERVICE ON POLE, REMOVE METER AND INSTALL BLANK OFF AT METER OPENING.
7. COORDINATE THIS WORK WITH MURTERS SEE CHANGES TO ELECTRICAL ENGINEERING MGR. AT 573-732-4415 x160.
8. REMOVE EXIST CB AND RETURN TO CONSTRUCTION REPRESENTATIVE.



EXIST ONE-LINE DIAGRAM FOR CAVE AIRLOCK AND SUBMARINE ROOM SERVICE ENTRANCES

EXIST ONE-LINE DIAGRAM FOR MISSOURI CAVERNS CAVE SERVICE ENTRANCE













BARRY D. FREIMER  
Registered Professional Engineer  
Expires 12-31-2024

**ROGERS-SCHMIDT  
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ST. LOUIS, MO 63106  
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OF AUTHORITY #004408

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DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
DATE:  
REVISION:  
DATE:  
REVISION:  
DATE:  
ISSUE DATE: 06-23-2023  
DRAWN BY: BDF  
CHECKED BY: BDF  
DESIGNED BY: BDF

SHEET TITLE:  
CAVE ELECTRICAL  
PLAN - SECTION F

SHEET NUMBER:

**E-106**

32 OF 50 SHEETS  
JUNE 23, 2023

**GENERAL NOTES:**

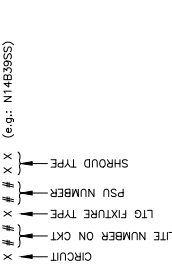
- FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
- PROVIDE NEW LTG FIXTURES PER THE NEW LIGHTING FIXTURE SCHEDULE ON DWG E-605 AND SPECIFICATION SECTION 265613.
- PROVIDE NEW PSU'S PER THE SCHEDULE ON DWGS E-606 & E-607 AND SPECIFICATION SECTION 265613.
- PROVIDE NEW LTG CNTRL STATIONS PER SPECIFICATION SECTION 265613 AND SPECIFICATION SECTION 265943.2.3.
- PLACE PSU'S AND LTG FIXTURES AS SHOWN BUT DO NOT REMOVE ANY EXCESS CABLE FROM LTG FIXTURES. CAVE LTG DESIGNER SHALL ESTABLISH FINAL DIMENSIONS AND PROVIDE DIMING PRIOR TO CONSTRUCTION. ALL DIMENSIONS AND LOCATION(S) HAVE BEEN APPROVED. ROUTE CABLES FROM FIXTURES TO PSU'S IN AS CONCEALABLE A PATH AS POSSIBLE. EXCESS CABLE IN AN UNDESIRABLE LOCATION DO NOT CUT FACTORY CABLE ON LTG FIXTURES.

120VAC (NEUT CABLES FOR PSU'S & DRIVERS LONGER THAN 200' SHALL BE 10AWG.

**KEY NOTES:**

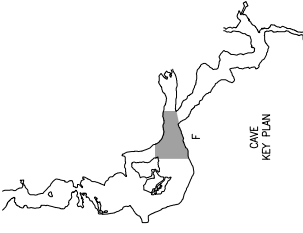
- SERVED FROM SUBMARINE ROOM FEEDER. SEE DWGS E3-101 & E-603.
- PROVIDE NEW PILED PER SPECIFICATION W/ LTG CNTRLS IN COMMON SS ENCL.
- MOUNT LTG FIXTURE TO CONC PAVR PER DETAIL 105/E-501.
- SEE TELEPHONE CABLE TO UNDERSIDE OF ELEVATED WALKWAY WITH SS BRDLE RINGS.
- ON DWG T-601.
- MOUNT PSU TO CMU WALL.

**LTG FIXTURE NAMING:**



**SHROUD TYPES:**

- S = SNOOT
- SS = SHORT SHROUD
- LS = LONG SHROUD



CAVE ELECTRICAL PLAN - SECTION F  
SCALE: 1/4"=1'-0"  
NORTH



Barry D. FREIMER  
Registered Professional Engineer  
Expires 12-31-2024

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DIVISION OF STATE PARKS  
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ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REVISION:  
DATE:  
DATE:  
REVISION:  
DATE:  
ISSUE DATE: 06-23-2023  
DRAWN BY: J. B. F.  
CHECKED BY: B. D. F.  
DESIGNED BY: J. B. F.

SHEET TITLE:  
CAVE ELECTRICAL  
PLAN - SECTION G

SHEET NUMBER:

E-107

33 OF 50 SHEETS  
JUNE 23, 2023

**GENERAL NOTES:**

- A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
- B. PROVIDE NEW LTG FIXTURES PER THE NEW LIGHTING FIXTURE SCHEDULE ON DWG E-605 AND SPECIFICATION SECTION 265313.
- C. PROVIDE NEW PSU'S PER THE SCHEDULE ON DWGS E-606 & E-607 AND SPECIFICATION SECTION 265613.
- D. PLACE PSU'S AND LTG FIXTURES AS SHOWN BUT DO NOT RELOCATE OR REMOVE ANY EXISTING FIXTURES UNLESS THE DESIGNER SHALL ESTABLISH FINAL PLACEMENTS AND FIXTURE AMING PRIOR TO SUBSTANTIAL COMPLETION. ROUTE CABLES FROM FIXTURES TO PSU'S IN AS CONCEALABLE A MANNER AS POSSIBLE. EXCESS CABLE SHALL BE CONCEALED IN CONCEALABLE LOCATION. DO NOT CUT FACTORY CABLE ON LTG FIXTURES.

**KEY NOTES:**

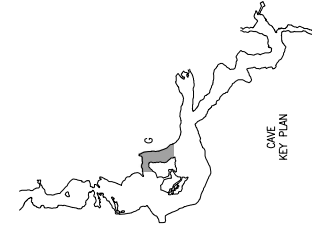
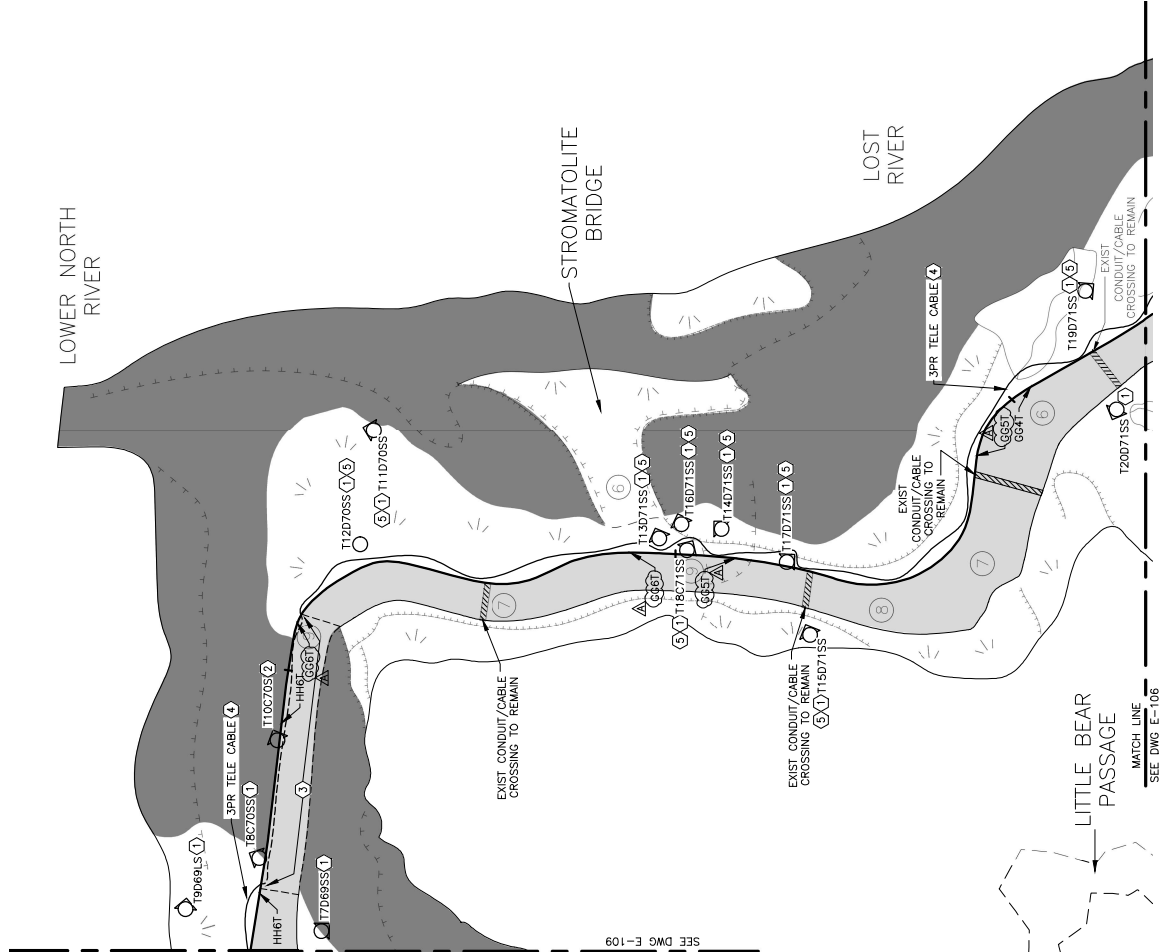
1. MOUNT LTG FIXTURE TO CONC PAVR PER DETAIL 105/E-501.
2. MOUNT LTG FIXTURE TO BRIDGE USING LUMINAIRE INSULATOR PER SPECIFICATION SECTION 265613.
3. SECURE TELEPHONE CABLE TO UNDERSIDE OF ELEVATED WALKWAY WITH SS BRIDLE RINGS.
4. SEE EVER TELEPHONE ONE-LINE DIAGRAM ON DWG E-501.
5. PROVIDE POLYCARBONATE OR FIBERGLASS 4"x4"x4" IP68 SPLICE BOX W/ 5/8"Ø CABLE TO EXTEND FACTORY LTG CABLE TO PSU.

**LTG\_FIXTURE NAMING:**

X # # # X # # # X X X (e.g.: N14839SS)  
CIRCUIT  
LTG NUMBER ON CRT  
LTG FIXTURE TYPE  
PSU NUMBER  
SHROUD TYPE

**SHROUD TYPES:**

S = SNOOT SHROUD  
SS = SHIRT SHROUD  
LS = LONG SHROUD



CAVE ELECTRICAL PLAN - SECTION G  
SCALE: 1"=1'-0"  
NORTH



BARRY D. FREINER  
Registered Professional Engineer  
License No. 12-31-2024

ROGERS-SCHMIDT  
ENGINEERING CO., P.C.  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #004408

OFFICE OF ADMINISTRATION  
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MANAGEMENT,  
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DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
URGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

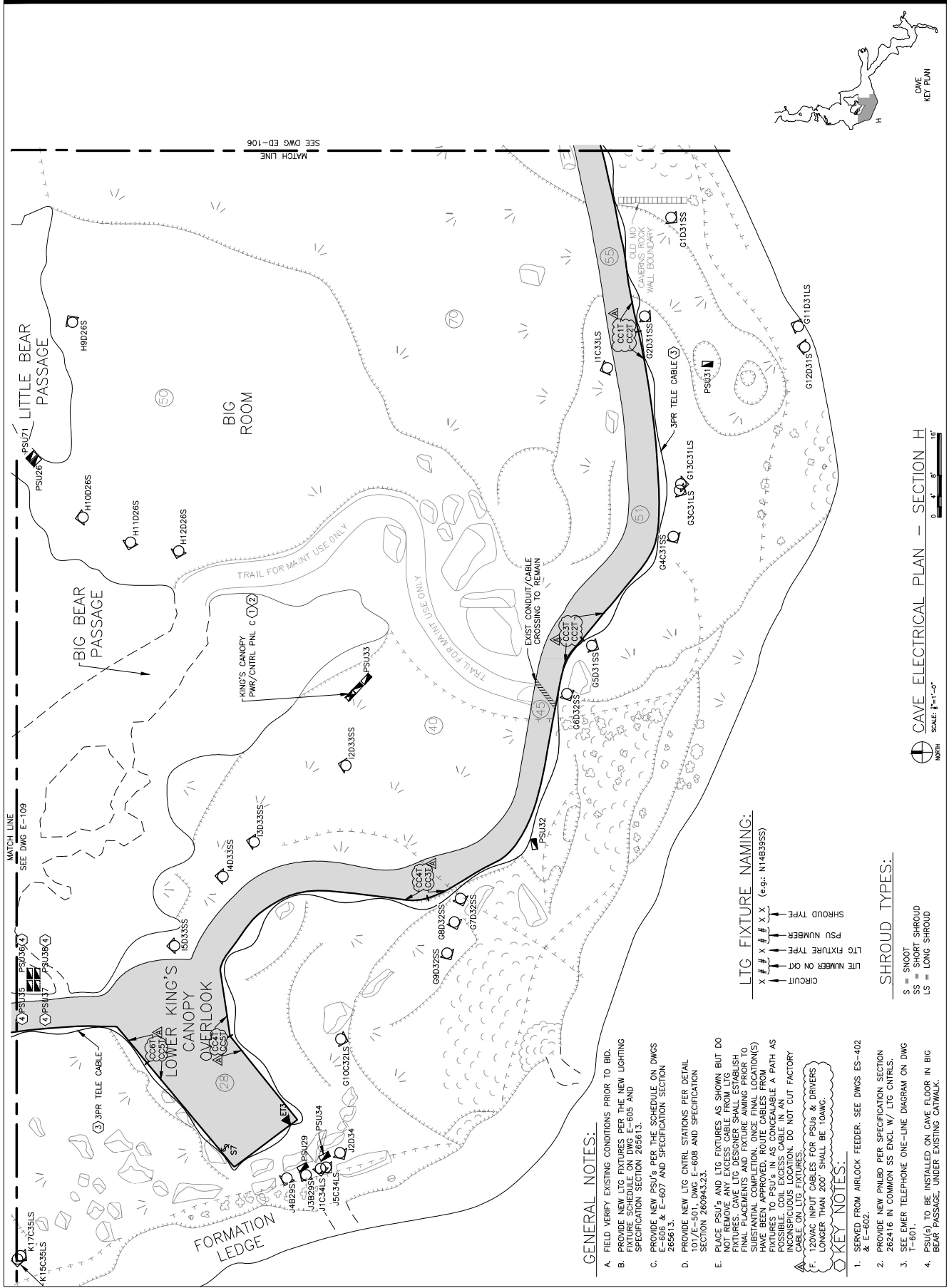
REVISION:  
REASON:  
DATE:  
DRAWN BY:  
CHECKED BY:  
DESIGNED BY:

SHEET TITLE:  
CAVE ELECTRICAL  
PLAN - SECTION H

SHEET NUMBER:

E-108

34 OF 50 SHEETS  
JUNE 23, 2023



**LTG FIXTURE NAMING:**  
X # # X # # X X (e.g.: N1#B395S)

SHROUD TYPE  
PSU NUMBER  
LTG FIXTURE TYPE  
LITE NUMBER ON KIT  
CIRCUIT

**SHROUD TYPES:**  
S = SNOOT  
SS = SHORT SHROUD  
LS = LONG SHROUD

**GENERAL NOTES:**

- A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
- B. PROVIDE NEW LTG FIXTURES PER THE NEW LIGHTING FIXTURE SCHEDULE ON DWG E-605 AND SPECIFICATION SECTION 26561.3.
- C. PROVIDE NEW PSU'S PER THE SCHEDULE ON DWGS E-605 & E-607 AND SPECIFICATION SECTION 26561.3.
- D. PROVIDE NEW LTG CNTRL STATIONS PER DETAIL SECTION 26094.3.2.3.
- E. PLACE PSU'S AND LTG FIXTURES AS SHOWN BUT DO NOT REMOVE ANY EXCESS CABLE FROM LTG FIXTURES. FINISH PLACEMENTS AND FIXTURE NAMING PRIOR TO SUBSTANTIAL COMPLETION. ONCE FINAL LOCATION(S) HAVE BEEN APPROVED, ROUTE CABLES FROM FIXTURES TO PSU'S IN AS CONCEALABLE A PATH AS POSSIBLE. ALL CABLES SHALL BE IN THE SAME INCONSISTENT LOCATION. DO NOT CUT FACTORY CABLE ON LTG FIXTURES.
- F. 120VAC INPUT CABLES FOR PSU'S & DRIVERS LONGER THAN 200' SHALL BE 10AWG.

**KEY NOTES:**

1. SERVED FROM AIRLOOK FEEDER. SEE DWGS ES-402 & E-602.
2. PROVIDE NEW PNLBD PER SPECIFICATION SECTION 26241.6 IN COMMON SS ENCL W/ LTG CNTRLS.
3. SEE ENER TELEPHONE ONE-LINE DIAGRAM ON DWG T-601.
4. PSU(S) TO BE INSTALLED ON CAVE FLOOR IN BIG BEAR PASSAGE, UNDER EXISTING CATWALK.

CAVE ELECTRICAL PLAN - SECTION H  
SCALE: 1"=10'  
NORTH





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DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2121-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REVISION:  
DATE:  
REVISION:  
DATE:  
ISSUE DATE: 06-23-2023  
DRAWN BY: KLF  
CHECKED BY: BDF  
DESIGNED BY: BDF

SHEET TITLE:  
CAVE ELECTRICAL  
PLAN - SECTION I

SHEET NUMBER:  
E-109

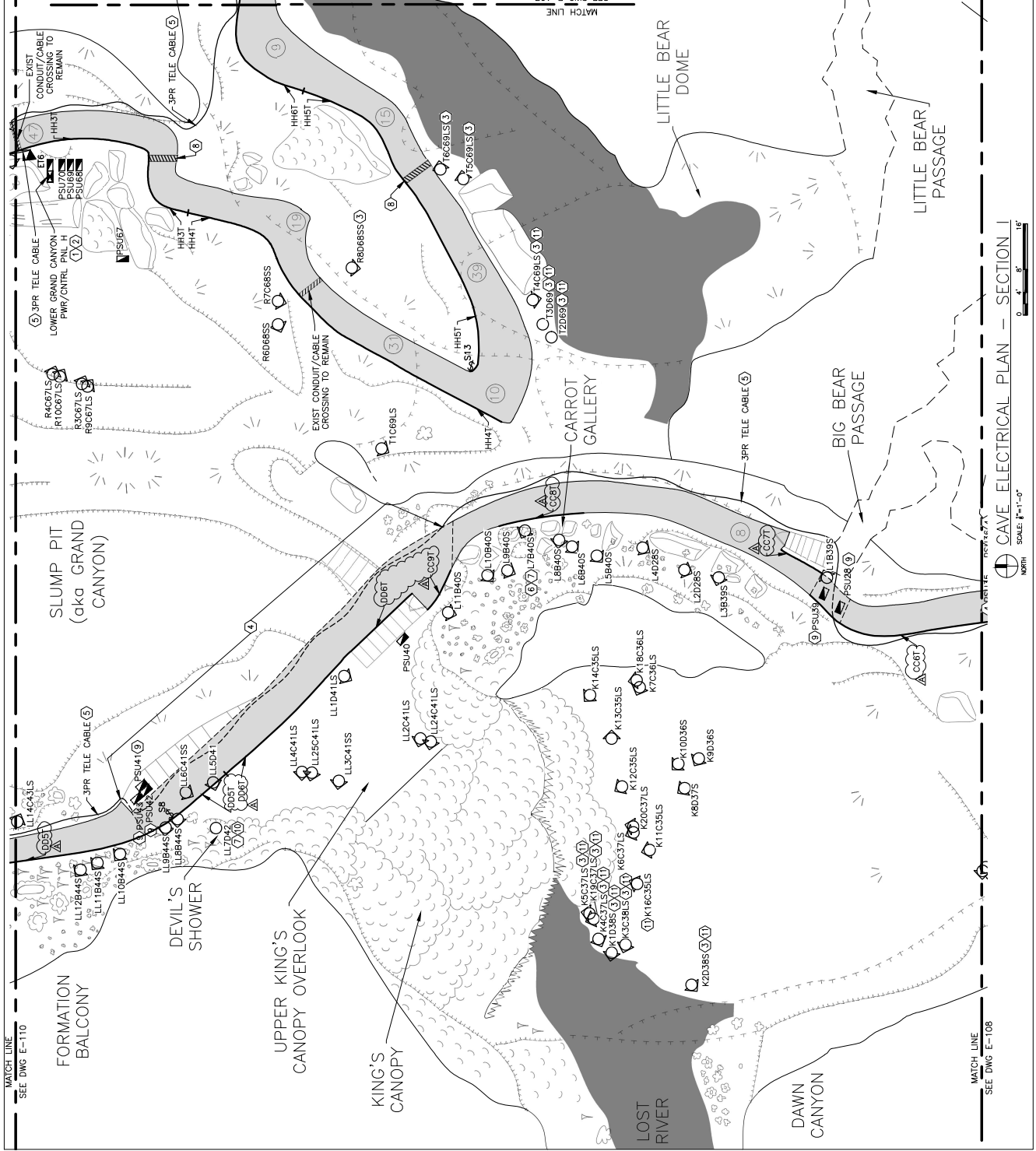
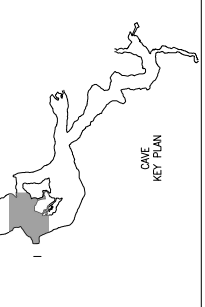
35 OF 50 SHEETS  
JUNE 23, 2023

- GENERAL NOTES:**
- FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID.
  - PROVIDE NEW LTG FIXTURES PER THE NEW SPECIFICATION SECTION 265613 AND SPECIFICATION SECTION 265613.
  - PROVIDE NEW PSU'S PER THE SCHEDULE ON SECTION 265613, E-608 & E-607 AND SPECIFICATION SECTION 265613.
  - PROVIDE NEW LTG CNTRL STATIONS PER DETAIL SECTION 260943.23.
  - PLACE PSUs AND LTG FIXTURES AS SHOWN BUT DO NOT REMOVE ANY EXCESS CABLE FROM LTG FIXTURES. CAVE LTG DESIGNER SHALL ESTABLISH THE PATH OF EXCESS CABLE PRIOR TO SUBSTANTIAL COMPLETION. EXCESS CABLES FROM FIXTURES TO PSUs IN AS CONCEALABLE A PATH AS POSSIBLE. COIL EXCESS CABLE TO FIT INTO THE CONDUIT. DO NOT CUT FACTORY CABLE ON LTG FIXTURES. LONGER THAN 200' SHALL BE 10AWG.

- KEY NOTES:**
- SERVED FROM SUBMARINE ROOM FEEDER. SEE DWGS ES-402 & E-603.
  - PROVIDE NEW PNLBD PER SPECIFICATION SECTION 262416 IN COMMON SS ENCL W/ LTG CNTRLS.
  - MOUNT LTG FIXTURE TO CONC PAVER PER DETAIL 105/E-501.
  - SECURE TELEPHONE CABLE TO UNDERSIDE OF ELEVATED WALKWAY WITH SS BRIDLE RINGS.
  - SEE EMER TELEPHONE ONE-LINE DIAGRAM ON DWG T-601.
  - LTG FIXTURE TO BE INSTALLED AT THE BOTTOM OF THE "RABBIT HOLE" IN THE CARROT GALLERY.
  - COORDINATE WITH PARK NATURALIST FOR ACCESS TO THIS LIGHTING FIXTURE.
  - INSTALL NEW CABLE SLEEVE PER DETAIL 204/E-602.
  - PSU(S) TO BE INSTALLED ON CAVE FLOOR BELOW EXISTING CATWALK.
  - LTG FIXTURE TO BE INSTALLED AT THE BOTTOM OF "DEVIL'S SHOWER."
  - PROVIDE POLYCARBONATE OR FIBERGLASS 4"x4"x4" IP68 SPLICE BOX W/ 5/8" CH 2 CABLE TO EXTEND FACTORY LTG CABLE TO PSU.

- LTG FIXTURE NAMING:**
- X # # # # # X X (e.g.: N14B95S)
- SHROUD TYPE  
PSU NUMBER  
LTG FIXTURE TYPE  
LTG NUMBER ON CRT  
CIRCUIT

- SHROUD TYPES:**
- S = SNOT SHROUD  
LS = LONG SHROUD



MATCH LINE  
SEE DWG E-110

MATCH LINE  
SEE DWG E-108

CAVE ELECTRICAL PLAN - SECTION I  
SCALE: 1"=1'-0"



BARRY D. FREIMER  
Registered Professional Engineer  
Expires 12-31-2024

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CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #004408

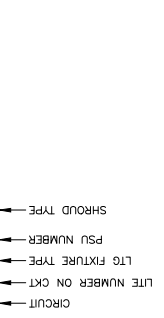
**GENERAL NOTES:**

- BID. VERIFY EXISTING CONDITIONS PRIOR TO.
- PROVIDE NEW LTG FIXTURES PER THE NEW LIGHTING FIXTURE SCHEDULE ON DWG E-605 AND SPECIFICATION SECTION 265613.
- PROVIDE NEW PSU'S PER THE SCHEDULE ON DWGS E-606 & E-607 AND SPECIFICATION SECTION 265613.
- PROVIDE NEW LTG CNTRL STATIONS PER DETAIL 1017E-501. DWG E-608 AND SPECIFICATION SECTION 260943.223.
- PLACE PSU'S AND LTG FIXTURES AS SHOWN ON THIS DRAWING. THE LOCATION OF ALL FROM LTG FIXTURES, CABLE TRAYS, AND SHALL ESTABLISH FINAL PLACEMENTS AND FUTURE AMING PRIOR TO SUBSTANTIAL COMPLETION. ONCE FINAL LOCATION(S) HAVE BEEN ESTABLISHED, THE CONTRACTOR SHALL PROVIDE TO PSU'S IN AS CONCEALABLE A PATH AS POSSIBLE. COIL EXCESS CABLE IN AN INCONSPICUOUS LOCATION. DO NOT CUT FACTORY CABLE ON LTG FIXTURES.
- 120VAC INPUT CABLES FOR PSUs & DRIVERS LONGER THAN 200' SHALL BE 10AWG.

**KEY NOTES:**

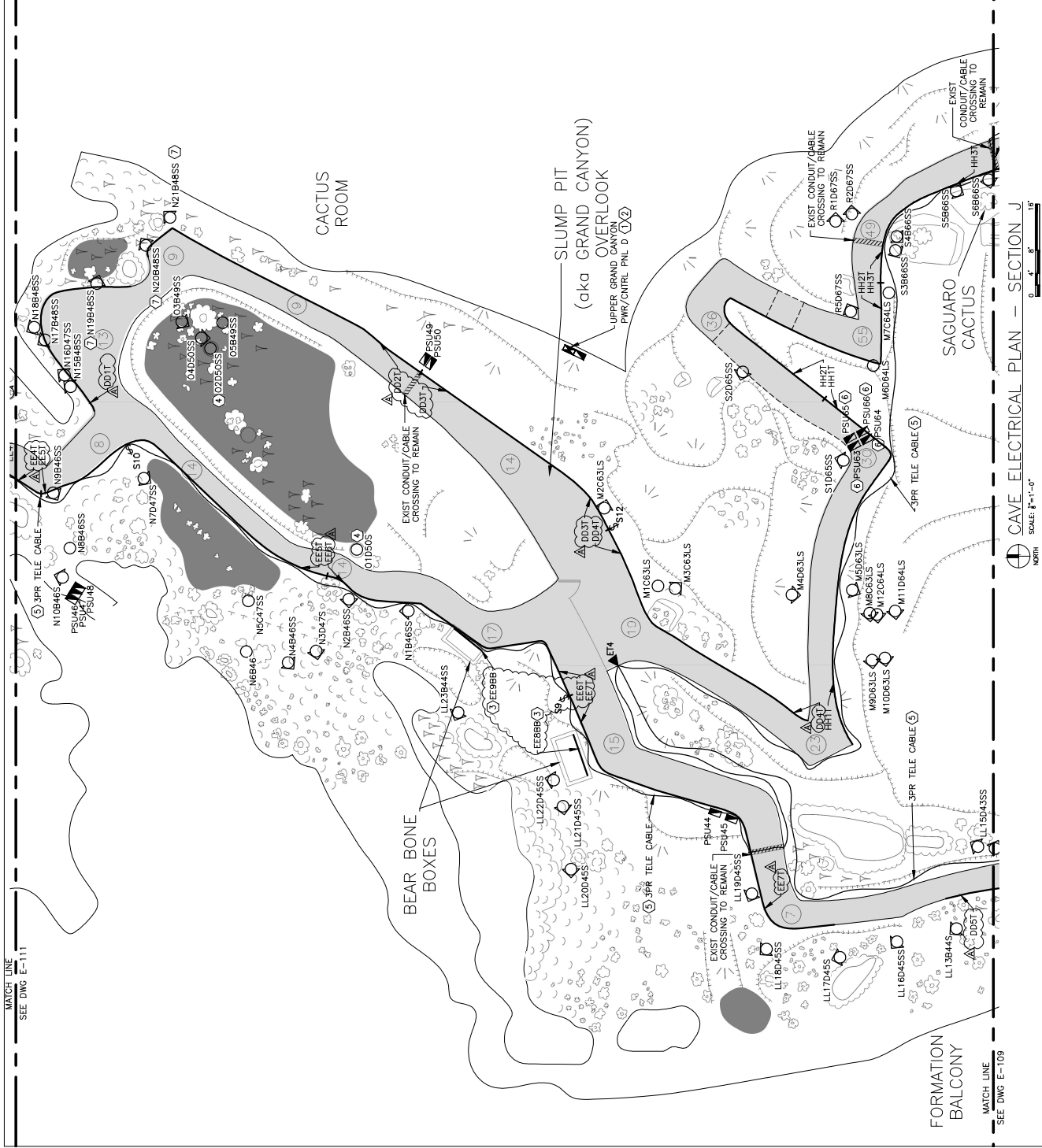
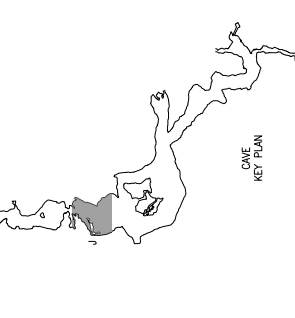
- SERVED FROM AIRLOCK FEEDER. SEE DWGS ES-402 & E-602.
- PROVIDE NEW PNLBD PER SPECIFICATION SECTION 262416 IN COMMON SS ENCL W/ LTG CNTRLS.
- MOUNT TYPE BB LTG FIXTURE TO INSIDE WALL ON CONC BOX AT 10FT.
- INSTALL NEW LTG FIXTURE INSIDE EXIST ROCK LIGHT SHIELD.
- SEE EMER TELEPHONE ONE-LINE DIAGRAM ON DWG E-601.
- BROOD PSU TO CONC WALL UNDER WALKWAY.
- BRIDGE: POLYPROPYLENE OR FIBERGLASS. PROVIDE 1/8" BSS SPRING W/ 1/2" CH212 CABLE TO EXTEND FACTORY LTG CABLE TO PSU.

**LTG FIXTURE NAMING:**



**SHROUD TYPES:**

- S = SNOOT  
 SS = SHORT SHROUD  
 LS = LONG SHROUD



MATCH LINE  
SEE DWG E-111

MATCH LINE  
SEE DWG E-109





Barry D. Freimer  
Registered Professional Engineer  
Expires 12-31-2024

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MISSOURI STATE CERTIFICATE  
OF AUTHORITY #004408

OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
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DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
URGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
DATE:  
DRAWN BY:  
CHECKED BY:  
DESIGNED BY:

ISSUE DATE: 06-23-2023  
DRAWING NUMBER: 2023-01-5015-1  
DRAWN BY: K.E. JAMES  
CHECKED BY: B.D.F.  
DESIGNED BY: B.D.F.

SHEET TITLE:  
ELECTRICAL  
DETAILS

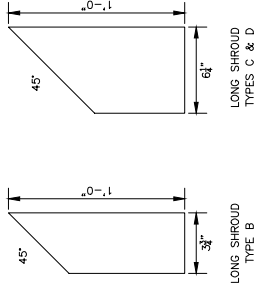
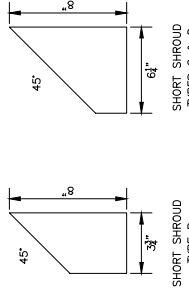
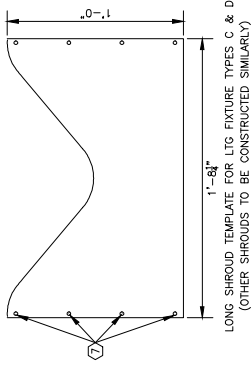
SHEET NUMBER:

E-501

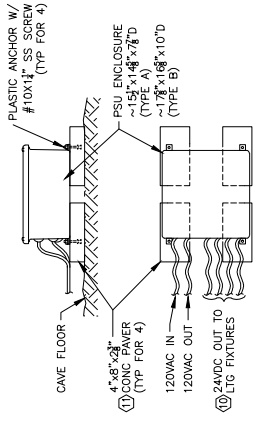
40 OF 50 SHEETS  
JUNE 23, 2023

KEY NOTES:

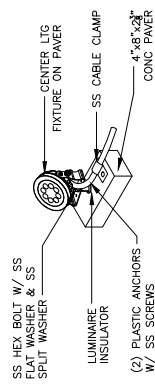
- INSTALL FIXTURES IN MANUFACTURER FURNISHED MTG CHANNEL. ALL LIG FIXTURES TO ILLUMINATE CENTER OF TRAIL AND CLAMP ASSEMBLY TO HORIZONTAL POSITION. USE MANUFACTURER FURNISHED CLAMPS.
- CONSTANT VOLTAGE DRIVER IN NEMA 6P/PIEB NON-METALLIC BOX. CLAMP DRIVER BY INTERNAL 120VAC. USE 1/2" THICK PLASTIC STRIP FOR U-BOLTS & SS MTG HARDWARE. DO NOT DRILL MTG HOLES IN BOX OR GUARDRAIL.
- 120VAC, 12/2 WG PVC JACKETED TYPE MC CABLE.
- USE FACTORY PROVIDED TRIP-OD MOUNTS UNLESS DIMS SPECIFICALLY REFERENCE A MTD DETAIL ON THIS SHEET.
- SS MTG HARDWARE TO BE SIZED AS RECD.
- MATERIAL FOR LIGHT SHROUDS SHALL BE ALUMINUM OR POLYESTER. 1/2" THICK SHROUDS MOUNT INSIDE FACTORY PROVIDED SNOOT.
- HOLES FOR BLACK PLASTIC POP RIVETS.
- DRILL INTO ROCK & SCROUT IN PLACE. SO LIG CNTRL STATION CONDUIT IS PLUMB AND SOLID.
- THIS DETAIL APPLIES UNLESS PSU IS SHOWN TO BE MTD OTHERWISE ON THE ELEC PLANS.
10. 1 TO 4 CABLES FOR TYPE A PSU. 5 TO 8 CABLES FOR TYPE B PSU.
11. A SINGLE PAPER THAT IS LARGE ENOUGH FOR MTG THE PSU IS ALSO ACCEPTABLE.
12. IF PVC COATED TYPE MC CABLES WILL NOT FIT IN THE CONTROL STATION BOX, NOTIFY THE MANUFACTURER TO PROVIDE AT SINGLE CONDUCTORS TO RUN UP INSIDE OF POST TO PUSH BUTTONS.



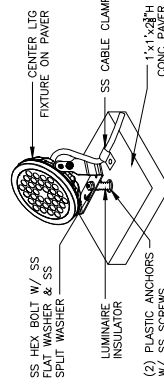
107 (E-501) LIGHT SHROUD DETAIL  
SCALE: 3"=1'-0"



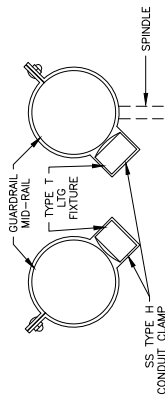
103 (E-501) PSU PAVR MTG DETAIL  
NO SCALE



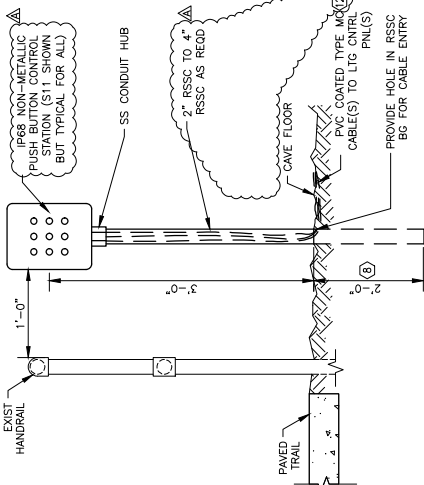
104 (E-501) TYPE B LIG FIXTURE MTG DETAIL - UNSTABLE SURFACE W/ LIMITED SPACE (SHOWN W/O SNOOT OR SHROUD INSTALLED)  
NO SCALE



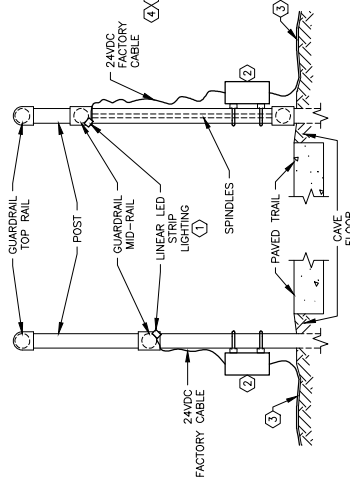
105 (E-501) TYPE C & D LIG FIXTURE MTG DETAIL (SHOWN W/O SNOOT OR SHROUD INSTALLED)  
NO SCALE



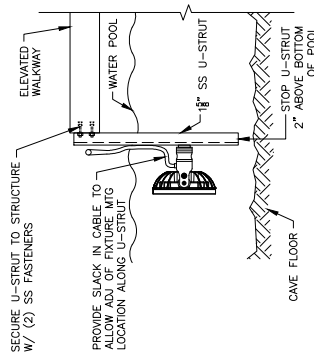
106 (E-501) CAVE TRAIL TYPE I STRIP LIG FIXTURE MTG DETAILS  
NO SCALE



101 (E-501) LIG CNTRL STATION MTG DETAIL  
NO SCALE



102 (E-501) CAVE TRAIL TYPE I STRIP LIG FIXTURE MTG DETAILS  
NO SCALE



108 (E-501) TYPE DS LIG FIXTURE MTG DETAIL  
NO SCALE







Barry D. FREINER  
Registered Professional Engineer  
Expires 12-31-2024

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DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY 11  
LEASBURG, MO 65555

PROJECT # X212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REASON:  
DATE:  
REVISION NO.:

ISSUE DATE: 06-23-2023  
DRAWN BY: J.D.F.  
CHECKED BY: B.D.F.  
DESIGNED BY: J.D.F.

SHEET TITLE:  
NEW PANELBOARD  
SCHEDULES

SHEET NUMBER:

E-604

45 OF 50 SHEETS  
JUNE 23, 2023

GENERAL NOTES:

- A. PROVIDE PNLB0'S PER SPECIFICATION SECTION 262416.
- B. FINAL CIRCUITING OF LIGHTING PSUs AND DRIVES SPECIFIED BY SCHEDULES 260943.22 RELAY BASED LTC CONTROL PNL BUILDER.

NEW PANELBOARD B (CANDLESTICK HILL)

CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT		
			VA	OA	OB					VA	OA	OB						
1	20	1	PSU 14	320	132		1	20	1	PSU 15	320	132		2	20	2		
2	20	1	PSU 14	320	132		3	20	1	PSU 16	320	132		3	20	3		
3	20	1	PSU 14	320	132		4	20	1	PSU 17	320	132		4	20	4		
4	20	1	PSU 14	320	132		5	20	1	PSU 17	320	132		5	20	5		
5	20	1	PSU 14	320	132		6	20	1	PSU 17	320	132		6	20	6		
6	20	1	PSU 14	320	132		7	20	1	PSU 17	320	132		7	20	7		
7	20	1	PSU 14	320	132		8	20	1	PSU 17	320	132		8	20	8		
8	20	1	PSU 14	320	132		9	20	1	PSU 17	320	132		9	20	9		
9	20	1	PSU 14	320	132		10	20	1	PSU 17	320	132		10	20	10		
10	20	1	PSU 14	320	132		11	20	1	PSU 17	320	132		11	20	11		
11	20	1	PSU 14	320	132		12	20	1	PSU 17	320	132		12	20	12		
12	20	1	PSU 14	320	132		13	20	1	PSU 17	320	132		13	20	13		
13	20	1	PSU 14	320	132		14	20	1	PSU 17	320	132		14	20	14		
14	20	1	PSU 14	320	132		15	20	1	PSU 17	320	132		15	20	15		
15	20	1	PSU 14	320	132		16	20	1	PSU 17	320	132		16	20	16		
16	20	1	PSU 14	320	132		17	20	1	PSU 17	320	132		17	20	17		
17	20	1	PSU 14	320	132		18	20	1	PSU 17	320	132		18	20	18		
18	20	1	PSU 14	320	132		19	20	1	PSU 17	320	132		19	20	19		
19	20	1	PSU 14	320	132		20	20	1	PSU 17	320	132		20	20	20		
			786	303	334					786	303	334						
													TOTAL VOLT-AMPERES =			2281		

60 AMP NGL 120/240/480V 1P/3C 100% W/INT. BUS AND 100A SPIN-TYPE 1 ENCL. SERVED FROM AIR LOCK SERVICE ENTRANCE

NEW PANELBOARD D (UPPER GRAND CANYON)

CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT		
			VA	OA	OB					VA	OA	OB						
1	20	1	PSU 41	320	132		1	20	1	PSU 42	320	132		1	20	1		
2	20	1	PSU 41	320	132		2	20	1	PSU 42	320	132		2	20	2		
3	20	1	PSU 44.45	351	148		3	20	1	PSU 44.47	351	148		3	20	3		
4	20	1	PSU 44.45	351	148		4	20	1	PSU 44.47	351	148		4	20	4		
5	20	1	PSU 44.45	351	148		5	20	1	PSU 44.47	351	148		5	20	5		
6	20	1	PSU 44.45	351	148		6	20	1	PSU 44.47	351	148		6	20	6		
7	20	1	PSU 44.45	351	148		7	20	1	PSU 44.47	351	148		7	20	7		
8	20	1	PSU 44.45	351	148		8	20	1	PSU 44.47	351	148		8	20	8		
9	20	1	PSU 44.45	351	148		9	20	1	PSU 44.47	351	148		9	20	9		
10	20	1	PSU 44.45	351	148		10	20	1	PSU 44.47	351	148		10	20	10		
11	20	1	PSU 44.45	351	148		11	20	1	PSU 44.47	351	148		11	20	11		
12	20	1	PSU 44.45	351	148		12	20	1	PSU 44.47	351	148		12	20	12		
13	20	1	PSU 44.45	351	148		13	20	1	PSU 44.47	351	148		13	20	13		
14	20	1	PSU 44.45	351	148		14	20	1	PSU 44.47	351	148		14	20	14		
15	20	1	PSU 44.45	351	148		15	20	1	PSU 44.47	351	148		15	20	15		
16	20	1	PSU 44.45	351	148		16	20	1	PSU 44.47	351	148		16	20	16		
17	20	1	PSU 44.45	351	148		17	20	1	PSU 44.47	351	148		17	20	17		
18	20	1	PSU 44.45	351	148		18	20	1	PSU 44.47	351	148		18	20	18		
19	20	1	PSU 44.45	351	148		19	20	1	PSU 44.47	351	148		19	20	19		
20	20	1	PSU 44.45	351	148		20	20	1	PSU 44.47	351	148		20	20	20		
			704	471	603					704	471	603						
													TOTAL VOLT-AMPERES =			2396		

60 AMP NGL 120/240/480V 1P/3C 100% W/INT. BUS AND 100A SPIN-TYPE 1 ENCL. SERVED FROM AIR LOCK SERVICE ENTRANCE

NEW PANELBOARD F (SUBMARINE ENTRANCE)

CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT		
			VA	OA	OB					VA	OA	OB						
1	20	1	PSU 19	280	112		1	20	1	PSU 19	280	112		1	20	1		
2	20	1	PSU 19	280	112		2	20	1	PSU 19	280	112		2	20	2		
3	20	1	PSU 19	280	112		3	20	1	PSU 19	280	112		3	20	3		
4	20	1	PSU 19	280	112		4	20	1	PSU 19	280	112		4	20	4		
5	20	1	PSU 19	280	112		5	20	1	PSU 19	280	112		5	20	5		
6	20	1	PSU 19	280	112		6	20	1	PSU 19	280	112		6	20	6		
7	20	1	PSU 19	280	112		7	20	1	PSU 19	280	112		7	20	7		
8	20	1	PSU 19	280	112		8	20	1	PSU 19	280	112		8	20	8		
9	20	1	PSU 19	280	112		9	20	1	PSU 19	280	112		9	20	9		
10	20	1	PSU 19	280	112		10	20	1	PSU 19	280	112		10	20	10		
11	20	1	PSU 19	280	112		11	20	1	PSU 19	280	112		11	20	11		
12	20	1	PSU 19	280	112		12	20	1	PSU 19	280	112		12	20	12		
13	20	1	PSU 19	280	112		13	20	1	PSU 19	280	112		13	20	13		
14	20	1	PSU 19	280	112		14	20	1	PSU 19	280	112		14	20	14		
15	20	1	PSU 19	280	112		15	20	1	PSU 19	280	112		15	20	15		
16	20	1	PSU 19	280	112		16	20	1	PSU 19	280	112		16	20	16		
17	20	1	PSU 19	280	112		17	20	1	PSU 19	280	112		17	20	17		
18	20	1	PSU 19	280	112		18	20	1	PSU 19	280	112		18	20	18		
19	20	1	PSU 19	280	112		19	20	1	PSU 19	280	112		19	20	19		
20	20	1	PSU 19	280	112		20	20	1	PSU 19	280	112		20	20	20		
			826	498	670					826	498	670						
													TOTAL VOLT-AMPERES =			2338		

60 AMP NGL 120/240/480V 1P/3C 100% W/INT. BUS AND 100A SPIN-TYPE 1 ENCL. SERVED FROM SUBMARINE ROOM SERVICE ENTRANCE

NEW PANELBOARD H (LOWER GRAND CANYON)

CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT	VOLT-AMPERES			LOAD	CMT NO	AMPS	CIRCUIT
			VA	OA	OB					VA	OA	OB				
1	20	1	PSU 17	280	112		1	20	1	PSU 17	280	112		1	20	1
2	20	1	PSU 17	280	112		2	20	1	PSU 17	280	112		2	20	2
3	20	1	PSU 17	280	112		3	20	1	PSU 17	280	112		3	20	3
4	20	1	PSU 17	280	112		4	20	1	PSU 17	280	112		4	20	4
5	20	1	PSU 17	280	112		5	20	1	PSU 17	280	112		5	20	5
6	20	1	PSU 17	280	112		6	20	1	PSU 17	280	112		6	20	6
7	20															



BARRY D. FREINER  
Registered Professional Engineer  
Exp. 12-31-2024

ROGERS-SCHMIDT  
ENGINEERING CO., P.C.  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #00408

GENERAL NOTE:

- A. PROVIDE LIG. FIXTURES PER SPECIFICATION SECTIONS 265113 & 265613.

NEW LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER CATALOG NUMBER	TYPE	NO.	WATTS	SPECIFICATIONS	VOLTAGE	FIXTURE WATTAGE	MOUNTING	FINISH	REMARKS
T	TRAIL GUARDRAIL UNDER LIGHTING	DIODE LED W/SS24-2C0A (1000-3A-LENTHIN) W/SS24-2C0A (1000-3A-LENTHIN) NO APPROVED EQUAL	LED	120mm	0.5 WFT	20 LUMENSFT, 3000K CCT, 90 CRI PREMIUM DIFFUSED 40 LMW EFFICACY	24VDC	VARIES BASED ON LENGTH	GUARDRAIL HORIZONTAL TUBE	STAINLESS STEEL OR SILVER	IP68 CONTINUOUSLY SUBMERSIBLE CHANGING W/SS24-2C0A OR SILVER PVC MOUNTING CONSTANT VOLTAGE 100V VLM DRIVER, FIXTURE LENGTHS AS SHOWN FOR EXIST GUARDRAIL CONTRACTOR PRIOR TO ORDERING.
BB	BEAR BONES BOX LINEAR LIGHTING	DIODE LED W/SS24-2C0A (1000-3A-LENTHIN) W/SS24-2C0A (1000-3A-LENTHIN) NO APPROVED EQUAL	LED	72in	1.8 WFT	123 LUMENSFT, 3000K CCT, 90 CRI 68.33 LMW EFFICACY	24VDC	VARIES BASED ON LENGTH	INSIDE WALL OF BEAR BONES CONCRETE BOX	SILVER	IP68 CONTINUOUSLY SUBMERSIBLE PROVIDE W/ SILVER PVC MOUNTING CHANNEL AND W/ 24VDC CONSTANT VOLTAGE 100V VLM DRIVER, FIXTURE LENGTHS TO BE AS SHOWN FOR MOUNTING TO THE CONCRETE WALL ON ONE LONG SIDE INSIDE BOTH EXIST BEAR BONES BOXES.
B	SMALL FLOOD LIGHT 40" X 4.47" BEAM SPREAD	ACCLAIM AQP-211-AHCN NO APPROVED EQUAL	LED	8	1	3000K CCT, 2 80CRI	24VDC	8	YOKES ELECTRICALLY ISOLATED TRIPPOD OR BOLTED TO PAVER OR LUMINAIRE INSULATOR	BLACK	IP68 CONTINUOUSLY SUBMERSIBLE TO 20 FEET PROVIDE W/ YOKES PROVIDE TRIPPOD OR LUMINAIRE INSULATOR, 2 SNOOT, SHORT OR LONG SHROUD WHERE INDICATED ON DWGS. ALL FIXTURE ACCESSORIES TO BE BLACK.
C	LARGE SPOT LIGHT 16" X 16" BEAM SPREAD	ACCLAIM AQP-211-CCCN NO APPROVED EQUAL	LED	36	1	3000K CCT, 2 80CRI	24VDC	36	YOKES ELECTRICALLY ISOLATED TRIPPOD OR BOLTED TO PAVER OR LUMINAIRE INSULATOR	BLACK	IP68 CONTINUOUSLY SUBMERSIBLE TO 20 FEET PROVIDE W/ YOKES PROVIDE TRIPPOD OR LUMINAIRE INSULATOR, 2 SNOOT, SHORT OR LONG SHROUD WHERE INDICATED ON DWGS. ALL FIXTURE ACCESSORIES TO BE BLACK.
D	LARGE FLOOD LIGHT 40" X 4.47" BEAM SPREAD	ACCLAIM AQP-211-CCCN NO APPROVED EQUAL	LED	36	1	3000K CCT, 2 80CRI	24VDC	36	YOKES ELECTRICALLY ISOLATED TRIPPOD OR BOLTED TO PAVER OR LUMINAIRE INSULATOR	BLACK	IP68 CONTINUOUSLY SUBMERSIBLE TO 20 FEET PROVIDE W/ YOKES PROVIDE TRIPPOD OR LUMINAIRE INSULATOR, 2 SNOOT, SHORT OR LONG SHROUD WHERE INDICATED ON DWGS. ALL FIXTURE ACCESSORIES TO BE BLACK.
DS	SUBMERSED LARGE FLOOD LIGHT 40" X 4.47" BEAM SPREAD	ACCLAIM AQP-211-CCCN NO APPROVED EQUAL	LED	36	1	3000K CCT, 2 80CRI	24VDC	36	YOKES BOLTED TO U-STRUT SUBMERGED IN WATER	BLACK	IP68 CONTINUOUSLY SUBMERSIBLE TO 20 FEET PROVIDE W/ YOKES. ALL FIXTURE ACCESSORIES TO BE BLACK. AS INDICATED ON DWGS.
F	ENCLOSED & GASKETED LED	LITHONIX 3000K MMXEL NO. 170, CCT: 3000K, 80 CRI, 8000 LUMENS WITH W/FEEND OR W/FEEND AND WITH FEENDS OR APPROVED EQUAL BY HE WILLIAMS OR COOPER	LED	1	-	2898 LUMENS, 3000K CCT, 80 CRI	120VAC	18	SURFACE CEILING	WHITE	FIBERGLASS HOUSING & ACRYLIC LINEAL FROSTED LENS WITH WATER TIGHT HOUSING AND FEENDS 33 IN TO BRACKETS
G	WET LOCATION CEILING MOUNT	VISION LIGHTING 88806-2 OR APPROVED EQUAL	LED	1	8	8100 LUMENS, 3000K CCT, 80 CRI E26, A19, 800 LUMENS, 80 CRI	120VAC	8	SURFACE CEILING	BLACK	POLYCARBONATE BODY AND POLYCARBONATE FROSTED TUBED DIFFUSER
W	WET LOCATION WALL MOUNT	VISION LIGHTING 88806-2 OR APPROVED EQUAL	LED	1	8	8100 LUMENS, 3000K CCT, 80 CRI E26, A19, 800 LUMENS, 80 CRI	120VAC	8	SURFACE WALL	BLACK	COMPOSITE RESIN HOUSING W/ FROSTED ACRYLIC LENS

LAMP TYPES: LED = LIGHT EMITTING DIODE

- 1. ALL LIGHTING FIXTURES SHALL BE POWERED FROM ACCLAIM ADR157 OR ADR400 REMOTE DIMMABLE POWER SUPPLY UNIT (PSU) MOUNTED IN AN IP68 NON-METALLIC ENCLOSURE BY CONTRACTOR.
- 2. FIXTURE TYPES B, C, D & DS SHALL BE POWERED FROM ACCLAIM ADR157 OR ADR400 REMOTE DIMMABLE POWER SUPPLY UNIT (PSU) MOUNTED IN AN IP68 NON-METALLIC ENCLOSURE BY CONTRACTOR.
- 3. SHROUDS FOR FEATURE LIGHTING FIXTURES ARE TO BE FABRICATED PER THE DETAILS ON DWG E-01. ALL OTHER ITEMS ARE TO BE STANDARD ACCESSORIES PROVIDED BY THE LIGHTING FIXTURE MANUFACTURER.
- 4. ALL FEATURE LIGHTING FIXTURES CALLED OUT TO HAVE EITHER A SHORT OR LONG SHROUD SHALL ALSO BE PROVIDED WITH A FACTORY 2' SNOOT.
- 5. ALL FEATURE LIGHTING FIXTURES CALLED OUT TO HAVE EITHER A SHORT OR LONG SHROUD SHALL ALSO BE PROVIDED WITH A FACTORY 2' SNOOT.
- 6. FIXTURE TYPES BB & T SHALL BE POWERED FROM MODELED TYPE VLM CONSTANT VOLTAGE (NON-DIMMABLE) DRIVER MOUNTED IN AN IP68 NON-METALLIC ENCLOSURE BY CONTRACTOR.

OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2214-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REASON:  
DATE:  
DRAWN BY:  
CHECKED BY:  
DESIGNED BY:

ISSUE DATE: 06-23-2023  
DRAWN BY: K.E. JAMES  
CHECKED BY: B.D.F.  
DESIGNED BY: B.D.F.

SHEET TITLE:  
NEW LIGHTING  
FIXTURE  
SCHEDULE

SHEET NUMBER:

E-605

46 OF 50 SHEETS  
JUNE 23, 2023



**BARRY D. FREIMER**  
Registered Professional Engineer  
Expires 12-31-2024

**ROGERS-SCHMIDT  
ENGINEERING CO., P.C.**  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
TEL: 314.433.8800  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #000408

**GENERAL NOTES:**

- A. PROVIDE PSUs PER SPECIFICATION SECTION 265613.
- B. PSUs THAT POWER FROM 1 TO 4 LTC FIXTURES ARE TYPE A. PSUs THAT POWER FROM 5 TO 8 LTC FIXTURES ARE TYPE B. SPECIFICATION SECTION 265613.

**POWER SUPPLY UNIT SCHEDULE FOR ALL CAVE LIGHTING EXCEPT TRAIL LIGHTS**

PSU #	LTC CKT	# OF LTC FIXTURES	LTC FIXTURE NUMBER AND TYPE										LITE SWITCH #	CONNECTED LOAD (VA)	LOCATION
1	A	8	A 1 B	A 2 B	A 3 B	A 6 B	A 7 B	A 8 B	A 9 B	A 10 B		S1.1, S1.4, S2.1, S4	76	LOCATED IN THE DEVILS BATH TUB. LOCATED AT THE CORNER OF THE TUNNEL ON THE RIGHT-HAND SIDE OF THE TRAIL	
2	B	1	B 3 D									S3.5, S4.1	47		
3	A	6	A 4 B	A 5 B	A 8 B	A 11 B	A 12 B	A 13 B	A 14 B		S1.1, S1.4, S2.1, S4.3	59			
4	B	1	B 4 D								S2.2, S4.1	47			
5	B	1	B 5 B								S2.3, S4.1	15	ON THE RIGHT-HAND SIDE OF THE TRAIL, TUCKED UP AGAINST THE DROP-OFF AT THE TRAIL EDGE		
6	B	1	B 1 B								S2.4, S4.1	15			
7	B	1	B 2 B								S2.5, S4.1	15			
8	B	1	B 6 B								S2.6, S4.1	15			
9	C	1	C 2 D								S3.1, S4.1	47			
10	C	1	C 1 C								S3.2, S4.1	47			
11	C	2	C 3 D	C 4 D							S3.3, S4.1	86	LOCATED ON TOP OF THE TOUCHSTONE BRIDGE		
12	D	8	D 1 D	D 2 D	D 3 C	D 4 D	D 5 D	D 6 D	D 7 D	D 47 D	S4.2, S4.4, S5.1, S5.2	323	LOCATED NEXT TO THE BRIDGE OVER THE LOST RIVER AT TRAIL BEND BEFORE THE DEVILS BATH TUB. LOCATE AS HIGH AS POSSIBLE TO REDUCE FLOOD DEPTH.		
13	D	7	D 8 D	D 9 D	D 10 D	D 11 D	D 12 D	D 13 D	D 18 C		S4.2, S4.4, S5.1, S5.2	283	LOCATED BEHIND THE NEW EMERGENCY TELEPHONE IN SLOT IN THE FLOOR		
14	D	8	D 14 D	D 15 D	D 16 C	D 17 D	D 19 C	D 20 D	D 21 D	D 25 D	S4.2, S4.4, S5.1, S5.2	323	LOCATED BETWEEN THE SOLDIER-SHAPED LEDGES TO THE LEFT OF THE TRAIL, BEFORE THE WOODEN BRIDGE		
15	D	8	D 22 D	D 23 D	D 24 C	D 26 D	D 27 D	D 28 C	D 29 D	D 30 D	S4.2, S4.4, S5.1, S5.2	323	LOCATED TO THE LEFT OF THE TRAIL AT THE CONDUIT CROSSING SOUTH OF THE BREAKDOWN ROOM		
16	D	8	D 31 D	D 32 D	D 33 D	D 34 D	D 35 C	D 36 D	D 37 C	D 38 D	S4.2, S4.4, S5.1, S5.2	323	LOCATED TO THE LEFT OF THE TRAIL TO THE "CANDLESTICK HILL" PAVILION PNL B. NEXT TO PSU20		
17	D	8	D 39 C	D 40 D	D 41 D	D 42 D	D 43 D	D 44 D	D 45 D	D 46 D	S4.2, S4.4, S5.1, S5.2	323	LOCATED ALONG THE TRAIL TO MISSOURI GAVENS ON THE RIGHT-HAND SIDE OF THE TRAIL AT THE TOP OF A CLAY BANK. NEXT TO PSU19		
18	P	1	P 17 B								S15.5, S17.7, S18.8	253	LOCATED NEXT TO THE "SUBMARINE ROOM" PAVILION PNL F IN AN ALCOVE OFF THE TRAIL AT THE TOP OF A CLAY BANK. NEXT TO PSU19		
19	V	7	V 31 C	V 32 D	V 33 D	V 34 C	V 36 D	V 37 D	V 38 D		S15.3, S15.4	163	LOCATED NEXT TO THE "SUBMARINE ROOM" PAVILION PNL F IN AN ALCOVE OFF THE TRAIL AT THE TOP OF A CLAY BANK. NEXT TO PSU19		
20	U	7	U 1 C	U 2 D	U 3 C	U 4 C	U 5 C	U 6 C	U 15 C		S14.2, S14.4, S15.4	283	LOCATED BEHIND THE HEAD KNOCKER ROCK NEXT TO THE "CANDLESTICK HILL" PAVILION PNL B. NEXT TO PSU 17		
21	E	2	E 1 B	E 3 B							S8.1, S7.1	26	LOCATED ON NORTH EDGE OF THE PLATFORM AT THE TWINS SOUTH OF THE TWINS PAVILION PNL G		
22	E	7	E 2 C	E 4 D	E 5 D	E 6 D	E 7 D	E 8 C	E 9 C		S8.1, S7.1	283			
23	E	1	E 11 B								S8.3, S7.1	15			
24	E	1	E 10 C								S8.2, S7.1	47			
25	H	4	H 6 D	H 7 D	H 8 D	H 13 D					S6.7, S7.1, S14.3, S14.5, S15.1	160	LOCATED AT THE ENTRANCE TO LITTLE BEAR PASSAGE, NEXT TO PSU 71		
26	H	4	H 9 D	H 10 D	H 11 D	H 12 D					S8.7, S7.1, S14.3, S14.5, S15.1	160	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSUs 53 THRU 57		
27	Q	1	Q 5 C								S14.2, S17.7, S18.8	47	LOCATED UNDER THE CATWALK AT THE ENTRANCE TO THE GARROT GALLERY, NEAR PSU 39		
28	L	2	L 2 D	L 4 D							S7.7, S8.5	68	LOCATED UNDER THE CATWALK AT THE ENTRANCE TO THE GARROT GALLERY, NEAR PSU 39		
29	J	2	J 3 B	J 4 B							S7.2, S7.3	26	LOCATED AT THE CORNER OF THE TWINS PLATFORM AGAINST THE WALL NEXT TO THE EMERGENCY TELEPHONE		
30	F	8	F 1 D	F 2 D	F 3 C	F 4 D	F 5 D	F 6 D	F 7 D	F 8 C	S8.4, S7.1	323	LOCATED IN THE SHALLOW PIT NEXT TO THE NEW FOSSIL PASSAGE ON THE ROCK OF AGES ROOM, NEXT TO PSUs 53 THRU 57		
31	G	8	G 1 D	G 2 D	G 3 C	G 4 C	G 5 D	G 11 D	G 12 D	G 13 C	S6.5, S7.1	323	LOCATED ON THE FLOOR UNDER THE CEILING LEDGE 10' BELOW THE LEFT SIDE OF THE TRAIL		
32	G	5	G 6 D	G 7 D	G 8 D	G 9 D	G 10 C				S6.5, S7.1	200	LOCATED BY THE MAINTENANCE TRAIL NEXT TO THE NEW "KING'S CANOPY" PAVILION PNL C. AT THE ROCKS AT THE END OF THE KING'S CANOPY OVERLOOK AND THE FORMATION LEDGE, NEXT TO PSU 30		
33	I	5	I 1 C	I 2 D	I 3 D	I 4 D	I 5 D				S6.6, S7.1	200	LOCATED UNDER THE STAIRS AT THE ENTRANCE TO THE GARROT GALLERY, NEAR PSU 28		
34	J	3	J 1 C	J 2 D	J 5 C						S7.2, S7.3	122	LOCATED AT THE BASE OF THE STAIRS AT THE END OF THE GARROT GALLERY GOING DOWN TO THE KING'S CANOPY LANDING		
35	K	7	K 11 C	K 12 C	K 13 C	K 14 C	K 15 C	K 16 C	K 17 C		S7.6, S8.5	283	LOCATED UNDER THE STAIRS AT THE ENTRANCE TO THE GARROT GALLERY, NEAR PSU 28		
36	K	4	K 7 C	K 9 D	K 10 D	K 18 C					S7.5, S8.5	160	LOCATED AT THE BASE OF THE STAIRS AT THE END OF THE GARROT GALLERY GOING DOWN TO THE KING'S CANOPY LANDING		
37	K	6	K 4 C	K 5 C	K 6 C	K 8 C	K 19 C	K 20 C			S7.5, S8.5	241	LOCATED UNDER THE STAIRS AT THE ENTRANCE OF THE FORMATION BALCONY GOING DOWN TO THE KING'S CANOPY LANDING		
38	K	3	K 1 D	K 2 D	K 3 C						S7.4, S8.5	122	LOCATED UNDER THE STAIRS AT THE ENTRANCE OF THE FORMATION BALCONY GOING DOWN TO THE KING'S CANOPY LANDING		
39	L	2	L 1 B	L 3 B							S7.7, S8.5	26	LOCATED IN THE CORNER OF THE TRAIL SOUTH OF BEAR BONE BOXES ON THE LEFT-HAND SIDE OF THE TRAIL NEXT TO A FLOOR LEDGE		
40	L	7	L 5 B	L 6 B	L 7 B	L 8 B	L 9 B	L 10 B	L 11 B		S7.7, S8.5	68	LOCATED IN THE CORNER OF THE TRAIL SOUTH OF BEAR BONE BOXES ON THE LEFT-HAND SIDE OF THE TRAIL NEXT TO A FLOOR LEDGE		
41	LL	8	LL 1 D	LL 2 C	LL 3 C	LL 4 C	LL 5 D	LL 6 C	LL 24 C	LL 25 C	S8.4, S9.1	323	LOCATED UNDER THE STAIRS AT THE ENTRANCE OF THE FORMATION BALCONY GOING DOWN TO THE KING'S CANOPY LANDING		
42	LL	1	LL 7 D								S8.1, S9.1	47			
43	LL	2	LL 14 C	LL 15 D							S8.4, S9.1	68			
44	LL	7	LL 8 B	LL 9 B	LL 10 B	LL 11 B	LL 12 B	LL 13 B	LL 23 B		S8.4, S9.1	68			
45	LL	7	LL 16 D	LL 17 D	LL 18 D	LL 19 D	LL 20 D	LL 21 D	LL 22 D		S8.4, S19.1	283			

NOTE:  
1. MOUNT PSUs AS INDICATED IN THE DETAIL ON THE DWGS IN THE LOCATIONS INDICATED IN THIS SCHEDULE. THE DESIGN INTENT IS THAT THE PSUs BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF SIGHT FROM THE TRAIL TO THE GREATEST EXTENT POSSIBLE.

ONONDAGA CAVE  
STATE PARK  
7556 HWY 11  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION: \_\_\_\_\_  
REVISION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
DRAWN BY: \_\_\_\_\_  
CHECKED BY: \_\_\_\_\_  
DESIGNED BY: \_\_\_\_\_

ISSUE DATE: 06-23-2023

SHEET TITLE:  
NEW LIGHTING  
POWER SUPPLY  
UNIT (PSU)  
SCHEDULE

SHEET NUMBER:  
E-606



Barry D. FREIMER  
Registered Professional Engineer  
Expires 12-31-2024  
**ROGERS-SCHMIDT**  
ENGINEERING CO., P.C.  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
TEL: 314.433.8800  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #004008

**GENERAL NOTES:**  
A. PROVIDE PSUs PER SPECIFICATION SECTION 265613.

**B. PSUs THAT POWER FROM 1 TO 4 LIG FIXTURES ARE TYPE A. PSUs THAT POWER FROM 5 TO 8 LIG FIXTURES ARE TYPE B. ACCLAIM AQUA DRIVER 400. SEE SPECIFICATION SECTION 265613.**

**POWER SUPPLY UNIT SCHEDULE FOR ALL CAVE LIGHTING EXCEPT TRAIL LIGHTS (CONTINUED)**

PSU#	LIG FIXTURES	# OF LIG FIXTURES	LIG FIXTURE NUMBER AND TYPE												LITE SWITCH #	CONNECTED LOAD (VA)	LOCATION			
			N 1 B	N 2 B	N 4 B	N 6 B	N 8 B	N 9 B	N 10 B	N 12 B										
46	N	8																S11.1, S11.16, S11.9, S12.1	76	LOCATED BEHIND THE COLUMN TO THE LEFT OF THE TRAIL BEFORE THE ENTRANCE TO THE ROCK OF AGES ROOM.
47	N	5																S0.3, S11.2, S11.8, S11.9, S12.1	200	LOCATED BEHIND THE COLUMN TO THE LEFT OF THE TRAIL BEFORE THE ENTRANCE TO THE ROCK OF AGES ROOM.
48	N	8																S0.3, S11.7, S11.8, S11.9, S12.1	76	LOCATED TO THE LEFT OF THE TRAIL ON THE EAST SIDE OF THE CACTUS ROOM ON THE FLOOR, NEXT TO THE EXISTING CONDUIT CROSSING.
49	O	2																S10.2, S11.7, S11.8, S11.9, S12.1	26	LOCATED TO THE LEFT OF THE TRAIL ON THE EAST SIDE OF THE CACTUS ROOM ON THE FLOOR, NEXT TO THE EXISTING CONDUIT CROSSING.
50	O	3																S10.2, S11.7, S11.8, S11.9, S12.1	122	LOCATED TO THE LEFT OF THE TRAIL ON THE EAST SIDE OF THE CACTUS ROOM ON THE FLOOR, NEXT TO THE EXISTING CONDUIT CROSSING.
51	P	8																S10.3, S11.7, S11.8, S11.9, S12.1	76	LOCATED NEXT TO THE RIGHT-HAND SIDE OF THE TRAIL JUST AS YOU ENTER THE ROCK OF AGES ROOM.
52	P	8																S10.3, S11.7, S11.8, S11.9, S12.1	323	LOCATED NEXT TO THE RIGHT-HAND SIDE OF THE TRAIL JUST AS YOU ENTER THE ROCK OF AGES ROOM.
53	Q	5																S11.4, S11.7, S11.8	200	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSU 27.
54	Q	1																S11.4, S11.7, S11.8	15	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSU 27.
55	Q	1																S11.2, S11.7, S11.8	15	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSU 27.
56	Q	3																S11.3, S11.7, S11.8	122	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSU 27.
57	Q	3																S11.1, S11.7, S11.8	122	LOCATED ALONG THE LEFT-HAND WALL IN THE LOW SIDE PASSAGE OFF OF THE ROCK OF AGES ROOM, NEXT TO PSU 27.
58	P	5																S11.5, S11.7, S11.8	200	LOCATED ALONG THE TRAIL TO MISSOURI CAVERNS ON THE RIGHT-HAND SIDE OF THE TRAIL, NEXT TO THE EXISTING CONDUIT CROSSING.
59	P	1																S11.6, S11.7, S11.8	15	LOCATED ALONG THE TRAIL TO MISSOURI CAVERNS ON THE RIGHT-HAND SIDE OF THE TRAIL, NEXT TO THE EXISTING CONDUIT CROSSING.
60	P	8																S11.6, S11.7, S11.8, S11.9, S12.1	323	LOCATED ALONG THE TRAIL TO MISSOURI CAVERNS ON THE RIGHT-HAND SIDE OF THE TRAIL, NEXT TO THE EXISTING CONDUIT CROSSING.
61	P	6																S10.3, S11.7, S11.8, S11.9, S12.1	99	LOCATED IN A SMALL DEPRESSION SOIT CAN BE SEEN FROM THE TRAIL 16' FROM THE RIGHT-HAND SIDE OF THE TRAIL AND THE GATE FOR THE MISSOURI CAVERNS TRAIL.
62	P	2																S10.3, S11.7, S11.8, S11.9, S12.1	85	LOCATED IN A SMALL DEPRESSION SOIT CAN BE SEEN FROM THE TRAIL 16' FROM THE RIGHT-HAND SIDE OF THE TRAIL AND THE GATE FOR THE MISSOURI CAVERNS TRAIL.
63	M	8																S0.2, S0.3, S12.2, S13.1	323	LOCATED IN A SMALL DEPRESSION 14' FROM THE RIGHT-HAND SIDE OF THE TRAIL JUST ABOVE THE MISSOURI CAVERNS STREAM, NEXT TO PSU 75.
64	M	4																S0.2, S0.3, S12.2, S13.1	160	LOCATED IN A SMALL DEPRESSION 14' FROM THE RIGHT-HAND SIDE OF THE TRAIL JUST ABOVE THE MISSOURI CAVERNS STREAM, NEXT TO PSU 75.
65	S	2																S12.3, S13.1	86	LOCATED UNDER THE WALKWAY BRIDGE AT THE 2ND PLATFORM IN THE SLUMP PIT.
66	S	4																S12.3, S13.1	43	LOCATED UNDER THE WALKWAY BRIDGE AT THE 2ND PLATFORM IN THE SLUMP PIT.
67	R	7																S12.4, S13.1	283	LOCATED BEHIND THE SAGUARO BLOCK WITH THE SAGUARO STALAGMITE 11' FROM THE RIGHT-HAND SIDE OF THE TRAIL.
68	R	3																S12.4, S13.1	122	LOCATED BEHIND THE SAGUARO BLOCK WITH THE SAGUARO STALAGMITE 11' FROM THE RIGHT-HAND SIDE OF THE TRAIL.
69	T	8																S13.2, S14.1	323	LOCATED NEXT TO THE NEW LOWER GRAND CANYON PAVICONTROL PNL H
70	T	4																S13.2, S14.1	160	LOCATED NEXT TO THE NEW LOWER GRAND CANYON PAVICONTROL PNL H
71	T	4																S13.2, S14.1	323	LOCATED AT THE ENTRANCE TO LITTLE BEAR PASSAGE, NEXT TO PSU 26
72	U	5																S14.2, S14.4, S15.2	200	LOCATED AT THE ENTRANCE TO LITTLE BEAR PASSAGE, NEXT TO PSU 26
73	U	3																S14.2, S14.4, S15.2	36	LOCATED NEAR THE 2ND PLATFORM ON THE QUEEN'S CANDY RAMP
74	H	5																S0.7, S2.1, S14.3, S14.5, S15.1	200	LOCATED NEAR THE 2ND PLATFORM ON THE QUEEN'S CANDY RAMP
75	P	4																S10.3, S11.7, S11.8, S11.9, S12.1	43	LOCATED IN A SMALL DEPRESSION 14' FROM THE RIGHT-HAND SIDE OF THE TRAIL JUST ABOVE THE MISSOURI CAVERNS STREAM, NEXT TO PSUS 60 THRU 62
76	V	8																S15.3, S15.4	323	LOCATED UNDER THE CATWALK BEFORE THE LILY PAD LOOP TRAIL
77	V	8																S15.3, S15.4	323	LOCATED UNDER THE CATWALK BEFORE THE LILY PAD LOOP TRAIL
78	V	6																S15.3, S15.4	59	LOCATED AT THE END OF THE OLD TRAIL BEHIND THE CONE-SHAPED STALAGMITE LOOP TRAIL
79	V	7																S15.3, S15.4	68	LOCATED UNDER THE CATWALK BRIDGE AT THE BEGINNING OF THE LILY PAD LOOP TRAIL
80	V	7																S15.3, S15.4	263	LOCATED UNDER THE CATWALK BRIDGE AT THE BEGINNING OF THE LILY PAD LOOP TRAIL
81	V	5																S15.3, S15.4	50	LOCATED IN A COVE BETWEEN THE COLUMN ON THE RIGHT-HAND SIDE OF THE TRAIL
82	V	8																S15.3, S15.4	323	LOCATED IN A COVE BETWEEN THE COLUMN ON THE RIGHT-HAND SIDE OF THE TRAIL

NOTE:  
1. THE PSUs AS INDICATED IN THE DETAIL ON THE DWGS IN THE LOCATIONS INDICATED IN THIS SCHEDULE. THE DESIGN INTENT IS THAT THE PSUs BE ACCESSIBLE FOR MAINTENANCE BUT OUT OF SIGHT FROM THE TRAIL TO THE GREATEST EXTENT POSSIBLE.

OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
URGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY 11  
LEASBURG, MO 65555

PROJECT # X221-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REVISION:  
DATE:  
DATE:  
REVISION:  
DATE:  
ISSUE DATE: 06-23-2023

SCALE: 1/8" = 1'-0"  
DRAWN BY: BDF  
CHECKED BY: BDF  
DESIGNED BY: BDF

SHEET TITLE:  
NEW LIGHTING  
POWER SUPPLY  
UNIT (PSU)  
SCHEDULE  
SHEET NUMBER:

E-607

48 OF 50 SHEETS  
JUNE 23, 2023



BARRY D. FREINER  
Registered Professional Engineer  
Expires 12-31-2024

**ROGERS-SCHMIDT  
ENGINEERING CO., P.C.**  
CONSULTING ENGINEERS  
1738 WEST PARK CENTER DR.  
SUITE 204  
ST. LOUIS, MO 63106  
TEL: 314.433.8800  
MISSOURI STATE CERTIFICATE  
OF AUTHORITY #000408

OFFICE OF ADMINISTRATION  
DIVISION OF FACILITIES  
MANAGEMENT,  
DESIGN AND CONSTRUCTION  
DEPARTMENT OF  
NATURAL RESOURCES  
DIVISION OF STATE PARKS  
UPGRADE CAVE ELECTRIC

ONONDAGA CAVE  
STATE PARK  
7556 HWY II  
LEASBURG, MO 65555

PROJECT # X2212-01  
SITE # 5215  
ASSET # 7815215013

REVISION:  
REVISION:  
DATE:  
REVISION:  
DATE:  
REVISION:  
DATE:

ISSUE DATE: 06-23-2023  
DRAWN BY: K.F.F.  
CHECKED BY: B.F.F.  
DESIGNED BY: B.F.F.

SHEET TITLE:  
**NEW LIGHTING  
CONTROL STATION  
CONFIGURATIONS**

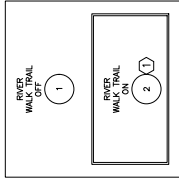
SHEET NUMBER:

**E-608**

49 OF 50 SHEETS  
JUNE 23, 2023

**GENERAL NOTES:**

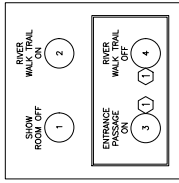
- PROVIDE LITG CNTRL PER SPECIFICATION SECTION 260943.23.
  - PROVIDE LITG CNTRL STATION LABELS PER SPECIFICATION SECTION 260553.
  - LITG CNTRL STATIONS ARE GENERICALLY SHOWN ALL THE SAME SIZE. PROVIDE NEMA TYPE 6P OR IP68 CNTRL STATION WITH THE SAME NUMBER OF PUSH BUTTONS CONTAINED WITHIN.
  - COLOR OF ALL PUSH BUTTONS SHALL BE BLACK UNLESS OTHERWISE NOTED.
- KEY NOTES:**
- YELLOW PUSH BUTTON.
  - RED PUSH BUTTON.



**STATION S5**

LOCATED ON THE TRAIL SOUTH OF QUEEN'S CANOPY

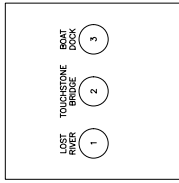
- S5.1: PSUs 12 - 17 OFF  
S5.2: PSUs 12 - 17 ON



**STATION S4**

LOCATED AT NORTH SIDE OF TRAIL LEAVING SHOW ROOM

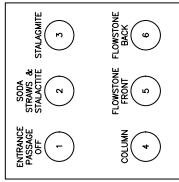
- S4.1: PSUs 2, 4 - 11 OFF  
S4.2: PSUs 12 - 17 ON  
S4.3: PSUs 1, 3 ON  
S4.4: PSUs 12 - 17 OFF



**STATION S3**

LOCATED AT WEST SIDE OF SHOW ROOM PLATFORM UNDER TOUCHSTONE BRIDGE

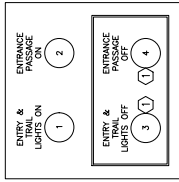
- S3.1: PSU 9 ON  
S3.2: PSU 10 ON  
S3.3: PSU 11 ON



**STATION S2**

LOCATED AT NE CORNER OF THE SHOW ROOM PLATFORM

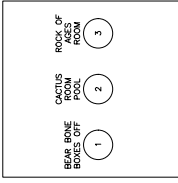
- S2.1: PSU 1, 3 OFF  
S2.2: PSU 4 ON  
S2.3: PSU 5 ON  
S2.4: PSU 6 ON  
S2.5: PSUs 2, 7 ON  
S2.6: PSU 8 ON



**STATION S1**

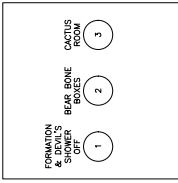
LOCATED ON NORTH WALL OF ARLOCK ENTRANCE TUNNEL

- S1.1: ALL TRAIL LIGHTS AND ENTRY LIGHTS ON  
S1.2: PSUs 1, 3 ON  
S1.3: ALL TRAIL LIGHTS AND ENTRY LIGHTS OFF  
S1.4: PSUs 1, 3 OFF



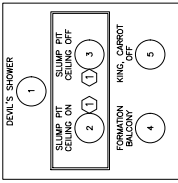
**STATION S10**

LOCATED AT THE NW CORNER OF THE CACTUS ROOM  
S10.1: LIGHTS (OFF & ON) OFF  
S10.2: PSUs 41, 50 ON  
S10.3: PSUs 51, 52, 60 - 62, 75 ON



**STATION S9**

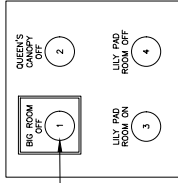
LOCATED BETWEEN THE TWO BEAR BONE BOXES  
S9.1: PSUs 41 - 45 OFF  
S9.2: LIGHTS (OFF & ON) ON  
S9.3: PSUs 46 - 48 ON



**STATION S8**

LOCATED NEXT TO THE DEVIL'S SHOWER ON THE UPPER KING'S CANOPY CATWALK

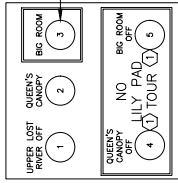
- S8.1: PSU 42 ON  
S8.2: PSUs 63, 64 ON  
S8.3: PSUs 67, 68 ON  
S8.4: PSUs 41, 43 - 45 ON  
S8.5: PSUs 28, 35 - 40 OFF



**STATION S15**

LOCATED ON THE SWITCHBACK TRAIL NORTH OF QUEEN'S CANOPY

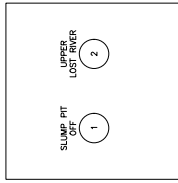
- S15.1: PSUs 25, 26, 74 OFF  
S15.2: PSUs 20, 72, 73 OFF  
S15.3: PSUs 19, 76 - 82 ON  
S15.3: PSUs 19, 76 - 82 OFF



**STATION S14**

LOCATED NEXT TO THE WATER PUMP IN THE BIG ROOM

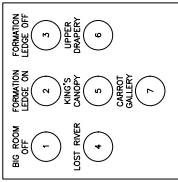
- S14.1: PSUs 69 - 71 ON  
S14.2: PSUs 20, 72, 73 ON  
S14.3: PSUs 25, 26, 74 ON  
S14.4: PSUs 20, 72, 73 OFF  
S14.5: PSUs 25, 26, 74 OFF



**STATION S13**

LOCATED AT THE SWITCHBACK SOUTH OF THE SLUMP PIT

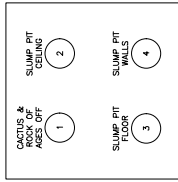
- S13.1: PSUs 63 - 68 OFF  
S13.2: PSUs 69 - 71 ON



**STATION S7**

LOCATED AT SW CORNER OF LOWER KING'S CANOPY OVERLOOK PLATFORM

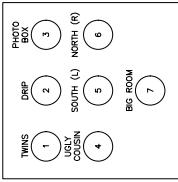
- S7.1: PSUs 21, 26, 30 - 33, 74 OFF  
S7.2: PSU 24 ON  
S7.3: PSUs 29, 34 ON  
S7.4: PSU 38 ON  
S7.5: PSUs 36, 37 ON  
S7.6: PSU 35 ON  
S7.7: PSUs 28, 39, 40 ON



**STATION S12**

LOCATED AT THE SE CORNER OF THE CACTUS ROOM

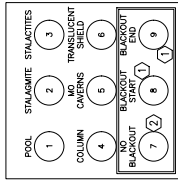
- S12.1: PSUs 46 - 52, 60 - 62, 75 OFF  
S12.2: PSUs 63, 64 ON  
S12.3: PSUs 65, 66 ON  
S12.4: PSUs 67, 68 ON



**STATION S6**

LOCATED AT SE CORNER OF THE TWIN'S PLATFORM

- S6.1: PSUs 21, 22 ON  
S6.2: PSU 24 ON  
S6.3: PSU 23 ON  
S6.4: PSU 30 ON  
S6.5: PSUs 31, 32 ON  
S6.6: PSU 33 ON  
S6.7: PSUs 25, 26, 74 ON



**STATION S11**

LOCATED ON THE NORTH SIDE OF THE ROCK OF AGES ROOM

- S11.1: PSU 57 ON  
S11.2: PSUs 27, 55 ON  
S11.3: PSU 56 ON  
S11.4: PSUs 53, 54 ON  
S11.5: PSUs 18, 58 ON  
S11.6: PSU 59 ON  
S11.7: PSUs 18, 27, 46 - 62, 75 & 76 ON  
S11.8: TRAIL LIGHTS (FEET) - OFF, DO IT!  
S11.9: PSUs 46 - 52, 60 - 62, 75 & 76 ON