STATE OF NEW YORK
OFFICE OF GENERAL SERVICES
DESIGN AND CONSTRUCTION GROUP
THE GOVERNOR NELSON A. ROCKEFELLER
EMPIRE STATE PLAZA
ALBANY, NY 12242

ADDENDUM NO. 2 TO PROJECT NO. 44520

ELECTRICAL WORK

REPLACE/UPGRADE STREET LIGHTING,
ROCKLAND PC - HUDSON RIVER CAMPUS
ROSS CIRCLE, CHENEY DRIVE, SNOW TERRACE AND PARKING LOTS, BLDS 141, 142
10 ROSS CIRCLE
POUGHKEEPSIE, NY 12601

May 31, 2013

NOTE: This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

ELECTRICAL WORK SPECIFICATIONS

1. SECTION 260526 – GROUNDING AND BONDING: Add Specification Section to the contract.

2. SECTION 262516 – PANELBOARDS: Revise the following paragraphs:
   a. 2.01 PANELBOARDS: Item 10: "Sections designated "space" or "provisions for future breaker equipped to accept future circuit breakers"
   b. 2.01 PANELBOARDS: Remove Item 14, c.

3. SECTION 265629 – STREET LIGHTING AND GROUNDS LIGHTING: Revise/add the following paragraphs:
   a. 2.01 LIGHTING STANDARDS: Add:
      "B. Aluminum Bracket Arm Lighting Standard: Hapco Style 82, Utility Metals "U" Series, MacLean Power Systems S-125 Series:
         1. Suitable for connection to wooden light pole."
   b. 2.03 GUYS AND ANCHORES: Add:
      "F. Cross Plate Anchors: A.B. Chance Co.'s X-16, X-24, Joslyn Corp.'s J3516, J3524, or McGraw-Edison Co.'s DA4P1, DA4P3."
   c. 2.13 OVERHEAD ELECTRICAL CABLE: Remove "A. Neutral- Supported Secondary and Service Drop Cable" paragraph. Revise:
      "B. Preassembled Aerial Cable: Copper insulated conductors, rated 600 volts, cabled together in a reverse lay, laid parallel to a copper covered steel messenger and the assembly bound together with a helically wrapped copper binding strip. Assembly shall conform to either of the following:
         1. ICEA S-19-81/NEMA WC-3 Section 7.3: Preassembled Aerial cable.
         2. ICEA S-68-516/NEMA WC-8, Section 7.3: Preassembled Aerial Cable.

4. SECTION 345115 – STEEL PIPE BOLLARDS: Revise Paragraph 2.01 MATERIALS, section B to:

"B. Bumper Post Sleeve: Model 1736 by Eagle Manufacturing Company, 2400 Charles Street, Wellsburg, WV 26070, (304) 737-3171, www.eagle-mfg.com.
1. Yellow"

ELECTRICAL WORK DRAWINGS

1. Drawing E-501 – ELECTRICAL DETAILS: Add Detail F: PANELBOARD GROUNDING. See accompanying sketch SK-E501-1.

2. Drawing E-601 – ELECTRICAL SINGLE LINE DIAGRAMS:
   a. Detail E – BOLLARD:
      i. Remove "PAINTED (YELLOW) ROUND CONCRETE" note.
      ii. Remove "(PAINTED YELLOW)" from "6" PIPE FILLED WITH CONCRETE (PAINTED YELLOW)" note.
   b. Add Panelboard Schedule for panelboards LP-1 and LP-2. See accompanying sketch SK-E601-1.

END OF ADDENDUM

James Dirolf, P.E.
Director of DesignDET

SECTION 260526

GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide a complete system of grounding electrodes, grounding electrode conductors, main bonding jumpers, equipment grounding conductors, and bonding in accordance with NEC requirements, in conformance with this Section and as shown on the Drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Related Sections include the following:

1. Division 26 Section "Wiring, General – 600 Volts and Under" for wire connector and equipment grounding conductor requirements.
2. Division 26 Section "Exposed Conduit – Wet Locations" for grounding bushing requirements.

1.03 SUMMARY

A. This Section includes requirements for grounding electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.04 DEFINITIONS

A. Refer to NEC for definitions of grounding terms used in this Section.

1.05 REFERENCE STANDARDS

A. Comply with the following standards:

1. IEEE 80-1986 Interpretation: Guide for Safety in AC Substation Grounding
2. IEEE 80-2000 Guide for Safety in AC Substation Grounding
3. IEEE 81-1983 Guide for Measuring Earth Resistively, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)
4. IEEE 118-1978 (R1992) Standard Test Code for Resistance Measurements
5. IEEE 142-1991 Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book)
6. IEEE 837-1989(R1996) Standard for Qualifying Permanent Connections Used in Substation Grounding
7. NFPA 70 The National Electrical Code

1.06 SUBMITTALS

A. Product Catalog Data Sheets: For each type of product indicated.

B. Product Data: For the following:
   1. Ground rods
   2. Grounding electrode conductors
   3. Exothermic weld grounding connection products
   4. Mechanical grounding connector products

C. Acceptance Test Reports: Submit written test reports to include the following:
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with the requirements described in this Section, provide products by one of the listed manufacturers in the Sub-Sections below.
   1. Ground Rods:
      a. Copperweld Corp.
      b. Eritech / Erico International Corporation
      c. Galvan Industries, Inc.
      d. Harger Lightning and Grounding, Inc.
      e. Robbins Lightning, Inc.
   2. Grounding electrode connectors:
      a. Exothermic type:
         1. Cadweld / Erico International Corporation
         2. Furseweld
         3. Harger Lightning and Grounding, Inc. (Ultraweld)
         4. ThermOweld, a division of Continental Industries
      b. Copper compression type:
         1) Dossert Corp.
         2) Framatome Connectors / Burndy
         3) Harger Lightning and Grounding, Inc.
         4) ILSCO
         5) O. Z. Gedney / EGS Electrical Group
         6) Panduit Corp.
         7) Robbins Lightning, Inc.

2.02 GROUNDING ELECTRODES

A. Ground Rods: 3/4 in. x 10 ft. Copper-clad steel, sectional type, with silicone bronze threaded connectors.

B. Ground Ring: #2/0 AWG Class A stranded copper conductor (7 strand). 17 strand ground wire is not acceptable in contact with earth.

C. Concrete-Encased Electrodes: Use concrete piers below generator foundation for this purpose, connect to structural tension rods inside piers as shown on the Drawings.

2.03 GROUNDING ELECTRODE CONDUCTORS

A. Grounding Electrode Conductors: Class A stranded, bare copper conductor, provide #2/0 AWG unless otherwise noted on the Drawings. Class B stranding is not acceptable for conductors in contact with earth.

B. Comply with the following:

1. Assembly of Stranded Conductors: ASTM B 8.

2.04 BONDING JUMPERS

A. Main Bonding Jumpers: copper or tin-plated copper, furnished with the service equipment by the equipment manufacturer. Panelboards up to 225 amps may use a bonding screw.

B. Equipment Bonding Jumpers: insulated copper building wire, sized to match the largest equipment grounding conductor in the associated conduits.

C. Splice and Termination Kit Bonding Jumpers: THWN insulated copper wire, #4 AWG minimum

2.05 EQUIPMENT GROUNDING CONDUCTORS

A. Equipment Grounding Conductors: THWN insulated copper wire with green insulation or marked with green tape at each end. Provide #2/0 AWG unless otherwise noted on the Drawings.

2.06 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467. Products shall be NRTL-listed and shall be suitable for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Two-hole, long barrel tin-plated copper compression type at equipment ground bus.

C. Grounding clamps for metal water pipe connections: all cast bronze parts with silicone bronze bolts

D. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

E. Wirenuts: for use only for branch circuit wiring in switch and receptacle outlet and junction boxes containing #10 AWG and smaller wires.

PART 3 - **EXECUTION**

3.01 **INSTALLATION – GENERAL**

A. Install grounding electrodes, grounding electrode conductors, main bonding jumpers, equipment grounding conductors, equipment bonding jumpers, and bonding, in accordance with NEC requirements and as shown on the Drawings.

B. Provide only copper and bronze grounding materials in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

C. Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

D. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

3.02 **INSTALLATION: GROUNDING ELECTRODES**

A. Concrete-Encased Grounding Electrode: Connect tension rods inside concrete piers, located below generator concrete foundation, to ground electrode conductors using exothermic welds as shown on the Drawings.

B. Ground Rods: Install at locations show on the Drawings.

1. Drive ground rods until tops are 12 inches below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating

C. Ground ring: Use bare Class A stranded (7-strand) copper conductor, #4/0 AWG. Bury at least 30 inches below grade.

D. Pad-Mounted Transformers, Switches, and Manual Transfer Switches: Connect equipment grounding conductors to switch ground bus, and to transformer grounding lugs.

3.03 INSTALLATION: GROUNDING ELECTRODE CONDUCTORS

A. Grounding Electrode Conductors: Route along shortest and straightest paths possible, unless otherwise indicated on the Drawings. Avoid obstructing access or placing conductors where subject to strain, impact, or damage.

B. Connect grounding electrode conductor(s) to service equipment as shown on the Drawings.

C. Bond grounding electrode conductors in conduit to each end of each conduit run using a bronze conduit-to-wire grounding fitting.

3.04 INSTALLATION: EQUIPMENT GROUNDING CONDUCTORS

A. Provide separate insulated equipment grounding conductors in raceways, boxes, and fittings, as shown on the Drawings and specified herein.

B. Provide separate insulated equipment grounding conductors with each 15kV cable run.

C. Equipment Grounding Conductor Terminations:

1. At oil-filled transformers, connect to tank studs provided by transformer manufacturer.
2. At dry-type transformers, provide two-hole long-barrel tin-plated compression connector bolted to ground busbars with tin-plated or silicone bronze bolts.
3. At switchgear, switchboard, distribution board, panelboard, and motor control centers, provide two-hole long-barrel tin-plated compression connector bolted to ground busbar(s) with tin-plated or silicone bronze bolts.
4. At generators, provide separate two-hole long-barrel tin-plated compression connector bolted to ground connection point in generator terminal box, and to generator structural steel frame, with tin-plated or silicone bronze bolts.

D. At building service switchgear, bond equipment grounding conductors to switchgear ground bus.

3.05 INSTALLATION: EQUIPMENT BONDING JUMPERS

A. At sheet metal junction, pull and outlet boxes, and electrical enclosures, use conduit hubs bolted to enclosure or double locknuts to bond enclosure to conduit, and connect grounding bushings to equipment grounding conductors. Install equipment bonding jumpers between conduit bushings entering and leaving boxes, using the lugs provided with the grounding bushings.

B. At cast enclosures, connect equipment grounding conductors together with a mechanical connector. Use mechanical connectors in conformance with Division 16 Section “Wire and Cable”. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

3.06 CONNECTIONS

A. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

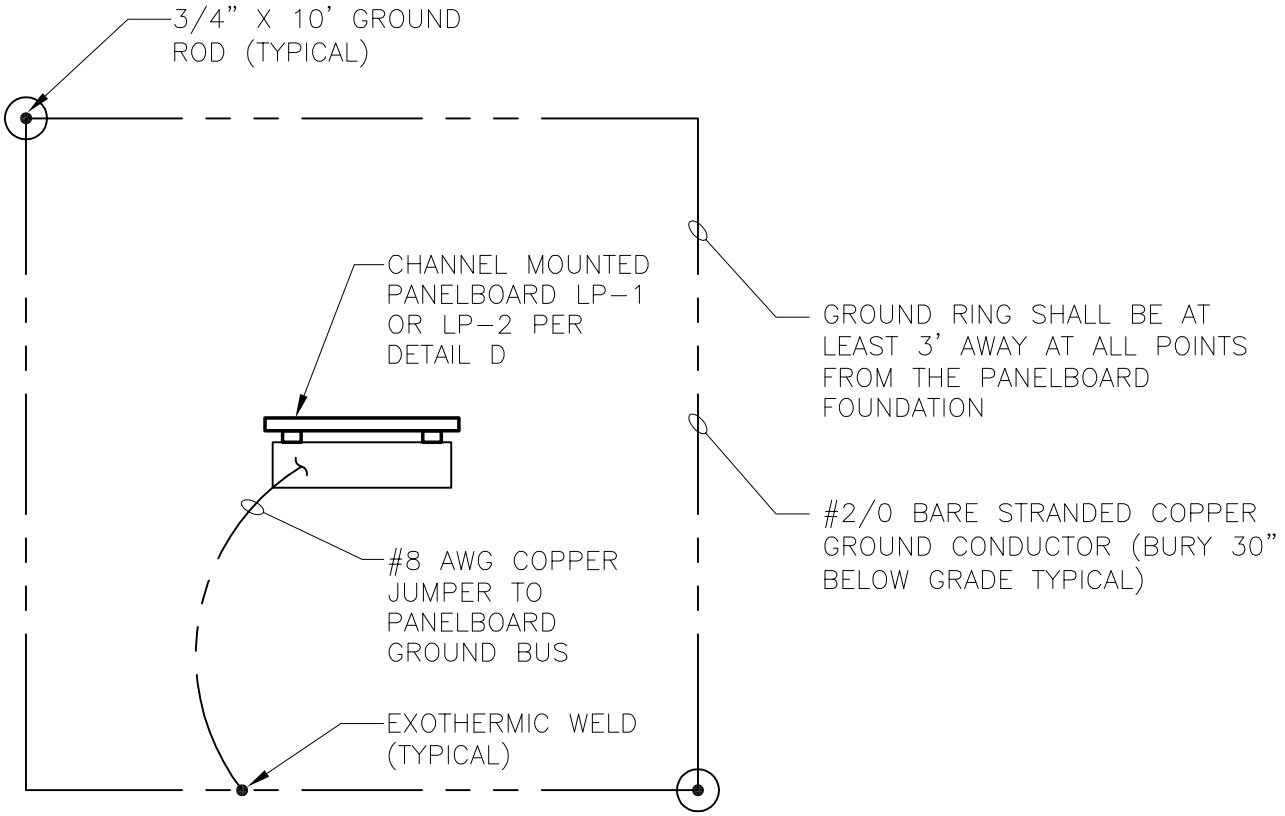
B. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

3.07 ACCEPTANCE TESTING

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test ground resistance.
2. Test completed generator grounding system at ground test well. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests using the fall-of-potential method according to IEEE 81.
3. Provide sketch of test setup with dimensions, locating each ground rod and ground rod assembly and other grounding electrodes. Identify each electrode by letter in alphabetical order, and key to the record of tests and observations. Include observations of weather and other phenomena that may affect test results.
4. Grounding resistance shall be 5 ohms or less.
5. Provide a written report of test results for fall-of-potential test and point-to-point tests. Include problems found, if any, and corrective actions taken.

END OF SECTION



DETAIL F – PANELBOARD GROUNDING

DETAIL F – PANELBOARD GROUNDING

REPLACE/UPGRADE STREET LIGHTING, ROSS CIRCLE, CHENEY DRIVE, SNOW TERRACE, AND PARKING LOTS, BLDGS 141, 142

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Deputy Commissioner, Design and Construction

RMF Engineering
Reliability. Efficiency. Integrity.

MAY 2013

SK-E501-1

PANEL NO.:	**LP-1 AND LP-2**	**MOUNTING:**	**CHANNEL MOUNTED**
USAGE:	**LIGHTING PANELBOARD**	**PANEL TYPE:**	**SEE SPECIFICATIONS**
LOCATION:	**SEE DRAWINGS**		
PHASE / FREQUENCY:	**3 60 Hz**		
L-L VOLTS	**480**		
L-G VOLTS	**277**		
BUS AMPS	**100**	**PANEL NOTES:**	EQUIPPED WITH GROUND BUS
FAULT CURRENT RATING:	**25,000**		EQUIPPED WITH FULL SIZE NEUTRAL
MAIN CB AMPS	**100**		BUS (UNLESS OTHERWISE NOTED)
AMBIENT TEMP. deg. C.:	**40**		

CONDUIT TYPE	CONDUIT SIZE	PHASE & NEUTRAL SIZE	EGC SIZE	CKT AMPS	LOAD DESCRIPTION	C.B. POLES	C.B. TRIP	CIRCUIT NUMBER A B C	C.B. TRIP	C.B POLES	LOAD DESCRIPTION	CKT AMPS	CONDUIT SIZE	PHASE & NEUTRAL SIZE	EGC SIZE	CONDUIT TYPE
PVC	2"	#6	#6	**0.00**	LIGHT CIRCUIT No. 1	3	20	**1 A 2**	20	3	LIGHT CIRCUIT No. 3	**0.00**	2"	#6	#6	PVC
-	-	-	-	**0.00**	-	-	-	**3 B 4**	-	-	-	**0.00**	-	-	-	-
-	-	-	-	**0.00**	-	-	-	**5 C 6**	-	-	-	**0.00**	-	-	-	-
PVC	2"	#6	#6	**0.00**	LIGHT CIRCUIT No. 2	3	20	**7 A 8**	20	3	SPARE	**0.00**	-	-	-	-
-	-	-	-	**0.00**	-	-	-	**9 B 10**	-	-	-	**0.00**	-	-	-	-
-	-	-	-	**0.00**	-	-	-	**11 C 12**	-	-	-	**0.00**	-	-	-	-
-	-	-	-	**0.00**	SPARE	3	30	**13 A 14**	30	3	SPARE	**0.00**	-	-	-	-
-	-	-	-	**0.00**		-	-	**15 B 16**	-	-		**0.00**	-	-	-	-
-	-	-	-	**0.00**		-	-	**17 C 18**	-	-		**0.00**	-	-	-	-

PANELBOARD SCHEDULE – LP–1 AND LP–2

LP–1 AND LP–2 PANELBOARD SCHEDULE

REPLACE/UPGRADE STREET LIGHTING, ROSS CIRCLE, CHENEY DRIVE, SNOW TERRACE, AND PARKING LOTS, BLDGS 141, 142

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