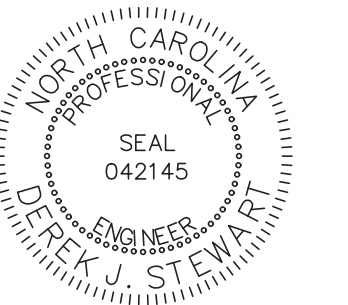


**1** SPEARMAN BUILDING PLAN - ELECTRICAL BASE BID  
E101 SCALE: 1/16" = 1'-0"

- NOTES:
- EXISTING SWITCHGEAR "MDP" TO REMAIN AND BE REUSED. SEE SHEET E201 FOR BASE BID EXISTING AND PROPOSED PANEL SCHEDULES AND RISERS.
  - BASE BID SHALL PROVIDE THE PROPOSED WELDING SUB-PANEL IN FULLY OPERABLE CONDITION WITH 800A MAIN BREAKER INSTALLED AND THE REMAINDER OF THE PANEL AS PREPARED SPACE FOR FUTURE BREAKER INSTALLATION. SEE SHEET E201 FOR FURTHER INFORMATION.
  - ADD-ALTERNATE BID #1 SHALL CONSIST OF THE BASE BID SCOPE PLUS RELOCATING THE EXISTING WELDING ELECTRIC SERVICE FROM THE SWITCHGEAR TO THE PROPOSED WELDING SUB-PANEL. SEE SHEETS E102 & E202 FOR FURTHER INFORMATION.

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derek@simsengineers.com



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by Derek J. Stewart  
Date: 2021.11.12 14:22:08-05'00'

**SPEARMAN BUILDING ELECTRICAL UPGRADES**

BLUE RIDGE COMMUNITY COLLEGE  
FLAT ROCK, NC

DATE: NOVEMBER 12, 2021

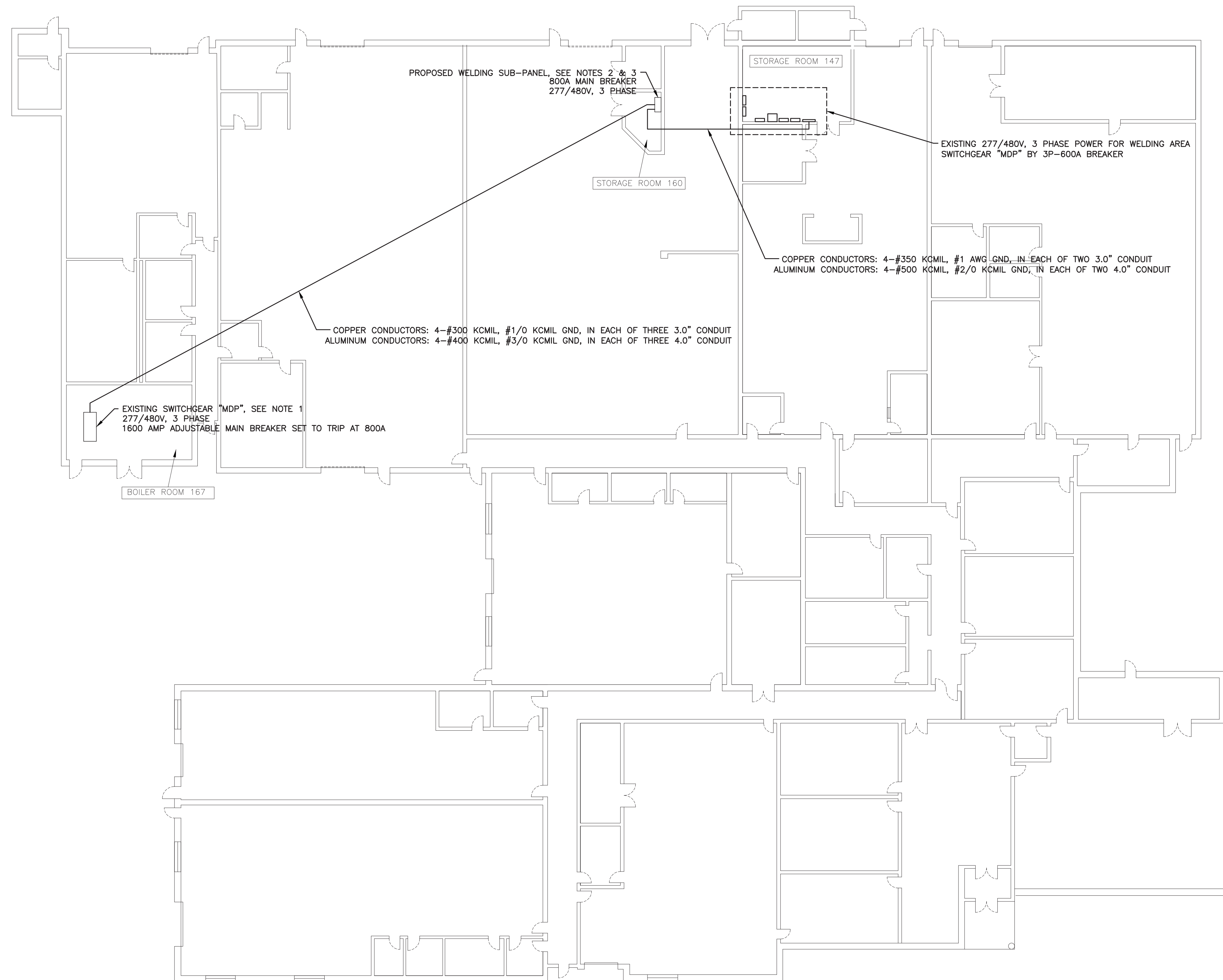
DESIGN BY: DJS

DRAWN BY: RKH

APPROVED BY: DJS

SHEET NUMBER:

**E101**



**1** SPEARMAN BUILDING PLAN - ELECTRICAL ADD-ALTERNATE #1  
E101 SCALE: 1/16" = 1'-0"

- NOTES:
- EXISTING SWITCHGEAR TO REMAIN AND BE REUSED.  
SEE SHEET E202 FOR ADD-ALTERNATE #1 EXISTING AND PROPOSED PANEL SCHEDULES AND RISERS.
  - BASE BID SHALL PROVIDE THE PROPOSED WELDING SUB-PANEL IN FULLY OPERABLE CONDITION WITH 800A MAIN BREAKER INSTALLED AND THE REMAINDER OF THE PANEL AS PREPARED SPACE FOR FUTURE BREAKER INSTALLATION.  
SEE SHEETS E101 & E201 FOR FURTHER INFORMATION.
  - ADD-ALTERNATE BID #1 SHALL CONSIST OF THE BASE BID SCOPE PLUS RELOCATING THE EXISTING WELDING ELECTRIC SERVICE FROM THE SWITCHGEAR "MDP" TO THE PROPOSED WELDING SUB-PANEL.  
SEE SHEET E202 FOR FURTHER INFORMATION.

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**SPEARMAN BUILDING ELECTRICAL UPGRADES**

BLUE RIDGE COMMUNITY COLLEGE  
FLAT ROCK, NC

DATE: NOVEMBER 12, 2021

DESIGN BY: DJS

DRAWN BY: RKH

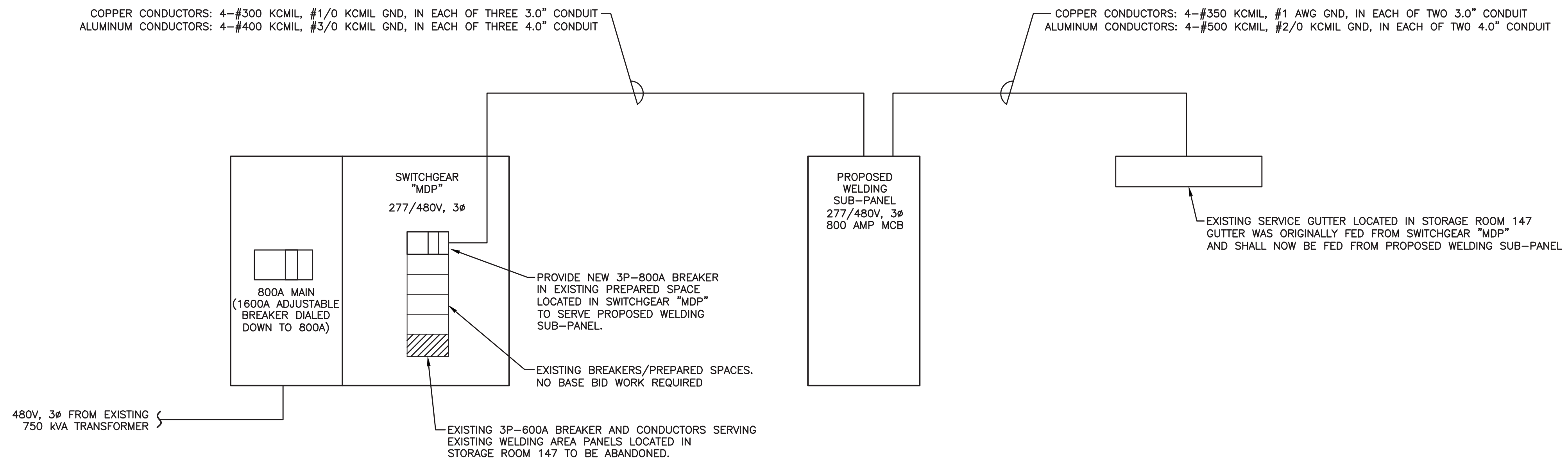
APPROVED BY: DJS

SHEET NUMBER:

**E102**



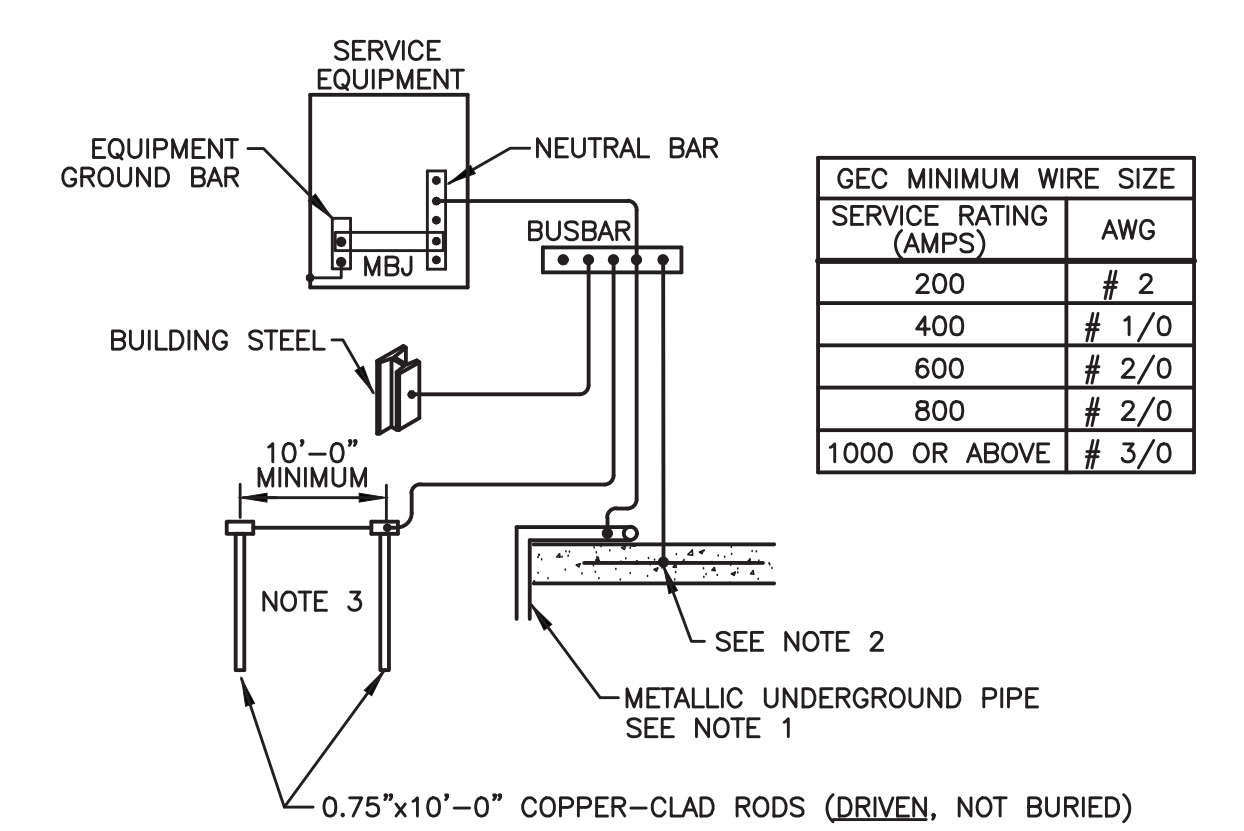




1 PARTIAL POWER RISER DIAGRAM - ADD-ALTERNATE #1  
 E202 NOT TO SCALE

- NOTES:  
 1. GROUNDING ELECTRODE SYSTEM IS EXISTING. SEE 3/E202 FOR ADDITIONAL GROUNDING INFORMATION.

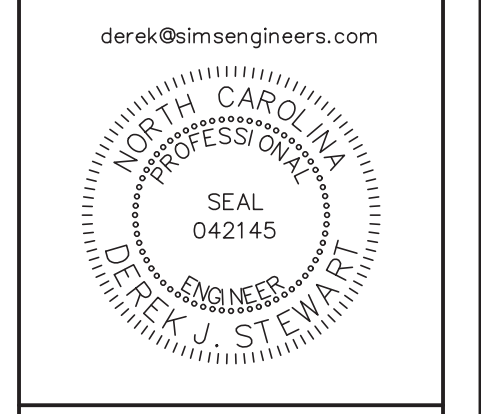
PROPOSED PANEL SCHEDULE										
PANEL DESIGNATION: WELDING SUB-PANEL		LOCATION: SEE PLAN								
VOLTAGE RATING: 480/277		BUS RATING: 800 AMPS		MCB (800A)		PHASE: 3		NO. OF WIRES: 4	NEMA 1 ENCLOSURE	SURFACE MOUNT
TYPE: PRL4	INTERRUPTING RATING: 65,000 AMPS RMS FULLY RATED		SPECIAL FEATURES:				OTHER REQTS: 1. COPPER BUS, 2. BOLT-ON C/B.			
LOAD	CB	PHASE A VA	PHASE B VA	PHASE C VA	CB	LOAD	CB	PHASE A VA	PHASE B VA	PHASE C VA
PREPARED SPACE	-	-	-	-	-	EXISTING WELDING AREA	-	-	-	-
PREPARED SPACE	-	-	-	-	3P 600A	COPPER CONDUCTORS: 4-#350 KCMIL, #1 AWG GND, IN EACH OF TWO 3.0" CONDUIT	-	-	-	-
PREPARED SPACE	-	-	-	-	-	ALUMINUM CONDUCTORS: 4-#500 KCMIL, #2/0 KCMIL GND, IN EACH OF TWO 4.0" CONDUIT	-	-	-	-
PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-
PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-
PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-
PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-
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PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-
PREPARED SPACE	-	-	-	-	3P 30A	SPD	-	-	-	-
PREPARED SPACE	-	-	-	-	-	PREPARED SPACE	-	-	-	-



3 GROUNDING ELECTRODE SYSTEM  
 E202 NOT TO SCALE

- NOTES:
- CONNECTIONS TO ELECTRODES SHALL BE BY EXOTHERMIC WELDING WITH THE FOLLOWING EXCEPTIONS:  
 WATER PIPE: BOND WITH BRONZE CLAMP, ILSCO TYPE "GPL" OR EQUIVALENT. INSTALL BONDING JUMPER AT WATER METER.  
 GAS PIPE: GAS PIPE IS NOT AN ELECTRODE; IT IS SHOWN ONLY SO THAT BONDING CAN BE SPECIFIED. BOND WITH BRONZE CLAMP, ILSCO TYPE "GPL" OR EQUIVALENT. MAKE CONNECTION WITH BRONZE CLAMP AT THE POINT WHERE THE PIPE ENTERS THE BUILDING.
  - CONCRETE-ENCASED ELECTRODES (REBAR) SHALL BE LOCATED WITHIN AND NEAR BOTTOM OF CONCRETE FOUNDATION OR FOOTING. ELECTRODES SHALL CONSIST OF AT LEAST 20 FEET OF REBAR OR #2 BARE COPPER (REF 250.52(A)(3)).
  - IF AT LEAST TWO OF BUILDING STEEL, WATER PIPE, AND CONCRETE ENCASED ELECTRODES ARE CONNECTED, THEN GROUND RODS ARE NOT REQUIRED UNLESS NEEDED TO ACHIEVE RESISTANCE TO EARTH LESS THAN 10 OHMS. SEE NOTE 5.
  - AFTER GROUNDING SYSTEM IS INSTALLED, RESISTANCE TO EARTH SHALL BE MEASURED. IF RESISTANCE EXCEEDS 10 OHMS, THEN DRIVE RODS AS NECESSARY TO ACHIEVE THE 10 OHM MAXIMUM.
  - GROUNDING ELECTRODE CONDUCTORS (GEC) SHALL BE COPPER. GEC MINIMUM SIZES ARE SHOWN IN THE TABLE ABOVE.
  - BUSBAR SHALL BE COPPER, HARGER # GBI STYLE OR EQUIVALENT.

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 Date: 2021.11.12 14:24:20-05'00'

**SPEARMAN BUILDING ELECTRICAL UPGRADES**  
 BLUE RIDGE COMMUNITY COLLEGE  
 FLAT ROCK, NC

DATE: NOVEMBER 12, 2021  
 DESIGN BY: DJS  
 DRAWN BY: RKH  
 APPROVED BY: DJS  
 SHEET NUMBER:

ALL WORK ON THIS SHEET SHALL BE CONSIDERED "ADD-ALTERNATE #1"

**E202**



SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 16 in addition to Division 1 – General Requirements.

1.2 SCOPE OF WORK

- A. Provide electric meter, electric service, power distribution equipment, conductors, luminaires, wiring devices, fire alarm system, and other required materials and labor to produce a complete and operating electrical system. Coordinate service with utility and advise owner of service application procedure. Provide conductors and conduit for all equipment in project. Provide conduit with pull cords for HVAC control circuits.
- B. Obtain all permits, pay all fees, and request inspection from authority having jurisdiction.
- C. All work and materials shall be guaranteed for one year from date of substantial completion.
- D. Provide temporary power during construction.

1.3 WORK SEQUENCE

- A. Coordinate construction and utility outages (if any) with Owner, all other trades, and utility companies. After-hours work may be required to interrupt service.
- B. Notify Engineer of discrepancies in the Contract Documents.
- C. E-Mail questions or comments to derek@simsengineers.com or fax (828-251-1933) in lieu of telephone calls.

1.4 REGULATORY REQUIREMENTS

- A. Conform to applicable State and Local Building Codes.
- B. Fire Alarm: NFPA 72.
- C. Electrical: NFPA 70.
- D. Life Safety Code, NFPA 101.
- E. The Contractor shall install all materials in accordance with State and Local Building Code. Any work that does not comply shall be made to comply at the contractor's expense.
- F. All equipment shall be UL or ETL listed for purpose specified.

1.5 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare record drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding. Submit all changes on Record Documents as a requirement of Project Closeout.
- C. Refer to Architectural Drawings for dimensions, locations, cabinets, etc. Do not scale Electrical Drawings.
- D. Conceal all materials except where the Architect grants specific permission to do otherwise.
- E. Arrange electrical work in a neat, well organized manner. Conduit shall run parallel with primary lines of the building construction.
- F. Locate operating and control equipment with adequate access for operation and maintenance.
- G. Give right-of-way to piping which must slope for drainage.
- H. Advise other trades of openings required in their work for the subsequent move-in of large electrical equipment.
- I. Coordination Drawings: For locations where several elements of electrical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings showing the actual dimensions required for the installation.

1.6 SUBSTITUTIONS:

The purpose of specifying equipment by catalog number is to establish quality standards, not necessarily to limit submittals. Substitutions may be accepted if approved as equivalent. Contact engineer prior to bid with any questions. If substitutes are not submitted within 14 days after the bid is accepted, then the equipment shall be provided as specified. Contractor submitting substitutions shall be responsible for any additional cost resulting from the substitution.

1.7 EXCAVATING FOR ELECTRICAL WORK

- A. General: The work of this article is defined to include whatever excavating and backfilling is necessary to install the electrical work. The contractor shall coordinate the work with other excavating and backfilling in the same area, including dewatering, floor protection provisions, and other temporary facilities. Coordinate the work with other work in the same area, including other underground services, landscape development, paving, and floor slabs on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling.
- B. General Standards: Except as otherwise indicated, comply with the applicable provisions of the Division 2 sections, for plumbing work excavating and backfilling. Refer instances of uncertain applicability to the Engineer for resolution before proceeding.
- C. Rock Excavation shall be defined as the removal of a formation that cannot be excavated without systematic drilling and blasting or without the use of pneumatic tools. All rock excavation/removal shall be performed by the General Contractor. The Electrical subcontractor shall lay out his work and perform all normal excavation. If rock is encountered, it shall be removed by the General Contractor. The General Contractor shall be responsible for providing backfill material.
- D. Sequencing: Delay backfill and encasement of conduit until testing of conductors has been completed.

2. PART 2 GENERAL DESCRIPTION OF WORK

2.1 Coordinate work with other Trades.

2.2 General:

- A. Provide all luminaires, wiring devices, conductors, switches, disconnects, fuses, fire alarm system, and other required materials. Coordinate electrical requirements for equipment supplied by other trades prior to ordering electrical materials.
- B. Provide U.L. listed Fire-Stop penetrations through rated assemblies. See Architectural life safety plans to locate rated assemblies.
- C. Identify major equipment with engraved Lamacoid labels.
- D. Provide typed panelboard directories.
- E. Gang mount switches. Provide continuous switchplate.
- F. Electrical Contractor shall provide all penetrations and patching required to install electrical work.
- G. Support all luminaires, materials, and equipment from building structure.
- H. Install all materials and equipment in accordance with manufacturer's instructions.
- I. Telephone service shall meet the requirements of and be coordinated with Utility.
- J. Electrical service shall meet the requirements of and be coordinated with Utility.
- K. Panelboards shall have copper bus unless otherwise noted.
- L. Electrical circuits shall not share neutrals unless otherwise noted.

2.3 Design Requirements vs. Code Minimum Requirements.

- A. Some of the design requirements stated for this project exceed the minimum requirements of the NEC. These decisions are usually made in order to:
  - 1. Increase reliability of the system.
  - 2. Increase service life of system components.
  - 3. Enhance system safety beyond the minimum requirements of the NEC.

B. Design requirements that may exceed NEC minimum are most often associated with the following:

- 1. Insulation type.
- 2. Conductor size.
- 3. Conduit type.
- 4. Conduit couplings.
- 5. Size of equipment grounding conductor. See NEC section 250.4A5.

3. PART 3 CONDUCTORS & CONDUIT

3.1 Conductors:

- A. Unless otherwise noted on plans:
  - 1. Conductors above grade shall be THWN-2 copper.
  - 2. Conductors underground or under slab shall be XHHW copper.
- B. All conductors shall be in conduit or other approved raceway.
- C. Provide EGC (equipment grounding conductor) with all circuits. Some EGCs are sized larger than the NEC minimum. This is done in order to reduce the probability of EGCs being damaged during ground faults.
- D. Conductors smaller than #8 AWG shall be solid.
- E. Approved manufacturers. (No other manufacturer's products are permitted.)  
ENCORE WIRE  
SOUTHWIRE  
AFC  
GENERAL CABLE  
OKONITE  
CERROWIRE
- F. Line-voltage conductors shall not be smaller than #12 AWG.
- G. Branch circuits longer than 75 feet shall be wired with conductors #10 AWG or larger.

3.2 Conduit and Raceway:

- A. Above grade: EMT with compression-type steel couplings and connectors.
- B. Below grade: Schedule 40 PVC with Schedule 80 PVC risers.
- C. Raceway Seal: Where a raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with NEC 300.5(G). Spare or unused raceways shall also be sealed. Sealant shall be American Polywater FST or equivalent.
- D. Conduit shall be trade size 3/4" minimum unless otherwise noted. Exceptions: control wiring, 120V receptacles, and switches may use trade size 1/2" if sized per NEC.
- E. Type MC Cable with copper conductors and green ground may be used for concealed branch circuits. Redhead bushings shall be provided at each termination.
- F. Support conduit from building structure with threaded rods and hangers, trapeze hangers, channel and clamps, or other approved method.

4. PART 4 DOCUMENTS AND SUBMITTALS

4.1 SUBMITTALS

- A. Submit under provisions of Contract Documents.
- B. Identify items with marks to match those shown on drawings.
- C. Architect shall approve all colors.
- D. All submittals shall have the Contractor's stamp with approval signature.
- E. Highlight deviations from specified materials.
- F. Product Data: 6 sets, including 3 sets for maintenance manuals. Data shall include the following:
  - Luminaires
  - Wiring Devices
  - Panelboards
  - Safety Switches
  - Surge Protective Devices (SPDs)
  - Fire Alarm System
- G. Test Reports (if required): 3 copies
- H. Warranties: 6 copies, including 3 for maintenance manuals.
- I. Maintenance Manuals: 3 complete sets in loose-leaf 3-ring binders, with rigid permanent vinyl covered back and front. Separators with index tabs shall be provided. One set shall have all sheets individually encased in clear, plastic document protectors.

4.2 CONTROL DATA: Provide control diagrams and wiring diagrams where applicable; include description of control systems, catalog data, and calibration instructions for all components. Provide name and address of Controls manufacturer and installer.

4.3 MAINTENANCE INSTRUCTION: Typewritten instructions for maintenance of the systems in itemized form and with time schedule shall be furnished. The instructions shall list each item of equipment requiring inspection, lubrication, or other service. The operating personnel shall be instructed regarding each maintenance procedure.

5. PART 5 ELECTRICAL WORK CLOSEOUT

5.1 General: Refer to the Division 1 sections for general closeout requirements. Maintain a daily log of operational data on electrical equipment and systems through the closeout period; record hours of operation, assigned personnel, fuel consumption, etc. Submit copy to Owner.

5.2 Record Drawings: Give special attention to the complete and accurate recording of underground circuits, and other concealed or non-accessible work. Record change orders where not shown accurately by contract documents. Submit to Architect/Engineer at end of project one set of reproducible sepia that show all changes in the electrical work.

5.3 Closeout Equipment/Systems Operations: Contractor shall demonstrate sustained, satisfactory performance of all equipment and systems in a test run of appropriate duration. The Owner's operating personnel shall be present. Adjust or correct equipment as required for proper performance. Clean equipment and luminaires.

5.4 Operating Instructions: Conduct a walk-through instruction seminar for the Owner's personnel. Explain the identification system, operation diagrams, emergency and alarm provisions, and sequencing requirements. Also explain requirements related to: seasonal provisions, security, safety, and efficiency.

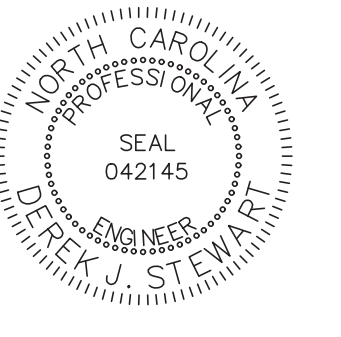
5.5 Training: Contractor shall provide training on all major equipment, controls, etc, as part of the contract.

5.6 Turn-Over of Operations: At the time of substantial completion, turn over the prime responsibility for operation of the electrical equipment and systems to the Owner's operating personnel. However, until the time of final acceptance, provide one electrician, who is completely familiar with the work, to consult with and continue training the Owner's personnel.

END OF SECTION

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**SPEARMAN BUILDING ELECTRICAL UPGRADES**

BLUE RIDGE COMMUNITY COLLEGE  
FLAT ROCK, NC

DATE: NOVEMBER 12, 2021

DESIGN BY: DJS

DRAWN BY: RKH

APPROVED BY: DJS

SHEET NUMBER:

**E301**