Specification for the Construction of the

Luther Forest 115kV Electric Station Above Grade

and

Stonebreak Road 115kV Electric Station Above Grade

In

The Town of Stillwater

Saratoga County

New York

For

Luther Forest Technology Campus Economic Development Corporation (LFTCEDC)

Prepared by: TRC

January 25, 2010

Version 1.2

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Attachments				
Number	**Document Number**	**Version**	**Date**	**Title**
1	None	7.0	01/25/10	Luther Forest Bill of Material
2	SP.08.00.001	1.0	07/01/08	National Grid Standard Construction Specification for Electric Stations
3	SMP 400.80.2	1.0	07/30/09	National Grid Substation Maintenance Procedure for Substation Commissioning and Energization
4	ST.03.06.001	1.0	03/09/09	National Grid Engineering Document for Substation Signs

1.0 Contractor Request for Proposal Overview

1.1 Introduction

This specification summarizes the above grade electric station requirements for the new Luther Forest and the new Stonebreak Road electric stations. The Above Grade Construction Contractor is required to follow this specifications, the drawings, National Grid's Engineering Document **SP.08.00.001 Version 1.0 07/01/08 Standard Construction Specification for Electric Stations** and all referenced documents. The Above Grade Contractor's work scope includes all electrical construction for the two stations. It is the Above Grade Construction Contractor's responsibility to ensure all precautions have been taken to guarantee personnel safety and prevent equipment damage

The work at the Luther Forest electric station begins after the completion of the in-ground construction contract (by others) and continues through the completion of the electric station construction per the drawings and specifications. It includes steel erection, high voltage equipment assembly and installation, installation of 115kV bus and conductors, installation and connection of low voltage power, control and metering conductors, installation of relay, control and metering switchboard panels and assisting the Testing and Commissioning Contractor with the testing of the station equipment and systems.

The work at the Stonebreak Road electric station begins after the completion of the in-ground construction contract (by others) and continues through the completion of the electric station construction per the drawings and specifications. It includes steel erection, high voltage equipment assembly and installation, installation of 115kV bus and conductors assisting the Testing and Commissioning Contractor with the testing of the station equipment and systems.

The following sections are an overview of the project with major items including the scope of work, construction schedule, special conditions, contacts, list of drawings and bid sheets.

The drawings provided with this specification are for bidding purposes only. A final set of construction drawings will be issued to the successful bidder.

The major pieces of electrical equipment have already been procured and will be provided for this project. There are also some other specialized equipment and material (Relay and Control Switchboards, Bus and Connectors, etc.) that has also been procured and will be provided for this project. The remainder of the equipment and material is to be procured by the Above Grade Construction Contractor for this project. A Bill of Material List, identifying who is responsible to procure, is included with this specification as attachment #1. Any miscellaneous material not listed is the responsibility of the Above Grade Contractor.

1.2 Scope of Work for Luther Forest Station

The following is a summarized list of items included in this Above Grade Construction Specification for the Luther Forest station that will become the responsibility of the awarded contractor. Refer to the construction drawings for specific design details.

1.2.1 Steel Structures

The station steel structures will have been delivered to the site and stored prior to the start of Above Grade Construction.

ST-1 (26) 3 Phase Low Bus Switch Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure column to the existing ground grid risers per the drawings
Install the ground loop and personal ground attachment provisions per the drawings

ST-2 (4) 3 Phase High Bus Switch Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure column to the existing ground grid risers per the drawings
Install the ground loop and personal ground attachment provisions per the drawings

ST-3 (12) CVT Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

1.2.1 Steel Structures (continued)

ST-4 (6) CVT Stand with Junction Box
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings
Provide and install junction box and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

ST-5 (4) CT/VT Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

ST-6 (2) CT/VT Stand with Junction Box
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings
Provide and install junction box and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

ST-7 (4) PT Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

1.2.1 Steel Structures (continued)

ST-8 (2) PT Stand with Junction Box
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings
Provide and install junction box and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

ST-9 (6) Bus Surge Arrester Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

ST-10 (36) 3 Phase Low Bus Support
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure to the existing ground grid risers per the drawings

ST-11 (40) 3 Phase High Bus Support
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure to the existing ground grid risers per the drawings

1.2.1 Steel Structures (continued)

ST-12 (2) 3 Phase High Bus Support with Differential Junction Box
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure to the existing ground grid risers per the drawings
Install junction box and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

ST-13 (6) Line Surge Arrester Stand
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

ST-14A (2) 60’ Lightning Mast with 4 Yard Lights
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each mast to the existing ground grid riser per the drawings
Provide and install yard lighting junction boxes and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

ST-14B (5) 60’ Lightning Mast with 3 Yard Lights
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each mast to the existing ground grid riser per the drawings
Provide and install yard lighting junction boxes and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box

1.2.1 Steel Structures (continued)

ST-15 (6) H Frame Takeoff Structure – (5 of the structures have yard lights, 3 of the structures have a fiber optic splice box near the base)
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure to the existing ground grid risers per the drawings
Provide and install yard lighting junction boxes and connect to the ground grid per the drawings
Provide and install conduit from the existing conduit risers to the junction box
Provide and install necessary devices in junction box
Provide and install a fiber optic junction box for 3 of the lines

ST-16 (6) Reactor Stand
Unload structures from the delivery vehicle
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

1.2.2 High Voltage Electrical Power Equipment

(9) 115kV HVB Power Circuit Breakers
Move from storage at 40 Hermes Road to the station site
Provide and install necessary anchor bolts in foundation
Place and assemble circuit breaker on the existing concrete foundations
Anchor circuit breaker to the foundations per the drawings
Connect each circuit breaker to the existing ground grid risers at the two ground pad locations with a two hole terminal pad per the drawings
Provide and install conduits from the existing conduit risers to the control cabinet per the drawings
Connect conduits to the ground grid per the drawings
Fill each circuit breaker with the necessary tested and certified SF6 gas per the manufacturer's requirements and specifications (SF6 cylinders must be returned to HVB AE Power Systems Inc. after filling)
Add wire terminations, labels and connect all control, communication and low voltage power cables per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

1.2.2 High Voltage Electrical Power Equipment (continued)

(2) 115kV Mitsubishi Synchronous Closing Power Circuit Breakers
Move from storage at 40 Hermes Road to the station site
Provide and install necessary anchor bolts in foundation
Place and assemble circuit breaker on the existing concrete foundations
Anchor circuit breaker to the foundations per the drawings
Connect each circuit breaker to the existing ground grid risers at the two ground pad locations with a two hole terminal pad per the drawings
Provide and install conduits from the existing conduit risers to the control cabinet per the drawings
Connect conduits to the ground grid per the drawings
Provide and fill each circuit breaker with the necessary tested and certified SF6 gas per the manufacturer's requirements and specifications (Do not leave any SF6 cylinders on site after filling)
Add wire terminations, labels and connect all control, communication and low voltage power cables per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(2) 115kV Cooper Capacitor Banks
Move from storage at 40 Hermes Road to the station site
Place and erect the support structure on the existing concrete foundations
Plumb and level structure and anchor to the foundation
Connect each support structure to the existing ground grid risers at the ground pad locations with a two hole terminal pad per the drawings
Install capacitor units in the frame per the drawings
Install insulators, bus work, connectors and current transformer per the drawings
Install and connect capacitor unit fuse tubes, fuse links and ejector springs per the drawings
Provide and install junction box on structure per the drawings and connect to the ground grid per the drawings
Provide and install conduits from the existing conduits riser to the junction box and from the junction box to the CT per the drawings
Connect conduits to the ground grid per the drawings
Complete the common point capacitor grounding connection
Add wire terminations, labels and connect all control, communication and low voltage power cables per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

1.2.2 High Voltage Electrical Power Equipment (continued)

(6) 115kV Areva Air Core Reactors
Move from storage at 40 Hermes Road to the station site
Place and erect the support structure on the existing concrete foundations
Install insulators and aluminum pedestals per the drawings
Install air core reactors per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(4) 115kV USCO Vertical Break Disconnect Switches – High Bus Height
Move from storage at 40 Hermes Road to the station site
Install each pole unit on the switch structure (3 poles per switch) per the drawings
Install the inter-phase linkages per the drawings
Mount and install the switch operating pipes and operating handle per the drawings
Connect the switch operator to the ground grid per the drawings
Connect switch to the 115kV conductor per the drawings
Adjust each switch per vendor's instructions per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(26) 115kV USCO Vertical Break Disconnect Switches – Low Bus Height
Move from storage at 40 Hermes Road to the station site
Install each pole unit on the switch structure (3 poles per switch) per the drawings
Install the inter-phase linkages per the drawings
Mount and install the switch operating pipes and operating handle per the drawings
Connect the switch operator to the ground grid per the drawings
Connect switch to the 115kV conductor per the drawings
Adjust each switch per vendor's instructions per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

1.2.2 High Voltage Electrical Power Equipment (continued)

(18) 115kV Trench CVTs
Move from storage at 40 Hermes Road to the station site
Place and mount on the support stand
Connect CVT to the ground grid per the drawings
Provide and install equipment inside the junction box per the drawings
Provide and install conduits from the existing conduit risers to the junction box and from the junction box to each CVT (phases 1, 2 and 3)
Connect conduits to the ground grid per the drawings
Add wire terminations, labels and connect all control, communication and low voltage power cables, including wiring between phases, per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(6) 115kV Trench Bus PTs
Move from storage at 40 Hermes Road to the station site
Place and mount on the support stand
Connect PT to the ground grid per the drawings
Provide and install equipment inside the junction box per the drawings
Provide and install conduits from the existing conduit risers to the junction box and from the junction box to each PT (phases 1, 2 and 3)
Connect conduits to the ground grid per the drawings
Add wire terminations, labels and connect all control, communication and low voltage power cables, including wiring between phases, per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(6) 115kV Cooper Bus Surge Arresters
Move from storage at 40 Hermes Road to the station site
Place and mount on the support stand
Connect each surge arrester to the ground grid per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

1.2.2 High Voltage Electrical Power Equipment (continued)

(6) 115kV Areva Line CT/VTs
Move from storage at 40 Hermes Road to the station site
Place and mount on the support stand
Connect CT/VT to the ground grid per the drawings
Provide and install equipment inside the junction box per the drawings
Provide and install conduits from the existing conduit risers to the junction box and from the junction box to each CT/VT (phases 1, 2 and 3)
Connect conduits to the ground grid per the drawings
Add wire terminations, labels and connect all control, communication and low voltage power cables, including wiring between phases, per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(6) 115kV Cooper Line Surge Arresters
Move from storage at 40 Hermes Road to the station site
Place and mount on the support stand
Connect each surge arrester to the ground grid per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(240) 115kV Station Post Insulators
This includes all (234) vertically mounted insulators and (6) horizontally mounted insulators on the takeoff structures for the Rotterdam - Luther Forest #1 and the Spier - Luther Forest – #302 lines.
Move from storage at 40 Hermes Road to the station site
Install on the bus supports with the necessary hardware

All 5" and 3"Aluminum Bus Tube and Aluminum Cable (336MCM, 795MCM and 1272MCM)
Assemble and install the aluminum bus tube and conductor, insulator supports, fittings, terminals, grounding provisions, damping material, etc per the drawings
The damping conductor shall be installed loosely inside the 5" bus tube, from end to end, before both ends of the bus tube are "sealed/closed"
Make the electrical connection from the station bus and equipment to the line compression deadend of the overhead 115kV transmission line conductor per the drawings

1.2.3 Low Voltage Secondary Power Equipment

Control, Communication and Low Voltage Power Cables

The control, communication and low voltage power cable to the electric station yard equipment uses a raceway system consisting of conduit, cable trench and cable tray

Install all necessary cables and conductors.

Install and connect all wiring from the panels and equipment in the Control Building to the outdoor switchyard equipment per the drawings. Refer to the Conduit and Cable schedule for the wire and cable sizes and the quantities of terminations. The estimated quantity of wire terminations for this is 3,800.

Install and connect all wiring from the panels and equipment in the Control Building to other panels and equipment in the Control Building per the drawings. The estimated quantity of wire terminations for this is 3,700.

Provide and install all necessary wire terminals and label every wire

Refer to the conduit plan drawings, conduit detail drawings and the conduit and cable schedule

Cable routing shall follow the design drawings to comply with the separation criteria for this project

Cables shall be routed to maximize the use of their dedicated purpose cable tray (see below) before transferring to another tray system and shall follow the most direct route

Cable trays A1 and A2 are 12" wide trays which are primarily dedicated for AC and DC power circuits. These trays are mounted at 12'-0" (to the tray bottom above finished floor) and do not penetrate the interior wall.

Cable trays B1 and B2 are 9" wide trays which are primarily dedicated for "A" and "B" system interconnect cables. These trays are mounted at 10'-6" (to the tray bottom above finished floor) and connect through penetrations in the interior wall.

Cable trays C1 and C2 are 30" wide trays and are dedicated for control cables. These trays are mounted at 9'-0" (to the tray bottom above finished floor) and do not penetrate the interior wall. Both trays have two vertical sections in the interior of the building to bring all cables down to the cable trenches.

Various size cable trays with covers shall be mounted vertically above the AC power panels ACPP#1A, 1B, 1C, 2, 2A and 2B. These trays are intended to route AC power cables from the panels to cable trays A1 and A2.

(32) Protective Relay, Control, Metering and Monitoring Switchboard Panels

Receive, unload, install and mount in the control building per the drawings

Install and connect all inter-panel wiring per the drawings

Install and connect all wiring from the panels to outdoor switchyard equipment per the drawings

Connect the ground bus of each panel to the adjacent panel with a 4/0 copper conductor.

Connect the ground bus of the end panels and every fourth panel to the cable tray ground above it with a 4/0 copper conductor

(1) Sync Panel

Receive, unload, install and mount in the control building per the drawings

Install and connect all inter-panel wiring per the drawings

Install and connect all wiring from the panel to the various pieces of equipment per the drawings

1.2.3 Low Voltage Secondary Power Equipment (continued)

(1) EMS RTU Cabinet (C1)
The station will have an Energy Management System for remote control, monitoring and indication of the station equipment.
Receive, unload, install and mount in the control building per the drawings
Connect to ground same as the switchboard panels grounding
Install and connect all inter-panel/cabinet wiring per the drawings
Install and connect all wiring from the cabinets to various pieces of equipment per the drawings

(1) DFR Cabinet (A2)
Receive, unload, install and mount in the control building per the drawings
Install and connect all inter-panel/cabinet wiring per the drawings
Install and connect all wiring from the cabinets to various pieces of equipment per the drawings
Connect to ground per the switchboard panel drawings

(4) Revenue Meters
Provide and install the revenue meter sockets, boxes, test switches, conduit, wireway and equipment per the drawings

(3) SF6 Circuit Breaker Gas Cart Outlets
Provide and install equipment per the drawings
Install and connect all wiring from the AC Power panels to the outdoor switchyard outlets per the drawings

(1) Yard Lighting Control Cabinet
Provide and install cabinet and equipment per the drawings
Provide and install necessary devices in control cabinet

(38) Yard Lights
Provide and install the lights, junction boxes and equipment per the drawings
Provide and install and connect all wiring from the yard lighting control cabinet to the outdoor yard lights per the drawings
Tilt, aim and test light fixtures per the drawings

Telephone Equipment
In cooperation with the local phone company, install and mount all necessary phone equipment in the control building at the designated location(s) per the drawings
An AC quadplex on a dedicated circuit to each telephone board shall have been installed by others
Provide and install a 2 pole DC fuse on a dedicated circuit to the telephone board on control room 1 per the drawings

1.2.3 Low Voltage Secondary Power Equipment (continued)

Wiring – General Note
All wiring in the control building will use conduits and/or overhead cable tray and/or wireways per the drawings. Refer to the necessary drawings and the conduit and cable schedule.

Every wire shall have a continuity test and insulation integrity test performed per National Grid SMP 400.80.2 by the Above Grade Construction Contractor.

Fiber optic cables
There are three fiber optic cables to be installed, one from Malta (24 strands), one from Mulberry (24 strands) and one from Global Foundries (24 strands).

For all three transmission lines, approximately 25' of fiber optic cable will be provided and coiled at the base of the structure by others.

For all three transmission lines mount a splice box at the base of the structure. Terminate all fiber strands in the splice box.

For the Luther Forest – Global Foundries LN222, pull in all fibers through the system of conduit, cable trench and cable tray as shown on the drawings. Terminate all the fiber optic strands in a patch panel on the telephone board mounted in Control Room 2 as shown on the drawings.

For all wall mounted equipment in the control building, all connections to ground shall use the wall mounted perimeter ground bus.

(2) 125VDC Station Batteries
Assemble and install the battery racks and spill containment systems
Connect the battery racks to ground
Install the battery cells in the battery rack
Assemble and connect all necessary intercell connectors
Connect the batteries to the DC panels and DC charger per the drawings

(2) 125VDC Battery Chargers
Assemble the stand and mount the battery chargers to the stand
Wire in the AC supply circuit, DC Output circuit and necessary alarms

(6) 125VDC DC Distribution Power Panels
Provide, assemble and install the DC distribution panels, cable tray, cover and conduits as shown on the drawings

(2) 125VDC DC Distribution Tie Throwover Switches
Provide, assemble and install the DC distribution tie switches and conduit as shown on the drawings

1.2.3 Low Voltage Secondary Power Equipment (continued)

(2) 125VDC DC Distribution Disconnect Switches
Provide, assemble and install the DC distribution switches and conduit as shown on the drawings

(2) Eye Wash Stations
Provide, assemble and install the eye wash stations as shown on the drawings

(2) 125VDC Station Batteries Hydrogen Gas Detection and Ventilation System
Connect each battery hydrogen gas sensor to the sensor remote, exhaust fan, air intake louver and alarm to the EMS RTU

Safety and Equipment Labeling
Install one (1) 911 address sign mounted on 4" x 4" pressure treated posts as required at the end of the station driveway near the public road access.
Provide and install (42) DANGER - KEEP OUT signs mounted on the station fence.
Provide and install (8) NO TRESPASSING signs mounted on the fence. Refer to attachment #4, National Grid Engineering Document ST.03.06.001 for sign specifications, locations and mounting requirements.
Provide and install all other identification, safety and warning signs and labels per National Grid Engineering Document SP.08.00.001, section 3A.6

Field Checks/As-Builts
Two full size sets of drawings, neatly marked in green (for removals) and red (for additions), working in cooperation with the Testing and Commissioning Contractor reflecting the final as built condition of the station shall be provided at completion of construction.

1.2.3 Low Voltage Secondary Power Equipment (continued)

Miscellaneous

The station yard finish grade shall be restored to final grade elevation and condition per the drawings after all construction is complete.

Install the cable trench covers on the cable trench.

Cap the ends of all empty conduits with the proper conduit caps.

All paper drawings and documentation provided by the material and equipment vendors and suppliers shall be boxed and stored in the control building, control room 1.

All spare and extra material and equipment provided by the Owner shall be neatly stored inside the station at a location agreed to with the National Grid representative.

Cables shall be neatly arranged, attached and labeled in all manholes.

After all wires have been installed, tested and accepted by the utility, all cable exits from conduits in yard equipment and in the control building shall be sealed with a weather proofing/rodent proof duct sealant material. All penetrations through the interior wall of the control building shall be sealed. The four cable trench entrances into the building shall be sealed. All control building wall penetrations shall be sealed to provide a fire rating matching the wall rating.

Any problems, errors, deficiencies, mistakes in the material and equipment provided to the contractor shall be immediately identified and reported to the Owner's field construction manager.

1.3 Scope of Work for Stonebreak Road Station

1.3.1 Steel Structures

Steel Structures

(1) 3 Pole Takeoff Structure
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each structure to the existing ground grid risers per the drawings

(2) Cable Riser Structures
Sort structural steel previously delivered to site
Inspect material and verify correct per the drawings
Assemble, erect, orientate and adjust per the drawings
Plumb and level structure and anchor to the foundation
The anchor bolts (and nuts) have been installed in the foundation previously by others
Connect each stand to the existing ground grid riser per the drawings

1.3.2 High Voltage Electrical Power Equipment

(2) 115kV Vertical Break Disconnect Switches
Move from storage at 40 Hermes Road to the station site
Install each pole unit on the switch structure (3 poles per switch) per the drawings
Install the inter-phase linkages per the drawings
Mount and install the switch operating pipes and operating handle per the drawings
Connect the switch operator to the ground grid per the drawings
Connect switch to the 115kV conductor per the drawings
Adjust each switch per vendor's instructions per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

1.3.2 High Voltage Electrical Power Equipment (continued)

(6) 115kV Line Surge Arresters
Place and mount on the support stand
Connect each surge arrester to the ground grid per the drawings
Connect to the 115kV conductor per the drawings
Assist and work with the Testing and Commissioning Contractor in the performance of all operational and functional tests per the manufacturer's instructions and requirements and National Grid requirements

(2) 115kV Lines
The line suspension insulators, attachment hardware and 795kcmil conductor for the two 115kV lines will be provided and installed to the (3) pole takeoff structure by others.
The overhead ground wire and OPGW along with the attachment hardware will be provided and installed to the (3) pole takeoff structure by others.
The underground high voltage power cable pothead terminations and the cable will be provided and installed by others.

115kV Station Bus Conductor
After the 115kV lines and cables are installed, as described above, provide and install all necessary conductor and connections from the overhead line to the disconnect switches, from the disconnect switches to the surge arresters and from the surge arresters to the underground pothead terminations per the drawings.

1.3.3 Low Voltage Secondary Power Equipment

Fiber optic cables
There is one fiber optic cable of 24 fibers to be installed.

1.4 Construction Schedule

The Contractor shall submit a detailed construction schedule identifying critical milestone lead times with all required construction activities. All this work shall be accomplished in the shortest duration practical, starting on or about March 1, 2010 and must be completed by July 31, 2010. All practical methods to reduce the duration of construction shall be taken.

1.5 Special Conditions

1.5.1 The Contractor shall be required to begin his portion of this project while other Contractor(s) may be on site. The contractor will be required to work with and coordinate his activities with the Testing and Commissioning Contractor and National Grid's Construction Supervisor.

1.5.2 Bids must be accompanied by Bid Security made payable to LFTCEDC in the amount of 5% of the Bid and in the form of a certified or bank check or a Bid bond issued by a surety duly licensed and authorized to do business in New York State. The Bid Security of the successful bidder (the Contractor) will be retained until the Contractor has executed a contract with LFTCEDC, furnished the required performance and payment bonds (see below) and met the other conditions of the Notice of Award, whereupon the Bid Security will be returned. If the successful bidder fails to execute and deliver the contract and furnish the performance and payment bonds within 15 days of the Notice of Award, LFTCEDC may annul the Notice of Award and the Bid Security of that bidder will be forfeited. The Bid Security of other bidders whom LFTCEDC believes to have a reasonable chance of receiving the award may be retained by LFTCEDC until the earlier of seven days after the effective date of the contract entered into by the successful bidder and LFTCEDC or 46 days after bid opening, whereupon Bid Security furnished by such bidders will be returned.

1.5.3 The Contractor will be required to furnish a performance bond and a payment bond, each in an amount equal to 100% of the contract price.

1.5.4 The Contractor will be required to comply with covenants relating to nondiscrimination in employment.

1.6 Contacts

The following Personnel will be the contacts for the duration of the project:

TRC Engineers - Joseph J. Procopio - Telephone (315) 671-1604
Email - jprocopio@trcsolutions.com

LFTCEDC - Jon Dawes – Telephone (518) 587-0945
Email – jdawes@LutherForest.org

1.7 List of Drawings

The following are a list of drawings provided for bidding purposes. A final set of Construction drawings for the listed drawings in addition to all AC Elementary, DC Elementary and wiring drawings, approximate total of 500, will be provided for construction.

1.7.1 List of Drawings for Luther Forest Station

Item	Drawing No.	Sheet No.	Rev. No	Date	Description
1	D-36040-E	1	D	10/16/09	General Plan
2	D-36051-E	1	B	06/26/09	Foundation Plans
3	D-36051-E	2	B	06/26/09	Foundation Plans
4	D-36068-E	1	C	10/16/09	Conduit Plan
5	D-36068-E	2	C	10/16/09	Conduit Plan
6	D-36069-E	1	C	10/16/09	Conduit and Grounding Details Above Grade
7	D-36069-E	2	C	10/16/09	Conduit and Grounding Details Above Grade
8	D-36069-E	3	C	10/16/09	Conduit and Grounding Details Above Grade
9	D-36069-E	4	C	10/16/09	Conduit and Grounding Details Above Grade
10	D-36069-E	5	C	10/16/09	Conduit and Grounding Details Above Grade
11	D-36069-E	6	C	10/16/09	Conduit and Grounding Details Above Grade
12	D-36069-E	7	C	10/16/09	Conduit and Grounding Details Above Grade
13	D-36069-E	8	C	10/16/09	Conduit and Grounding Details Above Grade
14	D-36069-E	9	C	10/16/09	Conduit and Grounding Details Above Grade
15	D-36069-E	10	C	10/16/09	Conduit and Grounding Details Above Grade
16	D-36069-E	11	B	10/16/09	Conduit and Grounding Details Above Grade
17	D-36069-E	12	A	10/16/09	Conduit and Grounding Details Above Grade
18	D-36070-E	1	C	10/16/09	Conduit and Grounding Details Below Grade
19	D-36071-E	1	--	10/16/09	Conduit and Cable Schedule
20	D-36071-E	2	--	10/16/09	Conduit and Cable Schedule
21	D-36071-E	3	--	10/16/09	Conduit and Cable Schedule
22	D-36071-E	4	--	10/16/09	Conduit and Cable Schedule
23	D-36071-E	5	--	10/16/09	Conduit and Cable Schedule
24	D-36071-E	6	--	10/16/09	Conduit and Cable Schedule
25	D-36071-E	7	--	10/16/09	Conduit and Cable Schedule
26	D-36071-E	8	--	10/16/09	Conduit and Cable Schedule
27	D-36071-E	9	--	10/16/09	Conduit and Cable Schedule
28	D-36071-E	10	--	11/12/09	Conduit and Cable Schedule
29	D-36071-E	11	--	10/16/09	Conduit and Cable Schedule
30	D-36071-E	12	--	11/12/09	Conduit and Cable Schedule

1.7.1 List of Drawings for Luther Forest Station

Item	Drawing No.	Sheet No.	Rev. No	Date	Description
31	D-36071-E	13	--	10/16/09	Conduit and Cable Schedule
32	D-36071-E	14	--	11/12/09	Conduit and Cable Schedule
33	D-36071-E	15	--	10/16/09	Conduit and Cable Schedule
34	D-36071-E	16	--	11/12/09	Conduit and Cable Schedule
35	D-36071-E	17	--	11/12/09	Conduit and Cable Schedule
36	D-36071-E	18	--	10/16/09	Conduit and Cable Schedule
37	D-36071-E	19	--	10/16/09	Conduit and Cable Schedule
38	D-36071-E	20	--	11/12/09	Conduit and Cable Schedule
39	D-36071-E	21	--	11/12/09	Conduit and Cable Schedule
40	D-36071-E	22	--	11/12/09	Conduit and Cable Schedule
41	D-36071-E	23	--	11/12/09	Conduit and Cable Schedule
42	D-36071-E	24	--	11/12/09	Conduit and Cable Schedule
43	D-36072-E	1	D	10/16/09	Cable Trench Plan
44	D-36074-E	1	C	10/16/09	Grounding Plan
45	D-36074-E	2	C	10/16/09	Grounding Plan
46	D-36075-E	1	C	10/16/09	Grounding Details
47	D-36086-E	1	C	10/16/09	Control Rooms 1 & 2 Electrical Equipment Plan
48	D-36087-E	1	C	10/16/09	Control Rooms 1 & 2 Electrical Equipment Elevations
49	D-36087-E	2	C	10/16/09	Control Rooms 1 & 2 Electrical Equipment Elevations
50	D-36095-E	1	A	10/16/09	Yard Lighting Plan
51	D-36096-E	1	A	10/16/09	Yard Lighting Junction Box
52	D-36096-E	2	A	10/16/09	Yard Lighting Junction Box
53	D-36096-E	3	A	10/16/09	Yard Lighting Junction Box
54	D-36097-E	1	A	10/16/09	Yard Lighting Junction Box Wiring Diagram
55	D-36097-E	2	A	10/16/09	Yard Lighting Wiring Diagram
56	D-36097-E	3	A	10/16/09	Yard Lighting Wiring Diagram
57	D-36098-E	1	A	10/31/09	H-Frame Takeoff Structure Line 1
58	D-36098-E	2	A	10/31/09	H-Frame Takeoff Structure Line 1
59	D-36098-E	3	A	10/31/09	H-Frame Takeoff Structure Line 1
60	D-36098-E	4	A	10/31/09	H-Frame Takeoff Structure Line 302
61	D-36098-E	5	A	10/31/09	H-Frame Takeoff Structure Line 302
62	D-36098-E	6	A	10/31/09	H-Frame Takeoff Structure Line 111
63	D-36098-E	7	A	10/31/09	H-Frame Takeoff Structure Line 111
64	D-36098-E	8	A	10/31/09	H-Frame Takeoff Structure Line 222
65	D-36098-E	9	A	10/31/09	H-Frame Takeoff Structure Line 222

1.7.1 List of Drawings for Luther Forest Station

Item	Drawing No.	Sheet No.	Rev. No	Date	Description
66	D-36099-E	1	A	10/31/09	H-Frame Takeoff Structure Line 3 and 308
67	D-36099-E	2	A	10/31/09	H-Frame Takeoff Structure Line 3 and 308
68	D-36099-E	3	A	10/31/09	H-Frame Takeoff Structure Line 3 and 308
69	D-36100-E	1	B	07/10/09	Steel Erection Plan
70	D-36100-E	2	B	07/10/09	Steel Erection Plan
71	D-36102-E	1	B	07/10/09	Reactor Stand
72	D-36104-E	1	C	07/10/09	115kV Switch Stand, 21' Bus Height
73	D-36104-E	2	C	07/10/09	115kV Switch Stand, 21' Bus Height
74	D-36105-E	1	C	07/10/09	115kV Switch Stand, 27' Bus Height
75	D-36105-E	2	C	07/10/09	115kV Switch Stand, 27' Bus Height
76	D-36106-E	1	B	07/10/09	115kV CVT Stand
77	D-36107-E	1	B	07/10/09	115kV CT/VT Stand
78	D-36108-E	1	B	07/10/09	115kV PT Stand
79	D-36109-E	1	B	07/10/09	115kV Bus Surge Arrester Stand
80	D-36110-E	1	B	07/10/09	3 Phase Low (21') Bus Support
81	D-36110-E	2	B	07/10/09	3 Phase Low (21') Bus Support
82	D-36110-E	3	B	07/10/09	3 Phase Low (21') Bus Support
83	D-36111-E	1	B	07/10/09	3 Phase High (27') Bus Support
84	D-36111-E	2	B	07/10/09	3 Phase High (27') Bus Support
85	D-36111-E	3	B	07/10/09	3 Phase High (27') Bus Support
86	D-36112-E	1	B	07/10/09	115kV Line Surge Arrester Stand
87	D-36113-E	1	B	07/10/09	60" Lightning Mast
88	D-36114-E	1	G	10/16/09	Electric Plan
89	D-36115-E	1	D	10/16/09	Electrical Elevations
90	D-36115-E	2	D	10/16/09	Electrical Elevations
91	D-36115-E	3	D	10/16/09	Electrical Elevations
92	D-36115-E	4	D	10/16/09	Electrical Elevations
93	D-36115-E	5	D	10/16/09	Electrical Elevations
94	D-36115-E	6	D	10/16/09	Electrical Elevations
95	D-36115-E	7	C	10/16/09	Electrical Elevations
96	D-36117-E	1	A	10/16/09	CVT Junction Box
97	D-36117-E	2	A	10/16/09	CVT Junction Box
98	D-36120-E	1	A	10/16/09	PT Junction Box
99	D-36123-E	1	A	10/16/09	CT/VT Junction Box
100	D-36125-E	1	A	10/16/09	Bus Differential Junction Box

1.7.1 List of Drawings for Luther Forest Station

Item	Drawing No.	Sheet No.	Rev. No	Date	Description
101	D-36141-E	1	C	10/16/09	AC Station Service Main Distribution Panel
102	D-36141-E	2	C	10/16/09	AC Power Panel Wiring Diagram
103	D-36141-E	3	C	10/16/09	AC Power Panel Wiring Diagram
104	D-36141-E	4	C	10/16/09	AC Power Panel Wiring Diagram
105	D-36141-E	5	C	10/16/09	AC Power Panel Wiring Diagram
106	D-36149-E	1	A	10/16/09	DFR #1 Point Assignments
107	D-36149-E	2	A	10/16/09	DFR #2 Point Assignments
108	D-36159-E	1	A	10/16/09	125VDC Power Panels Wiring Diagram
109	D-36159-E	2	A	10/16/09	125VDC Power Panels Wiring Diagram
110	D-36159-E	3	A	10/16/09	125VDC Power Panels Wiring Diagram
111	D-36160-E	1	F	10/16/09	One Line Ratings Diagram
112	D-36161-E	1	D	09/30/08	Single Line Diagram
113	D-36161-E	2	D	09/30/09	Single Line Diagram
114	D-36161-E	3	D	09/30/09	Single Line Diagram
115	D-36161-E	4	D	09/30/09	Single Line Diagram
116	D-36161-E	5	D	09/30/09	Single Line Diagram
117	D-36161-E	6	D	09/30/09	Single Line Diagram
118	D-36161-E	7	D	09/30/09	Single Line Diagram
119	D-36161-E	8	D	09/30/09	Single Line Diagram
120	D-36161-E	9	D	09/30/09	Single Line Diagram
121	D-36161-E	10	D	09/30/09	Single Line Diagram
122	D-36161-E	11	D	09/30/09	Single Line Diagram
123	D-36161-E	12	D	09/30/09	Single Line Diagram
124	D-36161-E	13	B	09/30/09	Single Line Diagram
125	D-36166-E	1	B	09/30/09	Panel Front Views A1 - A12
126	D-36166-E	2	B	09/30/09	Panel Front Views A1 - A12
127	D-36168-E	1	B	09/30/09	Panel Front Views B1 - B10
128	D-36168-E	2	B	09/30/09	Panel Front Views B1 - B10
129	D-36170-E	1	B	09/30/09	Panel Front Views C1 - C14
130	D-36170-E	2	B	09/30/09	Panel Front Views C1 - C14
131	D-36172-E	1	A	09/30/09	Sync Panel
132	D-36174-E	1	B	09/14/09	RTU #1 Point Assignments
133	D-36182-E	1	B	09/14/09	RTU #2 Point Assignments
134	D-36182-E	2	B	09/14/09	RTU #2 Point Assignments

1.7.2 List of Drawings for Stonebreak Road Station

Item	Drawing No.	Sheet No.	Rev. No	Date	Drawing Title
1	T1000	1	0	05/22/99	General Plan and Elevation
2	T10001	1	0	05/22/09	Grading Plan
3	T10002	1	0	05/22/09	Grading Sections and Details
4	T10003	1	0	05/22/09	Foundation Plan
5	T10004	1	0	05/22/09	Louver Fence Pier Foundations
6	T10005	1	0	05/22/09	Duct Bank Sections and Details
7	T10006	1	0	05/22/098	Typical Steel Pole Foundation Details
8	T10007	1	0	05/22/09	Retaining Wall and Fence Plan
9	T10008	1	0	02/13/09	Retaining Wall Elevation Venetian Aluminum Fence Details
10	T10009	1	0	05/22/09	Retaining Wall Elevation
11	T10010	1	0	05/22/09	Landscaping Plan
12	T10011	1	0	05/22/09	Ductline and Alignments
13	T10012	1	0	05/22/09	Cable Riser Structure
14	T10013	1	0	05/22/09	Cable Riser Structure
15	--	1	--	10/07/09	Cable Riser Structure Pothead Mounting Plate Adapter
16	--	1	--	10/07/09	Cable Riser Structure Riser Cable Support Adapter
17	T10014	1	0	05/22/09	Cable Riser Structure Foundation
18	T10015	1	0	05/22/09	Grounding Plan
19	T10016	1	0	05/22/09	Grounding Details
20	T10022	1	A	12/21/09	Take Off Structure & Anchor Bolt

1.8 Proposal Submittals

Three (3) copies of contractor proposals shall be submitted to:

Mr. Jon Dawes, VP LFTC EDC
LFTCEDC
28 Clinton Street
Saratoga Springs, New York 12866-2110

	BID FORM #1 **Luther Forest Station**		
Item	**Description**	**Unit**	**Total Lump Sum**
1.	Mobilization and site access	L.S.	$
2.	Assist and work with the Testing and Commissioning contractor for all equipment	L.S.	$
3.	Temporary power	L.S.	$
4.	Temporary facilities including job trailer	L.S.	$
5.	Establish all horizontal and vertical survey control points	L.S.	$
6.	Provide construction layout/benchmarks/baselines for all necessary construction	L.S.	$
7.	Move all station steel structures from storage, assemble, erect, orientate, adjust, plumb, level and anchor to the foundation, connect to ground	L.S.	$

	BID FORM #1 **Luther Forest Station**		
Item	**Description**	**Unit**	**Total Lump Sum**
8.	Install all high voltage electrical power equipment	L.S.	$
9.	Install all bus conductor and connectors	L.S.	$
10.	Furnish and install all above grade conduits	L.S.	$
11.	Install and terminate all control, communication, low voltage power and fiber optic cables from the yard equipment to the control building equipment	L.S.	$
12.	Install and terminate all control, communication, low voltage power and fiber optic cables between equipment within the control building	L.S.	$
13.	Install all protective relay, control, metering and monitoring switchboard panels, EMS RTU Cabinet, the Sync Panel and the DFR panel	L.S.	$
14.	Furnish and install all yard lights. Furnish and install the yard lighting cabinet, yard junction boxes and all yard lighting circuits and equipment, SF6 circuit breaker gas cart outlets, outdoor equipment junction boxes and cabinets, fiber optic splice boxes	L.S.	$
15.	Install all DC batteries, chargers, panels, disconnect and throwover switches, eye washes, miscellaneous indoor equipment	L.S.	$
16.	Furnish and install all identification, safety and warning signs and labels	L.S.	$

	BID FORM #1 **Luther Forest Station**		
Item	**Description**	**Unit**	**Total Lump Sum**
17.	Site cleanup, seeding, restoration and demobilization.	L.S.	$
Luther Forest 115 KV Station Total Lump Sum Price (Add Items 1 - 17)		L.S.	$

1.8 Proposal Submittals (continued)

	BID FORM #2 **Stonebreak Road Station**		
Item	**Description**	**Unit**	**Total Lump Sum**
1.	Mobilization and site access	L.S.	$
2.	Assist and work with the Testing and Commissioning contractor for all equipment	L.S.	$
3.	Temporary power	L.S.	$
4.	Temporary facilities including job trailer	L.S.	$
5.	Establish all horizontal and vertical survey control points	L.S.	$
6	Provide construction layout for all construction	L.S.	$
7.	Move all station steel structures from storage, assemble, erect, orientate, adjust, plumb, level and anchor to the foundation, connect to ground	L.S.	$
8.	Furnish and install ground connections to all structures and equipment	L.S.	$

	BID FORM #2 **Stonebreak Road Station**		
Item	**Description**	**Unit**	**Total Lump Sum**
9.	Install all high voltage electrical power equipment	L.S.	$
10.	Furnish and install bus conductor and connectors	L.S.	$
11.	Furnish and install all identification, safety and warning signs and labels	L.S.	$
12.	Site cleanup, seeding, restoration and demobilization.	L.S.	$
Stonebreak Road 115 KV Station Total Lump Sum Price (Add Items 1 - 12)		L.S.	$

LUMP SUM ITEMS

The total lump sum price for each item shall include all labor, tools, equipment and materials required to complete the work in its entirety. The total lump sum price shall exclude sales tax. Sales tax shall be identified as a separate line item. The Contractor shall determine his material quantities for each lump sum item based on the elevations, limits and dimensions included in the Contract Specifications, Reference Drawings and/or field measurements.

ADDITIONAL ITEMS/WORK

NO additional work shall commence without a written Authorization for Contract Change (ACC) by the Owner prior to the start of the additional work.

1.8 Proposal Submittals (continued)

SCHEDULE OF COMMENCEMENT AND COMPLETION

Bids will be due February 17, 2010 by 4 PM. Anticipated award date will be on or before February 24, 2010. The Contractor agrees if awarded the Contract, that they shall commence the work not later than five (5) calendar days after they receipt of notice to proceed from the Owner. The work shall progress with all reasonable speed and diligence so as to be fully completed on or before July 31, 2010.

The Contractor shall submit with his bid a detailed statement of conformance to the specification. The statement shall be of such detail as to illustrate the Contractor's complete understanding of the work required. The Contractor shall use the scope of work detailed in this specification as a basis for the statement of conformance. It shall indicate all services, which will be provided, and those in which the opinion of the Contractor should be provided but have not been requested. Submittal of the statement of conformance will not relieve the successful Contractor of any responsibilities specified in the construction specification, construction drawings and pre-bid meeting.

MINORITY/WOMEN'S BUSINESS ENTERPRISE UTILIZATION GOALS

EMPIRE STATE DEVELOPMENT CORPORATION

Empire State Development Corporation has established the following Minority/Women's Business Enterprise (MBE/WBE) utilization goals for this Project. The goal is expressed as a percentage of the total bid price.

Minority Business Enterprise Utilization Goal	5%
Women's Business Enterprise Utilization Goal	5%

Information related to the current certification status of Minority or Women's Business Enterprises can be obtained by contacting:

Empire State Development
Division of Minority and Women's Business Development
30 South Pearl Street
Albany, NY 12245
518-292-5250

The Contractor shall acknowledge the goals set forth herein in the Bid and shall designate a person who will have the responsibility for tracking usage by Contractor of Minority or Women's Business Enterprises in connection with the Project.

1.8 Proposal Submittals (continued)

SUBCONTRACTORS AND SUPPLIERS

We plan to use the following subcontractors and suppliers for operations as indicated:

Work to be performed	Subcontractor's & suppliers name & address	Approximate value

The Contractor agrees that this bid is to continue open for acceptance and is irrevocable until 90 days from the Bid Due Date.

Name, Signature and Title of Individual Preparing Bid

Name of Contractor (Firm, Corporation or Company)

Address

City, State, Zip Code

Telephone

1.8 Proposal Submittals (continued)

ADDITIONS AND DELETIONS

Unit prices, inclusive of General conditions, will be used for additions and deletions to the base contract as required. All units are in place costs.

ITEM	UNIT	ADDITION/DELETION
1. Install 115kV station post insulator	EA.	
2. Furnish and install conduit 2”	FT.	
3. Furnish and install conduit 4”	FT.	
4. Furnish and install ground grid conductor	FT.	
5. Pull, install and terminate low voltage cable (various sizes)	FT.	
6. Pull, install and terminate fiber optic cables	FT.	
7. Install an additional 120VAC or 208VAC or 125VDC power circuit	EA.	
8. Additional mobilizations	EA.	
9. Additional demobilizations	EA.	

COMPANY NAME _____

SIGNATURE _____

TITLE _____

DATE _____

1.8 Proposal Submittals (continued)

INFORMATION TO BE SUBMITTED

The Contractor shall submit with his bid a detailed bar chart schedule reflecting different phases of work and when each phase will be carried out including dates for critical milestone lead time items. In addition to the bar chart schedule the Contractor shall submit the required bid security and performance bond information. Should the Contractor take exception to the stated dates in the Schedule of Commencement and Completion section then the Contractor shall fill in the following information:

Starting Date _____Calendar Days after Written Notification of Award.

Construction Duration _____Calendar Days from Start to Contract Completion.

The Contractor shall also submit a fully loaded hourly labor rate schedule for all trades to be utilized on the project along with all hourly equipment rates including operator.

2.0 Terms and Conditions

2.1 Scope of Work

2.1.1 The Contractor shall perform all the Work in conformance with all applicable permits, Federal, State, and Local engineering, construction, safety, environmental, building and electrical codes, regulations, standards, directives, requirements, rules, regulations, laws and ordinances.

2.1.2 The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, procedures, safety and compliance programs in connection with the performance of the work.

2.1.3 A performance bond and a labor and materials payment bond are required as part of the final contract. No other bonds are required for the contract.

2.1.4 The correction of all errors, omissions or deficiencies due to the Above Grade Construction Contractor is the responsibility and expense of the Above Grade Construction Contractor.

2.2 Personnel

2.2.1 The Contractor shall provide a competent full time superintendent satisfactory to the Owner, at the Site during the progress of the Work to ensure that the Work is being performed in accordance with the contract. The superintendent shall not be removed from the Project without the Owner's prior written approval. The superintendent shall represent the Contractor, and all directions given the superintendent shall be binding as if given to the Contractor.

2.3 Changes in Work

2.3.1 No additions to, deletions from, or alterations in the Work and no amendment or repeal of, and no substitution for any terms, conditions, provisions or requirements of the Agreement shall be made unless first authorized in writing by the Owner.

2.4 Payment

2.4.1 The Contractor shall submit invoice(s) monthly by the 25th of each month to the Field Representative. The owner will have 40 days from the 25th to distribute payment to the Contractor. Each invoice shall reference the Owner's Purchase Order Number. Said invoice(s) shall include cost breakdowns and unit quantities as specified by the Owner. The Contractor shall submit, along with each invoice, a lien release in the form as provided by LFTCEDC or the Engineer at the time the contract is executed. Each monthly invoice must contain lien releases from the Contractor and each subcontractor.

2.4.2 Ten percent (10%) of each invoice shall be retained by the Owner until Final Acceptance by the Owner.

2.4.3 Not less than the prevailing rate of wages as determined by the New York State Department of Labor shall be paid to all laborers, workers and mechanics performing work under this contract. All of the Contractor's bonds shall include a provision as will guarantee the faithful performance of such prevailing wage clause as provided by the contract. In addition, Contractor shall ensure that the above requirements are included in all its contracts and any layer of subcontracts for activities for the Project.

2.5 Liability

2.5.1 If any act or omission to act on the part of the Contractor or its Subcontractors or any person under their control causes in whole or part, death or injury to any person, including but not limited to the Owner's or the Owner's affiliates' employees, or any damage to, environmental contamination of, or destruction of any property, including but not limited to property of the Owner or the Owner's affiliates, the Contractor shall be liable for any claims, losses, damages and costs (including legal expenses) arising there from.

2.5.2 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless, and at the Owner's option, defend the Owner, its affiliates and their officers, directors, employees, agents, successors, assigns, and servants, from and against any and all claims and/or liability for damage to property, injury or death of any person, including but not limited to, the Contractor's employees, Subcontractors, and the Subcontractor's employees, or any other liability incurred by the Owner or its affiliates, including expenses, legal or otherwise, caused wholly or in part, by any act or omission, negligent or otherwise of the Contractor, its Subcontractors and their officers, directors, employees, agents, servants, or assigns, arising out of or connected with the Agreement, regardless of whether caused in part by a party indemnified hereunder.

2.5 Liability (continued)

2.5.3 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless, and at the Owner's option, defend the Owner and its affiliates and their officers, directors, employees, agents, servants, and assigns from and against any liability, loss, or expense arising by reason of claims by any third party, including, but not limited to, the Contractor's employees, Subcontractors, and Subcontractors' employees as a result of the actual or asserted failure, omission, or neglect of the Contractor to comply with the Agreement.

2.5.4 The obligations under this section shall not be limited in any way by any limitation on the Contractor's insurance or by a limitation on the amount or type of damages. In addition, the obligations under this section shall not be limited in any way by any compensation or benefits payable by or for the Contractor or any Subcontractor under worker's compensation acts, disability benefit acts or other employee acts.

2.5.5 The Owner shall not be liable to the Contractor for consequential, special, incidental, multiple, or punitive damages (including attorney's fees or litigation costs) for performance or non-performance of the Agreement or for any actions undertaken in connection with or related to the Agreement, including without limitation damage claims based on causes of action for breach of contract, tort (including negligence), or any other theory of recovery.

2.5.6 The Contractor shall at all times conduct operations in a manner to ensure the safety of the general public and to avoid the risk of loss, theft, or damage by vandalism, sabotage, or any other means. The Contractor shall continually inspect the Project, materials, and equipment to discover and determine any conditions that might involve such risks and shall be solely responsible for discovery, determination, and correction of any such conditions.

2.6 Insurance

TRADE CONTRACTOR'S INSURANCE

Prior to start of the Trade Contract Work, the Trade Contractor shall procure for the Trade Contract Work and maintain in force Workers' Compensation insurance, Employer's Liability insurance, Comprehensive Automobile Liability insurance, Comprehensive or Commercial General Liability insurance on an occurrence basis, and any other insurance required of Trade Contractor under the Trade Contractor Agreement. The Trade Contractor's insurance shall include contractual liability insurance covering the Trade Contractor's obligations under this Trade Contractor Agreement. All policies procured by the Trade Contractor pursuant to this provision shall name the Owner, the Construction Manager, the Architect/Engineer, Consultants and their agents and employees as additional insured, and shall be primary and non-contributory to any insurance carried by these additional insured. Contractor's policy shall provide coverage for liability arising out of the acts or omissions of its Subcontractors. Each Subcontractor employed on site by the Contractor shall provide comprehensive liability insurance in accordance with the requirements of the Contractor described herein. Such insurance requirements shall be submitted to the Trade Contractor as part of the Subcontractor approval process.

2.6.1 The Contractor shall provide and maintain, at its own expense, insurance policies issued by reputable insurance companies with an A. M. Best rating of at least B+ that meet or exceed the following requirements:

A. Workers' Compensation and Employers Liability Insurance, as required by New York State.

B. Public Liability, including Contractual Liability and Products/Completed Operations coverage, covering all operations to be performed under this Agreement, with minimum limits of:

1. Bodily Injury - $2,000,000 per occurrence

2. Property Damage - $2,000,000 per occurrence

C. Automobile Liability, covering all owned, non-owned and hired vehicles used under or in connection with this Agreement, with minimum limits of:

1. Bodily Injury - $1,000,000 per occurrence

2. Property Damage - $1,000,000 per occurrence

3. Combined Single Limit - $2,000,000 per occurrence

2.6 Insurance (continued)

D. Excess Liability or Umbrella Liability – coverage with a minimum per occurrence limit of $9,000,000.

Contractor shall provide certificates of insurance to the Owner evidencing these specified coverages and showing LFTCEDC, NYS Urban Development Corporation dba Empire State Development Corporation, the Town of Stillwater and TRC as an additional insured.

2.7 Safety

2.7.1 The Contractor shall be solely responsible and assume all liability for the safety and supervision of its employees and other persons engaged in the Work or on the Site. The Contractor shall establish and effectively and continuously implement a safety program. The Contractor shall, and shall require its Subcontractors and their employees to comply with all applicable Federal, state and local safety directives, requirements, rules, regulations, laws and ordinances, whether the same are in force upon the execution of the Agreement or may in the future be passed, enacted or directed, including without limitation, compliance with the safety regulations and standards adopted under the Occupational Safety and Health Act of 1970 (OSHA), as amended from time to time. The Contractor shall continually inspect the Project and supervise its personnel to determine and enforce compliance with the above provisions.

2.7.2 The Contractor shall, and shall require its Subcontractors and their employees to comply with the Contractor's Safety Requirements and all established Project safety rules as they may be amended from time to time and to take all necessary safety and other precautions to protect property and persons from damage or injury arising out of performance on the Project, whether the same are in force at the execution of this Agreement or may in the future be passed, enacted or directed.

2.7.3 The Contractor shall provide adequate safeguards, safety devices and protective equipment and enforce their use and take any other needed actions to protect the life, health and safety of the public and to protect property in connection with its performance on the Project.

2.7.4 The Contractor shall at its sole expense provide adequate first aid facilities and shall make those facilities available for the treatment of persons who may be injured or become ill at the Site or while engaged in the performance of Work.

2.8 Permits, Licenses, Laws and Regulations

2.8.1 Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Unless otherwise specified, permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner. In either case the Contractor shall be responsible for prosecuting its Work in accordance with the provisions of all applicable permits and licenses.

2.8.2 The Contractor shall complete the Work so that it complies with all applicable laws, rules, regulations, requirements, orders, directives, ordinances, codes and standards of all Federal, State, and Local governmental agencies having jurisdiction over the Owner and its affiliates, the Contractor, the Subcontractors, or the Project, whether the same are in force at the execution of this Agreement or may in the future be passed, enacted or directed.

2.9 Environmental Protection

2.9.1 The Contractor shall comply with all permit conditions, the Owner's policies set forth in the Agreement, and all applicable Federal, state and local environmental laws, requirements, orders, directives, rules, regulations, ordinances, and codes whether the same are in force at the execution of this Agreement or may in the future be passed, enacted or directed. The Contractor shall immediately notify the Owner of any citations or notices incurred on the Project and forward copies thereof immediately upon receipt to the Owner.

2.9.2 The Contractor shall conduct all operations in such a manner to minimize the impact upon the natural environment and shall comply with all solid waste, hazardous waste, health and safety, notice, training, and environmental protection laws, rules, regulations, requirements, orders, directives, ordinances, codes and standards, of all Federal, State and Local governmental agencies having jurisdiction over the Owner and its affiliates, the Contractor, the Subcontractors, or the Project, whether the same are in force at the execution of this Agreement or may in the future be passed, enacted or directed.

2.9.3 The Contractor shall provide the owner with Material Safety Data Sheets covering all materials furnished under or otherwise associated with the work under this agreement, or provide the owner with a document certifying that the Material Safety Data Sheets are not required for each such material.

2.9 Environmental Protection (continued)

2.9.4 If any violation of environmental permits, licenses and other environmental regulations or statutes occurs, the Contractor shall take immediate action to mitigate any further violation. The Contractor shall immediately notify the owner of the violation.

2.9.5 The Contractor shall, at its sole expense, defend, indemnify and hold harmless the Owner and its affiliates and their officers, directors, employees, agents, servants, and assigns from and against all liabilities to third parties (including governmental entities), whether civil or criminal, and all costs and expenses incurred by the Owner, its affiliates, third parties including other contractors and the Contractor as a result of the Contractor's noncompliance with this Article.

3.0 Summary of Work

3.1 Definitions

Backfill, Common	Soil suitable for use as backfill consisting of any mixture of sand and gravel. Rocks less than 6" in diameter and silt may also be included in the mixture.
Backfill, Select	Well-graded gravel, well-graded sandy gravel, or a mixture of these materials for use as backfill also called Select Borrow.
Conservation Seed Mix	A mix of annual and perennial grass seed. For local Conservation Seed Mix contact the Soil & Water Conservation District at (518) 885-6900 ext - 3.
Engineer	An entity reporting directly to the Owner responsible for the engineering design drawings and specifications.
Environmental Monitor	A person reporting directly to the Owner responsible for monitoring the Contractor's environmental compliance and who will provide advice and guidance on issues involving Wetlands.
Field Representative	A person reporting directly to the Owner responsible for monitoring the Contractor's compliance with the design drawings and specifications.
Materials	The components used in the construction of a Project

3.1 Definitions (continued)

Material Storage Yard	An area which is kept secured by the Contractor, and where Materials are kept after being issued to the Contractor but before being used for a Project.
Owner	Luther Forest Technology Campus Economic Development Corporation (LFTCEDC)
Plan, Resource	The document prepared by the Contractor and submitted to the Owner which describes the quantities and types all labor, equipment, Contractor furnished Materials, and other resources to be used on a Project and how those resources are to be allocated to the Project through the duration of the Agreement.
Plan, Work	The document prepared by the Contractor and submitted to the Owner describing how the Scope of Work comprising a Project is to be accomplished.
Regulated Wetland Area	An area which is regulated because it is a Wetland or within the buffer zone of a Wetland as defined by the regulations of the state in which the Work is being done.
Right-of-Way	The strip of land where the Owner has legal rights to construct, operate, and maintain an electric power line and in which the Work is to be done.
Road, Access	A minimum 12’ surface within a 20’ access route between an existing public way and the Right-of-Way on which Equipment is driven.
Route, Access	A minimum 20’ wide area within a right of way utilized to move personnel and Equipment from an existing public way to the right-of-way.
Route, Construction	An improved or unimproved way utilized to move personnel and Equipment along and across the Right-of-Way.
Staging Area	An area used by the Contractor during a Project for marshaling personnel and equipment.
Wetland	An area that meets the definition of a wetland by an applicable Federal, state or local statute or regulation. Wetlands include swamps, marshes, bogs, streams, rivers, ponds, and lakes.

3.2 Materials

3.2.1 Contractor Furnished Materials

A. The Contractor shall furnish all material required for the completion of the Work shown on the project drawings and /or listed in the specification except those materials as specifically indicated to be supplied by the Owner.

B. All Materials shall be of good quality and new, except as otherwise provided in the Specifications. If required by the Owner, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of Materials and equipment. All Materials shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable supplier except as otherwise provided in the Specifications.

C. If Materials are specified by using the name of a proprietary item or the name of a particular manufacturer, fabricator, supplier or distributor, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, Materials or equipment of other manufacturers, fabricators, suppliers or distributors may be accepted by the Owner if sufficient information is submitted by the Contractor to allow the Owner to determine that the Materials or equipment proposed are equivalent to that named.

D. The Contractor shall provide certificates for Materials furnished by the Contractor which demonstrate proof of compliance with applicable Specifications or Drawings. Each certificate shall be executed in three (3) copies and shall be signed by an authorized official of the manufacturing company. Each certificate shall show the name and address of the Contractor, the Project title and location and the quantity and dates of shipments or deliveries to which the certificates apply. Certification shall not be construed as relieving the Contractor from furnishing satisfactory Materials if subsequent tests show that the Materials do not meet the specific requirements.

E. The Contractor shall submit shop drawings to the Field Representative for approval prior to beginning fabrication or installation of any of the Contractor furnished Material. Shop drawings shall be submitted in three (3) copies. Approval of shop drawings shall not be construed as relieving the Contractor of the responsibility of furnishing satisfactory Materials. Manufacturers' literature and drawings shall be submitted for all items which the Contractor is to supply.

3.2.1 Contractor Furnished Materials (continued)

F. The procedure for review by the Owner of requests for substitute items will be as set forth in the following paragraphs.

1. Requests for review of substitute items of Materials and Equipment will not be accepted by the Owner from anyone other than the Contractor. If the Contractor wishes to furnish or use a substitute item of Material or Equipment, the Contractor shall make written application to the Owner for acceptance thereof, certifying that the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substances to that specified and be suited to the same use and capable of performing the same function as that specified. The application shall state whether or not acceptance of the substitute for use in the Work shall require a change in the Drawings or Specifications to adapt the design to the substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified shall be identified in the application and available maintenance, repair and replacement service will be indicated.

2. The Owner will be allowed a reasonable time within which to evaluate each proposed substitute. The Owner will be the sole judge of acceptability, and no substitute shall be ordered, installed or utilized without the Owner's prior written acceptance which shall be evidenced by a reviewed shop drawing. The Owner may require the Contractor to furnish a special performance guarantee or other surety with respect to any substitute. The Owner will record time required by the Owner in evaluating substitutions proposed by the Contractor and in making changes in the Specifications occasioned thereby.

3.2.2 Storage and Care

A. The Contractor shall store and care for the Materials in the most suitable manner, subject to the review and approval of the Field Representative, to protect them from loss or damage from any cause whatsoever. Outside storage in Material Storage Yards is generally acceptable, provided mats, dunnage, pallets or other approved items are used to protect the Materials from moisture and contaminants. Slings for handling the Material shall be of such material or protected in such a way as not to damage the Material. There is material and equipment required for the project which will require indoor storage and shall be stored indoors.

3.3 Access

3.3.1 Use of Roads

A. The Contractor shall use only established roadways or new roadways approved by the Owner as may be necessary for the performance of the Work. Where materials are transported in the execution of the Work, vehicles shall not be loaded beyond the loading capacity prescribed by any Federal, State or local law or regulation. When it is necessary to cross curbings or sidewalks, protection against damage shall be provided by the Contractor. Any damaged roads, curbings, or sidewalks shall be repaired by, or at the expense of, the Contractor.

3.3.2 Contractor's General Responsibilities

A. Access roads, as indicated on the Drawings, will be available for use by the Contractor; however, the Contractor shall make his own assessment of the suitability of access roads for his use. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, any landowners on whose property the roads lie and their agents, and employees from and against all claims, damages, losses, and expenses, including, but not limited to, attorney's fees arising out of or resulting from the use of any access road.

B. The Contractor shall establish roadways as may be necessary for the performance of the Work. Unless directed otherwise, these roadways shall be left in place for future maintenance activities. The roads shall be built in accordance with the Drawings and Specifications with particular attention to erosion control and existing land use. The Contractor may use the access roads provided by the Owner as he deems necessary; however, these access roads used by the Contractor must be left in a condition equal to or better than the condition that existed prior to construction. Construction roads on the right-of-way shall be routed by the Contractor subject to the approval of the Field Representative. Stream and wetland crossings by roads shall be made where shown on the Drawings. Roads shall be routed to avoid prohibited areas such as "no vehicular access areas," archeological and historical areas, and trails not available for use as shown on the Drawings.

C. Discharge of dredged or fill material into waters of the United States or their adjacent wetlands other than the required fill roads, fords, culverts, mat roads, bridges, and structure pads shown on the Drawings shall not be allowed. Waters of the United States include inland rivers lakes, streams, and wetlands.

D. Access roads and construction roads shall be maintained by the Contractor through completion of the Work.

3.3.2 Contractor's General Responsibilities (continued)

E. Public roads subject to interference by the operations of the Contractor shall be kept open or detours shall be provided at the expense of the Contractor. The Contractor shall provide, erect, and maintain all necessary barricades, sufficient red light warning and danger signals, and signs and shall take all necessary precautions for the protection of the Work and the safety of the public, all in accordance with the requirements of the applicable officials. Highways and roads closed to traffic or under repair shall be protected by effective barricades on which shall be placed approved warning and detour signs. Signs shall be placed, in clear view, at all points of ingress and egress to public and well traveled private roads. All barricades and obstructions shall be illuminated or reflectorized at night and all lights shall be kept burning from sunset until sunrise.

F. The Contractor shall brief all his personnel concerning the location of areas prohibited to vehicular equipment and wetlands and the requirement that vehicles and equipment, other than hand held, are not allowed in these areas.

G. Town Roads

It is the Contractor's responsibility to coordinate the use and upgrading of town roads with the appropriate town. The Contractor shall adhere to all requirements set forth by local governing authorities.

3.4 Environmental Protection

3.4.1 The Contractor shall make every reasonable effort to perform the Work in a manner which will minimize adverse impacts to the environment.

3.4.2 The Contractor shall be responsible for monitoring the Work and its compliance with environmental laws, rules, regulations, ordinances, codes, orders of condition, and standards of all local, state, and Federal governmental agencies having jurisdiction over the Work and with the provisions of the Agreement.

3.4.3 The Contractor shall provide the Field Representative with the name and 24-hour telephone number(s) of the person with responsibility for ensuring compliance seven days prior to the commencement of Work.

3.4.4 Erosion Control

A. The Contractor shall prevent soil erosion resulting from the Work. The method(s) of controlling soil erosion shall be subject to the review and approval of the Field Representative.

3.4 Environmental Protection (continued)

B. Siltation and erosion control materials acceptable to the Owner must be kept on Site at all times.

C. Installation of controls shall be in accordance with the Drawings.

3.4.5 Wetlands

A. General

No changes in grade, permanent removal of vegetation, or changes in hydrology are authorized within Wetlands.

B. Operation of Equipment within Wetlands

1. The operation of vehicles traveling in Wetlands shall be confined to existing Access and Construction Routes to the maximum extent possible.

2. Any vehicles used by the Contractor in Wetlands shall be operated on swamp mats or below-ground-pressure tracked vehicles or low-ground-pressure wide-tire vehicles unless otherwise directed by the Environmental Monitor and Field Representative. Swamp mats shall be constructed of wood that has not been treated with any preservative, unless otherwise approved by the Owner. Low-ground-pressure vehicles are defined as those whose average ground pressure does not exceed 650 pounds per square foot.

3. Ruts created by low-ground-pressure vehicles may not exceed six inches in depth, and vegetation may not be excessively disturbed without the approval of the Environmental Monitor and the Field Representative.

4. If, when using vehicles in a Wetland, ruts in excess of six inches in depth are created or excessive disturbance of vegetation occurs, the use of such vehicles shall immediately be stopped. The Environmental Monitor and Field Representative shall then direct the steps to be implemented to repair and mitigate rutting.

5. The use of multiple Access or Construction Routes within a Wetland in order to increase the number of vehicle trips through a Wetland without swamp mats are not authorized.

3.4.5 Wetlands (continued)

6. Fuel, oil, and hazardous materials shall not be stored within 100 feet of Wetlands. Field refueling, equipment, and prevention of spillage shall all be strictly in compliance with the requirements of the applicable section(s) of this Specification.

7. Equipment containing petroleum or hazardous materials may not be left unattended in Wetlands during non-working hours unless the Equipment is on swamp mats and unless leaving the Equipment is authorized by the Environmental Monitor and Field Representative.

C. Erosion and Sedimentation Control

1. The Contractor shall protect against erosion or sedimentation of soil into Wetlands resulting from the Work.

2. At all Work Sites and Construction and Access Routes located in Regulated Wetland Areas where top soil is expected to be disturbed, erosion and sedimentation controls consisting of hay bales and/or siltation fence shall be installed in accordance with the Drawings prior to the disturbance of the top soil. These controls are required even under frozen ground conditions.

3. No excavated material shall be placed directly into a Wetland. Excavated material that is to be used as backfill may be temporarily stockpiled on geotextile fabric or a swamp mat adjacent to the Work Site if properly protected by erosion and sedimentation controls. Neither excess excavated material nor geotextile fabric may be left in a Wetland after work at a Work Site is complete. Methods of removing excess excavated material from Wetlands shall be subject to the review and approval of the Environmental Monitor and Field Representative. In areas adjacent to - but not in - Wetlands, excess excavated material may be spread around the Work Site with the approval of the Environmental Monitor and Field Representative. Natural drainage channels shall not be blocked.

3.4.6 Archeological and Historical Objects

The Contractor shall immediately notify the Field Representative if any suspected archeological or historical objects are identified during performance of the work. The Field Representative will advise the Contractor on the mitigation measures that will be necessary.

3.4.7 Noise Control

The Contractor shall control noise at all times to the extent possible. Air compressors shall be equipped with silencers and the exhaust of all gasoline engines and other power equipment shall be provided with mufflers.

3.4.8 Dust Control

The Contractor shall control nuisance dust by applying water and/or a dust palliative, other than calcium chloride, for the alleviation or prevention of dust nuisances caused by construction operations. The Contractor shall operate vehicles to minimize dust nuisances.

3.4.9 Equipment

A. Equipment shall be in good working order, be properly maintained, and be properly operated.

B. Equipment shall not leak fluids.

C. Smoke from equipment shall be minimized at all times to the extent possible.

3.4.10 Prevention of Spillage

Chemicals, fuels, oils, greases, bituminous materials, solids, waste washing, concrete or similar substances used in construction operations shall be properly stored and handled to prevent accidental spills and contamination of surface waters and ground waters. Oil spill kits and other appropriate remedial supplies shall be kept on-site at all times and on each vehicle at all times.

3.4.11 Field Refueling and Maintenance Operations

A. Refueling

Refueling shall not take place in Regulated Wetland Areas or in or within 100 feet of environmentally sensitive areas such as Wetlands or drinking water sources. Refueling should be done on a paved area if possible. Refueling operations shall be continuously monitored for fuel spills, drips, or seeps. If spills, drips, or seeps occur, refueling operations shall be stopped until the source is found and repaired. All spills or drips of fuel shall be properly cleaned up.

B. Grease, Oil, and Filter Change

Routine maintenance lubrication and oil changes shall not take place in Regulated Wetland Areas or within 100 feet of environmentally sensitive areas such as Wetlands and drinking water sources. Lubrication and oil changes should be done on a paved area if possible. All reasonable environmental and safety precautions shall be taken. Waste oil and lubricants shall be collected and properly disposed of. All spills and drips of grease or oil shall be properly cleaned up.

C. Other Field Maintenance Operations

Other vehicle or equipment maintenance operations shall not take place in or within 100 feet of environmentally sensitive areas such as Wetlands or drinking water sources if at all possible. Maintenance operations should be performed on a paved area if possible. If the maintenance operations must be done in or within 100 feet of an environmentally sensitive area, extraordinary precautions shall be taken to prevent oil or hazardous material from being released to the environment. These precautions include, but are not limited to, use of portable basins or similar secondary containment devices, use of ground covers such as plastic tarpaulins, and precautionary placement of floating booms on nearby surface water bodies. If the maintenance operations will be done away from an environmentally sensitive area, all reasonable environmental and safety precautions shall be taken.

3.4.12 Temporary Facilities

The Contractor shall provide all temporary facilities required for the Work covered in this specification including but not limited to temporary power, office trailer, telephone, water and toilets. Portable, self-contained chemical toilets shall be provided for all workers when permanent toilets are not available. The portable toilets shall be maintained and cleaned regularly and wastes shall be properly disposed of.

3.5 Clean-up and Restoration

3.5.1 Clean-up

The Contractor shall at all times during the progress of the work keep all construction areas, including Staging Areas and Material Storage Yards, free from removed materials, waste material, and rubbish. Materials, waste material, and rubbish removed from the construction areas shall be properly disposed of.

3.5.2 Restoration

Unless otherwise specified below, Work Site and Right-of-Way restoration of disturbed areas shall be completed as soon as possible after the work is performed. If the work is to be done in phases, the disturbed area must be stabilized between phases so as to not degrade further.

3.5.3 Restoration/Clean-up Standards

A. Unless otherwise specified below, all disturbed areas, including Wetlands and Access and Construction Routes, shall be returned to original grade, seeded with a Conservation Seed Mix, and mulched with hay.

B. Yards, lawns, agricultural areas, and other improved areas shall be returned to a condition at least equal to that which existed at the start of the Project.

C. Access Roads and Construction Roads shall be returned to a condition at least equal to that which existed at the start of the Project except that Access and Construction Roads shall, at a minimum, be serviceable for four-wheel drive vehicles. Ruts shall be removed from Access and Construction Roads. Seeding and/or mulching of Access or Construction Roads is not required unless necessary to prevent erosion.

D. All damage to property occurring as a result of a project shall be immediately repaired or replaced. In some locations, it may be desirable to document preexisting damage prior to the project in order to demonstrate afterwards that the damage did not result from the Project.

E. After all work is completed; swamp mats and temporary bridges shall be removed. Removal of swamp mats and temporary bridges must be done in accordance with the Environmental Protection section of this Specification.

3.5.3 Restoration/Clean-up Standards (continued)

F. After all work has been satisfactorily completed and vegetation has been reestablished, and upon approval by the Environmental Monitor and Field Representative, all siltation fence shall be removed, stakes from hay bales shall be removed, and the strings on the hay bales cut and properly disposed of. Hay bales which were used for sedimentation or siltation control may be used to mulch disturbed areas. Remaining hay bales which do not block the flow of water may be left in place. Hay bales which block the flow of water must be moved. Siltation fence and hay bale stakes shall be disposed of properly off site.

G. Any stone wall removed or breached by construction activities shall be repaired or rebuilt, unless directed otherwise by the Field Representative. Rebuilt stone walls shall be placed on the same alignment that existed prior to temporary removal.

H. After all work has been satisfactorily completed, the Contractor shall remove all work-related trailers, buildings, rubbish, waste soil, temporary structures, and unused materials belonging to him or used under his direction during construction, or waste materials from previous construction and maintenance operations. All areas shall be left clean and restored to a stable condition and where feasible, as near as possible to its original condition, as determined by the Field Representative.

I. Upon completion of all Work, all Material Storage Yards and Staging Areas shall be completely cleared of all waste and debris. Unless otherwise directed or unless other arrangements have been made with an off right-of-way land owner, Material Storage Yards and Staging Areas shall be returned to the condition which existed prior to the installation of the Material Storage Yard or Staging Area. Whether or not arrangements have been made with a land owner, all areas shall be left in an environmentally sound condition. Also any temporary structures erected by the Contractor, including fences, shall be removed by the Contractor and the area restored as near as possible to its original condition, including possibly seeding and mulching.

3.6 Rights and Permits

3.6.1 Right-of-Way Easements

A. The Owner shall obtain all easements and rights-of-entry required for the Work unless otherwise noted in this Specification.

B. The rights obtained by the Owner include the right to erect, maintain and remove structures, cables, and other appurtenances. Any other activities proposed by the Contractor shall be subject to the review and approval of the Field Representative.

3.6.2 Highway Traffic Control

Unless otherwise stated, the Contractor shall arrange for local and state highway traffic control and flag protection and inspection, as required.

3.6.3 Dig Safe

A. The Contractor shall determine the locations of all existing power, communication and pipeline facilities within the Project areas in accordance with applicable laws and regulations. It shall consult with the respective agencies or owners and make all necessary provisions to avoid interference with the operation and maintenance of such facilities to the satisfaction of the Owner.

B. The Contractor shall notify: Dig Safely NY and obtain a Dig Safe number for all locations where the existing ground, public or private, within or outside the Site, will be disturbed in any way. The Contractor shall perform pre-marking, if required. The Contractor shall be aware that many municipal utilities do not participate in the Dig Safe program and shall contact each applicable municipal utility as appropriate.

3.7 Contractor Yards

3.7.1 Material Storage Yards

A. The Contractor shall acquire rights for and construct any facilities required for Material Storage Yards. Rights-of-way and land owned by the Owner may not be used for Material Storage Yards. The Contractor shall submit copies of all signed agreements securing rights from landowners for Material Storage Yards. The Owner reserves the right to direct the Contractor to modify Material Storage Yards or provide additional Material Storage Yards.

B. The locations of Material Storage Yards shall be subject to the review and approval of the Field Representative. Material Storage Yards shall not be located in or within 100’ of Regulated Wetland Areas.

C. The Contractor shall maintain the Material Storage Yards in an orderly and clean condition. The Contractor shall remove snow from the aisles within the yards to keep them accessible at all times.

D. The Material Storage Yards must be adequate in size to store both the Owner furnished Materials and Contractor furnished Materials.

3.7.2 Staging Areas

A. The Contractor shall construct any facilities required for Staging Areas. All Staging Areas on the Right of Way are subject to the review and approval of the Field Representative. The Contractor shall acquire the rights to construct off Right-of-Way Staging Areas. The Contractor shall submit signed copies of all agreements securing rights from landowners for off Right-of-Way Staging Areas.

B. The locations of Staging Areas shall be subject to the review and approval of the Field Representative. Staging Areas shall not be located in or within 100' of Regulated Wetland Areas.

3.8 Power, Communications and Pipeline Facilities

3.8.1 The Contractor shall determine the locations of all existing power, communication and pipeline facilities within the Project areas in accordance with applicable laws and regulations. It shall consult with the respective agencies or owners and make all necessary provisions to avoid interference with the operation and maintenance of such facilities to the satisfaction of the Field Representative.

3.9 Excavation

3.9.1 Excavation

The Contractor shall do all grubbing, soil and rock excavation, drilling, forming, sheathing, shoring, trenching, pumping, and draining required for proper installation of the Work. Excavation shall be done with appropriate Equipment with the excavation size being minimized.

A. Classification of excavated material shall be as follows:

1. Rock excavation - Rock shall be defined as:
   (a) All solid or ledge rock which cannot, in the opinion of the Field Representative, be removed by standard excavation Equipment and which requires the use of jack hammers, breaker points or other methods for excavation.
   (b) Boulders or portions thereof where the excavation volume of the whole boulder or portion thereof exceeds one-quarter cubic yard, and where such boulder or portion thereof cannot, in the opinion of the Field Representative, be removed by standard excavation Equipment and which requires the use of jack hammers, breaker points, or other methods for excavation.

2. Common excavation - shall mean all material which is not, by definition, rock excavation.

3. All loose or disturbed soil or rock shall be removed from the bottom of excavations.

4. All excess excavated material shall be disposed of in areas approved by the Field Representative. The Contractor shall submit a disposal plan to the Field Representative for approval prior to the start of excavation.

5. All open excavations shall be covered or protected in such a manner that livestock, pets, and people cannot fall into the excavation nor can persons easily remove the covers or protection.

3.9.1 Excavation (continued)

B. Control of Water

Since there is often a presence of a high water table, the Contractor shall be responsible for having readily available such pumps, hose lines, and other Equipment as may be required to control water inflow and to dewater excavations prior to and during placement of concrete.

If there is adequate vegetation in upland areas to function as a filter medium, the water generally will be discharged to the vegetated land surface. Where adequate vegetation is absent or where slope prohibits, water will be pumped into a temporary hay bale dewatering basins which will be located in approved areas outside wetland resource areas. Such temporary dewatering basins, as detailed on the drawings, shall be installed as directed by the Field Representative, and are incidental to the Work. The pump intake hose will not be allowed to set on the bottom of the excavation throughout dewatering. The basin and all accumulated sediment will be removed following dewatering operations and the area will be seeded and mulched.

3.10 Submittals

3.10.1 The Contractor is responsible for compiling (6) copies of all required submittals per the submittal schedule below. All submittals shall be distributed to the Engineer of Record "TRC" for review and approval prior to work commencing. The following is a schedule of submittals required:

1. Fiber optic equipment and connectors
2. Any item identified as Engineering approved equal on the Bill of Material list for which the Contractor is proposing the use of an alternate material.

3.11 Closeout Requirements

3.11.1 The Contractor is responsible for providing to the owner at completion of the project a full closeout binder to include all warranties (manufacturer and contractor), as built drawings, owner and operator manuals, daily reports, testing reports, photographs, etc. Final payment will not be released to the Contractor until receipt and acceptance of all closeout documentation provided.

Revision History

Version	Date	Description
1.0	10/16/09	Original Issue for Quotations
1.1	11/13/09	Section 1.2.3 Page 14 – Added information on cable trays and routing Section 1.7.1 – Added H-frame takeoff drawings Section 1.8 Page 32 – Added Minority/Women's business enterprise utilization goals section. Updated Attachment #1 Bill of Material Issue for Quotations
1.2	01/25/10	Section 1.2.3 – Added information on the battery hydrogen gas sensor Sections 1.4 and 1.8 – Revised dates Section 1.7.2 – Added item 20 to the list of drawings for Stonebreak Road station Section 2.6 – Added paragraph for Trade Contractor's Insurance Section 2.6.1.B.1 – Changed from $1,000,000 to $2,000,000 Section 2.6.1.B.2 – Changed from $1,000,000 to $2,000,000 Section 2.6.1.C.1 – Changed from $500,000 to $1,000,000 Section 2.6.1.C.2 – Changed from $500,000 to $1,000,000 Section 2.6.1.C.3 – Changed from $1,000,000 to $2,000,000 Section 2.6.1.D – Changed Malta to Stillwater, added TRC. Attachment #1 – Updated Bill of Material List

Luther Forest and Stonebreak Road Stations Above Grade Construction Specification

Attachment #1 – Luther Forest Bill of Material								Version 7.0 – 01/25/10
		Responsible to Order						
Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
1	A01	X			245 Ea	Bus Tubing, 5" Aluminum, Schedule 40, Alloy 6101-T6, 37' lengths		Per NGRID Spec E-1098
2	A02	X			21 Ea	Bus Tubing, 3" Aluminum, Schedule 40, Alloy 6101-T6, 37' lengths		Per NGRID Spec E-1098
3	A03	X			2500 LF	Cable, Bare, 1272 MCM, 61 strands, All Aluminum		1,193l bs/1,000 Ft
4	A04	X			9500 LF	Cable, Bare, 795MCM, 37 strands, All Aluminum		Bus dampening cable, 746.3 Lbs/1,000 Ft
5	A05	X			4500 LF	Cable, control, 600v, 1c #14 Copper, non-shielded		
6	A06		X			Cable, 500MCM CU, 600V	TRC to spec & request submittal	Station service transformer secondary cable
7	A07					1/0 CU cable, 25kV with concentric neutral		Station service transformer primary cable
8	A08		X		12500 LF	9/16", 19/#9 Copperweld Cable		Ground grid cable
9	A09		X	X	12500 LF	Cable, Bare, 4/0 AWG, 19 strands, soft drawn copper		Ground grid riser cable/Control house grounding wire
10	A10		X	X		Copper wire, bare, #2, solid, soft drawn		
11	A11		X	X		Copper wire, bare, #6, solid, soft drawn		
12	A12		X		350 LF	Potential Equalizing Grid mesh, 8" x 8" x 6'		8" x 8" mesh is 6'-0" wide x 10'-0" long
13	A13		X		512 Ea	Ground rod, copper clad, 3/4"x8'		
14	A14		X		387 Ea	Coupling, Ground Rod, 3/4 in, Bronze		
15	A15		X		125 Ea	Stud, Driving, 3/4 in Dia, 10 UNC, 2 in Long, Black Iron		
16	A16			X		Copper bar, 1/8" x 1: wide, 10" long		Box Ground Bus. Order 96" long pieces. Field to cut, bend, drill and install copper bar as shown on drawings.
17	A17		X		LF	Copper bar 1/4" x 2" Wide Ground Bus system		Control Building Ground Bus. Includes bus bar, splice plates, mounting brackets, and standoff insulators. Manufacturers: Storm Copper Components Co. 1-866-716-9773, Harger Lightning and Grounding (Local Distributor - Electrolines, Inc 315-455-5701)
18	A18	X			1500 LF	Cable, control, 600v, 7c #12 Copper, non-shielded		
19	A19	X			3500 LF	Cable, control, 600v, 1c #10 Copper, non-shielded		
20	A20					Spare #		
21	A21	X			6500 LF	Wire, Instrumentation, 600v, 1 twisted pair with individual shield, #16 awg, Copper		
22	A22	X			1000 LF	Wire, Instrumentation, 600v, 3 twisted pairs with individual shield, #16 awg, Copper		

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
23	A23	X				Cable, Fiber Optic, Singlemode, 24 Strand		OFS Brightwave p/n AT-3BE12TT-024.
24	A24			X	100 LF	Cable, Fiber Optic, Singlemode, 1 pair and all required terminations		Fiber to connect RuggedComm
25	A25					Spare #		
26	A26			X	100 LF	RS232 Serial cable and all required terminations		(2 cables)
27	A27	X			20000 LF	Cable, control, 600v, 1c #4 Copper, non-shielded		
28	A28	X			2000 LF	Cable, control, 600v, 1c #6 Copper, non-shielded		
29	A29	X				Cable, general purpose, white, 600V, 1c #12		
30	A30	X			1000 LF	Cable, control, 600v, 1c #4/0 Copper, non-shielded		
31	A31	X			6000 LF	Cable, control, 600v, 1c #12 Copper, non-shielded		
32	A32	X			2500 LF	Cable, control, 600v, 2c #12 Copper, non-shielded		
33	A33	X			2000 LF	Cable, control, 600v, 5c #12 Copper, non-shielded		
34	A34	X			250 LF	Cable, control, 600v, 9c #12 Copper, non-shielded		
35	A35	X			500 LF	Cable, control, 600v, 12c #12 Copper, non-shielded		
36	A36					Spare #		
37	A37	X			13000 LF	Cable, control, 600v, 2c #10 Copper, non-shielded		
38	A38					Spare #		
39	A39	X			35000 LF	Cable, control, 600v, 5c #10 Copper, non-shielded		
40	A40	X			8000 LF	Cable, control, 600v, 12c #10 Copper, non-shielded		
41	A41	X			3500 LF	Cable, control, 600v, 19c #10 Copper, non-shielded		
42	A42	X				Cable, control, 600v, 5c #10 Copper, shielded		
43	A43					Spare #		
44	A44			X	300 LF	Cable, Category 3 and all required terminations		Phone circuits
45	A45	X				Cable, Coax, RG58/U, 1000' reel, Non-Plenum, Belden 9310		

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
46	A46	X				Cable, Coax, RG213/U, 1000' reel, Non-Plenum		
47	A47	X				Cable, Belden #3106A		
48	A48	X				Cable, Belden #9841		Network Communication Cable Revenue Meter Connections
49	A49		X		1000 LF	Wire, Bare, soft drawn, 1c #2 7 Str Cu		Fence and Switch Grounding
50	A50	X			27 Ea	SEL Cable C273A		Network Communication Cable SEL300 & 500 Series Relay to Orion LX
51	A51	X			4 Ea	SEL Cable C281		Network Communication Cable RFL to Orion LX
52	A52			X	1500 LF	Ethernet Cable E154502 CAT.6 24AWG. Patch Cable and all required terminations		Network Communication Cable Connections to Ethernet Sw. 1 & 2 (24 cables)
53	A53			X	1100 LF	RG58A/U and all required terminations		Network Communication Cables (26 cables)
54	A54			X	500 LF	Cable, Belden #9842 and all required terminations		Network Communication Cable Bitronics RS485 Loop (10 cables)
55	A55			X	Ea	Cable, Covered, 4/0 AWG Copper, 19 strand, soft drawn		4/0 COVERED WIRE FOR CAP BANKS center point ground
56	A56			X	1 Ea	Station Ground Bus, Copper, 4" wide x 20" long w/ insulator standoff brackets		Chatsworth p/n 40153-020 or Engineering approval equal, provide submittal for approval. (for telephone board in Control Room 1)
57	A57			X	1 Lot	Ring Tongue Wire Terminals of various sizes		Refer to National Grid standard Construction Specification for Electric Stations section 3F.2
58	A58			X	1 Lot	Wire Labels and Markers		Refer to National Grid standard Construction Specification for Electric Stations section 3F.2
59	B01					Spare #		
60	B02			X	Ea	Enclosure, 36"x36"x12", NEMA 4, Aluminum with 33"x33" subpanel and provisions for padlocking. Hoffman Catalog # **A36H3612ALLP Enclosure with #A36P36AL Subpanel** *NO Substitutions*		CVT Junction Boxes (6), CT/VT Junction Boxes (2), PT Junction Boxes (2)
61	B03	X			2 Ea	Enclosure, 40"H x 28"W x 12"D, NEMA 4X Aluminum, with 28" x 28" subpanel, two doors, continuous hinges, three point latches, and padlock provisions.	Custom Sheet Metal	Differential Junction Box, See Dwg. D-36127-E
62	B04					Spare #		
63	B05		X		Ea	Conduit, 4", PVC, Bell end fitting		Schedule 40
64	B06		X		Ea	Conduit, 4", PVC, straight sections, 20' length		Schedule 40
65	B07		X		Ea	Conduit, 4", PVC expansion connector. Carlon #E945N		Schedule 40
66	B08		X		Ea	Conduit, 4", PVC, Coupling		Schedule 40

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
67	B09		X		Ea	Conduit, 4", PVC to Galvanized, female adapter		
68	B10		X		Ea	Conduit, 4", Galv., Bend, 90 degree, 36" radius		
69	B11		X		Ea	Conduit, 4", Galvanized, straight section, 10' length		
70	B12		X		Ea	Conduit, 4", Coupling, hot dipped galv mild rigid steel		
71	B13			X	Ea	Connector, Conduit, 4", Insulated, straight, for flexible liquid tight. Appleton #STB-400		
72	B14		X		Ea	Conduit, 4", Insulated Grounding Bushing, plated malleable iron		
73	B15		X		Ea	Conduit, ground clamp for galvanized 4" - 5" steel conduit		
74	B16		X		Ea	Conduit, 2", PVC, Bell end fitting		
75	B17		X		Ea	Conduit, 2", PVC, straight sections, 20' length		Schedule 40
76	B18		X		Ea	Conduit, 2", PVC expansion connector. Carlon #E945J		Schedule 40
77	B19		X		Ea	Conduit, 2", PVC, Coupling		Schedule 40
78	B20		X		Ea	Conduit, 2", PVC to Galvanized, female adapter		
79	B21		X		Ea	Conduit, 2", Galv., Bend, 90 degree, 36" radius		
80	B22		X		Ea	Conduit, 2", Coupling, hot dipped galv mild rigid steel		
81	B23		X		Ea	Conduit, 2", Galvanized, straight section, 10' length		
82	B24			X	Ea	Conduit, 2", insulated straight connector for flexible liquid tight		
83	B25			X	Ea	Conduit, 2", flexible, liquid tight		
84	B26			X	Ea	Conduit, 2", Insulated Grounding Bushing, plated malleable iron		
85	B27		X		Ea	Conduit, ground clamp for galvanized 1-1/4" - 2" steel conduit		
86	B28		X		Ea	Conduit, 1 1/2", PVC straight sections		
87	B29		X		Ea	Conduit, 1 1/2", PVC coupling		
88	B30		X		Ea	Conduit, 1 1/2", PVC to Galvanized, female adapter		
89	B31		X		Ea	Conduit, 1 1/2", Galv. Bend, 90 degree, 8 1/4" Radius		

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
90	B32		X		Ea	Conduit, 1 1/2", Coupling, hot dipped galv mild rigid steel		
91	B33		X		Ea	Conduit, 1 1/2", Galvanized, straight section, 10' length		
92	B34			X	Ea	Connector, Conduit, 1 1/2", Insulated, straight, for flexible liquid tight.		Appleton #STB-150 or Engineering approval equal, provide submittal for approval.
93	B35			X	Ea	Connector, Conduit, 1 1/2", Insulated, 45 degree, for flexible liquid tight.		Appleton #STB-45150 or Engineering approval equal, provide submittal for approval.
94	B36			X	Ea	Conduit, 1 1/2", flexible liquid tight		
95	B37			X	Ea	Conduit, 1 1/2" insulated Grounding Bushing, plated malleable iron, Ground lug size #4-#14.		OZ Gedney #BLG-1504 or Engineering approval equal, provide submittal for approval.
96	B38			X	Ea	Conduit, 1 1/2", single hole malleable iron, hot dipped galvanized.		Thomas & Betts #1280 or Engineering approval equal, provide submittal for approval.
97	B39			X	Ea	Conduit, 2", single hole malleable iron, hot dipped galvanized.		Thomas & Betts #1281 or Engineering approval equal, provide submittal for approval.
98	B40			X	Ea	Connector, Conduit, 2", Insulated, 45 degree, for flexible liquid tight.		Appleton #STB-45200 or Engineering approval equal, provide submittal for approval.
99	B41					Spare #		
100	B42					Spare #		
101	B43					Spare #		
102	B44					Spare #		
103	B45			X	Ea	Connector, Conduit, 3/4", Insulated, straight, for flexible liquid tight.		Appleton #STB-75 or Engineering approval equal, provide submittal for approval.
104	B46			X	Ea	Conduit, 3/4" flexible, liquid tight		
105	B47			X	1 Ea	Conduit, 3" reducer to 2", integral bushing		Crouse - Hinds #REC86 or Engineering approval equal, provide submittal for approval.
106	B48			X	1 Ea	Conduit, 4" reducer to 3", integral bushing		Crouse - Hinds #REC108 or Engineering approval equal, provide submittal for approval.
107	B49			X	Ea	1" Diameter Midget Louver, regular series, aluminum, plain finish		
108	B50					Spare #		
109	B51			X		Conduit, Spacer, Malleable iron hot dipped galvanized. Use for 1 1/4"-2" rigid steel conduit.		Use with BOM #B38 & B43. Thomas & Betts #1351 or Engineering approval equal, provide submittal for approval.
110	B52					Spare #		
111	B53					Spare #		
112	B54					Spare #		

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
113	B55					Spare #		
114	B56					Spare #		
115	B57					Spare #		
116	B58			X	Lf	Conduit, 4", flexible, liquid tight		
117	B59			X	Ea	Conduit, 1-1/2", Insulated Grounding Bushing, plated malleable iron. Lug size #1/0-#8.		Crouse Hinds #GLL-5-10C or Engineering approval equal, provide submittal for approval.
118	B60			X		Conduit, 1-1/2", Aluminum LB condulet		
119	B61			X		Conduit, 1-1/2", Aluminum LR condulet		
120	B62			X		Cover for 1-1/2" condulet (LB, LR & T)		
121	B63			X		Gasket for 1-1/2" condulet (LB, LR & T)		
122	B64			X		P7000 Unistrut		
123	B65			X		Aluminum Barrier, 12 Gauge 8-1/8" x 32"		For CVT Junction Box (item B2), see Dwg. D-36117-E, Sh.2
124	B66		X		LF	Electric Channel, 1 5/8" x 1 5/8", Galvanized		Unistrut #P1000T-HG or Engineering approval equal, provide submittal for approval.
125	B67		X		Ea	Pipe Clamp 1 1/2" steel conduit, galvanized, for use with 1 5/8" x 1 5/8" electric channel		Unistrut #P1115-HG or Engineering approval equal, provide submittal for approval.
126	B68		X		Ea	Pipe Clamp 2" steel conduit, galvanized, for use with 1 5/8" x 1 5/8" electric channel		Unistrut #P1117-HG or Engineering approval equal, provide submittal for approval.
127	B69		X		Ea	Pipe Clamp 4" steel conduit, galvanized, for use with 1 5/8" x 1 5/8" electric channel		Unistrut #P1121-HG or Engineering approval equal, provide submittal for approval.
128	B70			X	1 Ea	Enclosure, Steel, NEMA 1, 36"H x 36"W x 9 1/4"D, with slotted flush latch, 33" H x 33" W subpanel and mounting bracket kit.		Hoffman #A36N3609 (Enclosure), #A36P36 (Sub-panel) f or **Yard Lighting Control Panel** *No Substitutions*
129	B71			X	LF	Standard Din Rail, 35 x 7mm		
130	B72			X	Ea	Connector, Aluminum, straight strain relief flexible cord, sized for light fixture cord being supplied under BOM #E2		Thomas & Betts #2900AL series or Engineering approval equal, provide submittal for approval.
131	B73			X	Ea	Conduit, 1 1/2", Insulated straight connection for rigid steel		Cooper Crouse Hinds (Meyers Hubs) #STAG-5 or Engineering approval equal, provide submittal for approval.
132	B74			X	Ea	Conduit, 3/4", Insulated straight connection for rigid steel		Cooper Crouse Hinds (Meyers Hubs) #STAG-2 or Engineering approval equal, provide submittal for approval.
133	B75			X	Ea	Enclosure, 12"x12"x6", NEMA 3 & 4, G-90 grade galvanized steel, screw cover with neoprene gasket.		Hubbell Wiegmann #WA121206GSCG for Yard Lighting Junction Boxes *No Substitutions*
134	B76			X	Ea	Strain Relief Grip, Galvanized steel, single eye to support cable diameter range .43-.56 OD cable		Bryant #BDS43U or Engineering approval equal, provide submittal for approval.

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135	B77			X	Ea	Conduit, 3/4", Galvanized rigid steel, straight section, 10' length		
136	B78			X	Ea	Conduit, 3/4" insulated Grounding Bushing, plated malleable iron		OZ Gedney #BGL-0704 # or Engineering approval equal, provide submittal for approval.
137	B79					Spare #		
138	B80			X	Ea	Conduit, 3/4", single hole malleable iron, hot dipped galvanized.		Thomas & Betts #1277 or Engineering approval equal, provide submittal for approval.
139	B81		X		Ea	1 1/2" PVC Bell End		Schedule 40
140	B82		X		Ea	1 1/2" PVC Expansion Connector		Schedule 40
141	B83			X	Ea	Reducer, 2" to 1" galvanized rigid steel conduit. Steel-electrogalvanized with chromate treatment		Crouse - Hinds #REC603 or Engineering approval equal, provide submittal for approval.
142	B84			X	Ea	Connector, Conduit, 1", Insulated, straight, for flexible liquid tight.		Appleton #STB-100 or Engineering approval equal, provide submittal for approval.
143	B85			X	Ea	Connector, Conduit, 1", Insulated, 90 degree, for flexible liquid tight.		Appleton #STB-90100 or Engineering approval equal, provide submittal for approval.
144	B86			X	Lf	Conduit, 1", flexible, liquid tight		
145	B87			X	Ea	Conduit, 1", single hole malleable iron, hot dipped galvanized.		Thomas & Betts #1278 or Engineering approval equal, provide submittal for approval.
146	D01	X			122 Ea	Coupler, 5" Schedule 40 Aluminum Bus, DMC Part #PLK1000D80	DMC	Coupler *No Substitutions*
147	D02	X			78 Ea	End Cap, 5" schedule 40 Aluminum Bus, DMC Part #PLK1350D80	DMC	End cap (EC) *No Substitutions*
148	D03	X			84 Ea	Expansion Bus Support Connector, 5" Schedule 40 Aluminum Bus, Tube to Tube, DMC Part #PLK2700D80E23	DMC	Expansion connector (E) *No Substitutions*
149	D04	X			57 Ea	Expansion Bus Support Connector, 5" Schedule 40 Aluminum Bus, Tube to Flat NEMA 4 Hole Pad, DMC Part #PLK2600D80E1	DMC	Expansion terminal connector (ET) *No Substitutions*
150	D05	X			162 Ea	Clamp or Slip Bus Support Connector, 5" Schedule 40 Aluminum Bus, DMC Part #PLK2230D80E2	DMC	Fixed bus support (F) *No Substitutions*
151	D06	X			7 Ea	Line Stirrup,356-T6 Alum.Clamp,1/2"tinned cu. AAC(550-1033MCM)/ACSR(477-954MCM) Part # AHLSC-34	Sefcor	Sefcor Part #AHLSC-34 *No Substitutions*
152	D07	X			36 Ea	Tee Connector, Tube to NEMA 4 Hole Pad, 5" Schedule 40 Aluminum Bus, DMC Part #PLK1100D80E1	DMC	T-Tap (T) *No Substitutions*
153	D08	X			63 Ea	Electrical Connector "A" Frame, 5" Schedule 40 Aluminum Main Run to 3" Tabs, 30 Degree, DMC Part #PLK1600D4880	DMC	*No Substitutions*
154	D09	X			126 Ea	Electrical Connector Tee, 5" Schedule 40 Aluminum Main Run to 3" Tab, 15 Degree, DMC Part #PLK1500D4880E2	DMC	*No Substitutions*
155	D10	X			159 Ea	Bus Support Bolt Package, 5" Bolt Circle, DMC Part #PLK8010C0815	DMC	Order 1 bolt package for each bus support connector *No Substitutions*
156	D11	X			9 Ea	Connector, Compression, Parallel 1272 cables to NEMA 4 hole pad (Tee), Cables to have 8" spread, DMC Part #CLK714D12720-8X	DMC	CT *No Substitutions*

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Line	BOM Item #	Responsible to Order			Quantity	Description	Supplier	Notes
		TRC	In-Grnd Const Cont	Above-Grnd Const Cont				
157	D12	X			0 Ea	Connector, Compression, Parallel 1272 cables to NEMA 4 hole pad,90 degree, Cables to have 8" spread, DMC Part #CPLK9649D12720-8X	Not Used	CT *No Substitutions*
158	D13	X			0 Ea	Connector, Terminal, Compression Type for 1272 KCMIL All AL Cable to 4 Hole Offset Flat Pad with NEMA pad	Not Used	DMC Part #CLK9430D12720S *No Substitutions*
159	D14	X			0 Ea	Straight Bolted Cable Spacer, 356-T6 Aluminum Casting, Aluminum Alloy hardware, 2-1272KCMIL cables, 8" length	Not Used	Sefcor Part #ASPC-39-8 *No Substitutions*
160	D15	X			168 Ea	Connector, Terminal, compression, two barrel 1272MCM AL cables to NEMA 4 hole pad. DMC Part #CPLK9642D12720-8X	DMC	*No Substitutions*
161	D16	X			96 Ea	Spacer, Cable, 2-1272MCM AL cables, Straight, Bolted, 8" centerline to centerline. Sefcor Part #ASPC-41-8	Sefcor	(CS) *No Substitutions*
162	D17	X			75 Ea	Spacer, Cable, 2-1272MCM AL cables, Straight, Bolted, 8" centerline to centerline, with grounding provisions. Sefcor Part #ASPC-41-8-ST	Sefcor	(CSG) *No Substitutions*
163	D18			X	Ea	Connector, fiber optic, singlemode, type ST	G&W Electric Co.	
164	D19	X			102 Ea	Connector, Compression, 4 hole NEMA terminal offset for 795KCMIL Alum DMC Part#CPLK9432D07950S	DMC	*No Substitutions*
165	D20	X			45 Ea	Connector, Compression, 4 hole NEMA terminal, 5" bus tube. DMC Part #PLK1850D80B	DMC	(TE)
166	D21		X		Ea	Connector #2 Solid -250 KCMIL Copper Cable to Flat. Cast Copper Alloy Body	FCI Burndy	FCI Burndy #GB29 or equal
167	D22			X	Ea	Connector, Cable to Flat, for Two #2 Sol-250 KCMIL Copper Cables. Cast Copper Alloy Body. Bolt, Nut & Lockwasher Silicon Bronze.	FCI Burndy	FCI Burndy #GB2929 or equal
168	D23			X	Ea	Connector, Ring Tongue, #2 Solid CU, 1/2" Bolt Amp	FCI Burndy	FCI Burndy #YA2CL-BOX or equal, Need a dieless hypress tool to crimp to #2 solid CU conductor. The FCI Catalog number for this dieless tool is Y644HSXT [hand held hydraulic tool], or PAT644XT18V [battery operated tool] or Engineering approval equal, provide submittal for approval.
169	D24		X		Ea	Connector, tap, compression, Copper, 3/0-4/0 Run to 3/0-4/0 Tap	FCI Burndy	FCI Burndy #YC28C28 or Engineering approval equal, provide submittal for approval.
170	D25		X		Ea	Connector, tap, compression, Copper, 4/0 Run to #2 Tap	FCI Burndy	FCI Burndy #YC28C2 or Engineering approval equal, provide submittal for approval.
171	D26			X	Ea	Connector, Ground, #4 Sol to 2/0 Str Cable to Flat, Cast Copper Body	FCI Burndy	FCI Burndy #GB26 or Engineering approval equal, provide submittal for approval.
172	D27			X	Ea	Connector, compression, 1 hole terminal for #2 solid Copper wire	Anderson	Anderson Electric #VHCS-2-516 or Engineering approval equal, provide submittal for approval.
173	D28			X	Ea	Connector, Terminal, Compression Type, 4/0 Copper Cable to 2 Hole Flat Pad with NEMA Drilling.	FCI Burndy	FCI Burndy #YCA28-2N or Engineering approval equal, provide submittal for approval.
174	D29		X		25 Ea	Connector, cable to cable (9/16" 19/9 copperweld to 9/16" 19/9 copperweld), splice, CADWELD exothermic weld.	Erico	CADWELD Mold Part #SSC-9F. Contractor shall use all manufacturer recommended tools for connector installation. *No Substitutions*
175	D30		X		400 Ea	Connector, cable to cable (9/16" 19/9 copperweld run to 4/0 19 strand soft drawn copper tap), horizontal tee, CADWELD exothermic weld.	Erico	CADWELD Mold Part #TAC-9F2Q. Contractor shall use all manufacturer recommended tools for connector installation. *No Substitutions*
176	D31		X		125 Ea	Connector, cable to cable (9/16" 19/9 copperweld run to 9/16" 19/9 copperweld tap), horizontal X, CADWELD exothermic weld.	Erico	CADWELD Mold Part #XBQ9F9F. Contractor shall use all manufacturer recommended tools for connector installation. *No Substitutions*
177	D32		X		125 Ea	Connector, cable to ground rod (9/16" 19/9 copperweld cable to 3/4" copperclad ground rod), CADWELD exothermic weld.	Erico	CADWELD Mold Part #GTC189F. Contractor shall use all manufacturer recommended tools for connector installation. *No Substitutions*

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Line	BOM Item #	Responsible to Order			Quantity	Description	Supplier	Notes
		TRC	In-Grnd Const Cont	Above-Grnd Const Cont				
178	D33		X		225 Ea	Connector, split bolt, Run - #8 str., Tap - #8 sol	FCI Burndy	FCI Burndy #KSU-23 or Engineering approval equal, provide submittal for approval.
179	D34		X		34 Ea	Braid, Copper, flexible, Tinned, 18"L x 1"W, 200amp rating		for fence gate grounding
180	D35		X		50 Ea	Clamp, Ground, Bronze, U-Bolt Type, for 2" Fence Post and #2/0 Solid-250 KCMIL Cable		for fence gate grounding
181	D36		X		4 Ea	Clamp, Ground, Bronze, U-Bolt Type, for 2.5" Fence Post and #2/0 Solid-250 KCMIL Cable		for fence gate grounding
182	D37		X		4 Ea	Clamp, Ground, Bronze, U-Bolt Type, for 3.5" Fence Post and #2/0 Solid-250 KCMIL Cable		for fence gate grounding
183	D38	X			13 Ea	Bolted Cable Spacer, two 1272MCM Cables to station post insulator (TR2286), 5" bolt circle.,356-T6 Aluminum Casting, Aluminum Alloy hardware, 8"cable spacing	Sefcor	Sefcor Part #AVCA2-43-5-8 *No Substitutions*
184	D39	X			36 Ea	Ground stirrup assembly, 5" Schedule 40 Aluminum Bus	DMC	DMC Part #PLK1161D80 *No Substitutions*
185	D40		X		180 Ea	Connector, compression, C type, Copper, 2 sol-2 str run to 8 sol-4str tap	FCI Burndy	FCI Burndy #YC2C4TN or Engineering approval equal, provide submittal for approval.
186	D41	X			261 Ea	Station Post Insulator, High Strength, TR287,115kV nominal, 45" high, 5" bolt circle, 2600lbs cantilever strength, 550kV BIL	**Seves USA**	246 Required + 15 spare = 261 total ordered. LAPP Insulators Catalog #315287-70 or Victor Insulators Catalog #17PA25. See Insulator Specification 103014-INS
187	E01			X		HEATER, 80 WATT, 120 VOLT, 2 AMP, SELF REGULATING, DIN RAIL MOUNT, WITH ONE NEMA 4 VENT, DAYTON #4503		JUNCTION BOX HEATER. Each heater comes with air vent and din rail for heater mounting. *No Substitutions*
188	E02			X	38 Ea	Floodlight, High Pressure Sodium, 400WATT, Non Time Auto Switch Quartz (Quartz Re-Strike), Trunnion Mount, 208VOLT, Dark Bronze Finish, Wide Uniform Beam (7x6)		Hubbell Outdoor Lighting Magnuliter MV Series #MVM-0400-S-268-QSS. (Specified fixture comes with a quad tap ballast wired for 277Volts. Fixture shall be rewired in field for 208Volt operation.) *No Substitutions*
189	E03			X		Lamp, High Pressure Sodium, 400W, 100v, Clear, Univ burning mogel base		GE Lighting #LU400, Philips #C400S51/ALTO, Sylvania #LU400/ECO
190	E04			X	4 Ea	LIGHTING CONTACTOR, 30A, 12 POLE, 120V COIL, NEMA 1 ENCLOSURE, ELECTRICALLY HELD		SQUARE D CAT # LO1200V02 or Engineering approval equal, provide submittal for approval.
191	E05			X	3 Ea	General-Duty Safety Switch, 120/240 Volt, 30Amp, 3 wire with solid neutral, 120/240Vac, NEMA 3R Enclosure.		Eaton Cutler-Hammer #DG221NRB, Service: Gas Cart outlets No Substitutions
192	E06		X		1 Ea	Main Distribution Panel (MDP) Main and distribution section		
193	E07		X		1 Ea	AC PANELBOARD - ACPP #1A SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 2 – 3P60 TYPE QOB, 2-3P30 TYPE QOB, 8-2P40 TYPE QOB, 2-2P30 TYPE QOB, 10 – 1P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.2 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#1A

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
194	E08		X		1 Ea	AC PANELBOARD - ACPP #1B SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 2 – 3P60 TYPE QOB, 2-3P30 TYPE QOB, 8-2P40 TYPE QOB, 2-2P30 TYPE QOB, 10 – 1P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.2 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#1B
195	E09		X		1 Ea	AC PANELBOARD - ACPP #1C SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 4 – 3P30 TYPE QOB, 4 - 2P20 TYPE QOB, 22 - 1P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.3 FOR PANELBOARD LAYOUT.	Square DorCutler HammerorGE	ACPP#1C
196	E10		X		1 Ea	AC PANELBOARD - ACPP #2 SQUARE D, I-LINE 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 400A TYPE MG CIRCUIT BREAKER. BUS: COPPER, TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 3 - 3P225 TYPE QD, 1 - 3P60 TYPE FA. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.4 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#2
197	E11		X		1 Ea	AC PANELBOARD - ACPP #2A SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 2 – 3P60 TYPE QOB, 2 – 3P30 TYPE QOB, 8 – 2P40 TYPE QOB, 2-2P30 TYPE QOB, 6-1P20 TYPE QOB, 4 – 1P30 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.4 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#2A
198	E12		X		1 Ea	AC PANELBOARD - ACPP #2B SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. BRANCH BREAKERS: 4 – 3P30 TYPE QOB, 4 - 2P20 TYPE QOB, 22 - 1P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.5 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#2B
199	E13		X		1 Ea	AC PANELBOARD - ACPP #3 SQUARE D, NQOD, 208Y/120V, 3 PH, 4W, 60HZ, SCCR:18K. MAIN: 225A MAIN LUG SERIES RATED. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING TOP FEED. BRANCH BREAKERS: 6 -1P20 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36141-E SH.3 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	ACPP#3

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
200	E14			X	1 Ea	DC PANELBOARD - DCPP #1A SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#1A Contractor to provide submittal for review and approval.
201	E15			X	1 Ea	DC PANELBOARD - DCPP #1B SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#1B Contractor to provide submittal for review and approval.
202	E16			X	1 Ea	DC PANELBOARD - DCPP #1C SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#1C Contractor to provide submittal for review and approval.
203	E17			X	1 Ea	DC PANELBOARD - DCPP #1D SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#1D Contractor to provide submittal for review and approval.
204	E18			X	1 Ea	DC PANELBOARD - DCPP #2A SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#2A Contractor to provide submittal for review and approval.
205	E19			X	1 Ea	DC PANELBOARD - DCPP #2B SQUARE D, QMB, 125VDC, 2 WIRE, MAIN: 200A FUSED SWITCH. BUS: COPPER, SILVER/TIN PLATING. COPPER GROUND BAR. TYPE 1 ENCLOSURE. INCOMING BOTTOM FEED. FUSIBLE BRANCH SWITCHES: 22 -TANDEM 2P600 TYPE QOB, 18 - 2P20 TYPE QOB. SOLID COPPER NEUTRAL. NAMEPLATE WHITE FACE BLACK LETTERS. SEE DRAWING D-36159-E SH.1 FOR PANELBOARD LAYOUT.	Square D or Cutler Hammer or GE	DCPP#2B Contractor to provide submittal for review and approval.
206	E20			X	4 Ea	SAFETY SWITCH, 250VDC, 2POLE, 400A, FUSIBLE, NEMA-1 ENCLOSURE		For Battery Main Disconnect Switches (System-1 & 2) and 125VDC Battery Tie Switches (1 & 2) Contractor to provide submittal for review and approval.

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
207	G01	X			6 Ea	SEL Distance Relay, Type 311C Model #: 0311C00H24254XX Power Supply: 125/250 VDC Firmware: Standard 2U Horizontal Rack Mount Communications: SEL ASCII w/ Mirrored Bits		21A/21NA/LN222 21A/21NA/LN2 21A/21NA/LN302 21A/21NA/LN308 21A/21NA/LN3 21A/21NA/LN111
208	G02	X			2 Ea	SEL High Impedance Differential Relay, Type 587Z Model: 0587Z0X325H12XX Firmware: Standard Power Supply: 48/125Vdc or 125Vac, Control Input Voltage: 125 Vdc High Energy (2 MOVs), 5 Amp Phase Horizontal Rack Mount Comm. Ports: EIA-232 Front and Rear Comm Protocol: Standard plus Modbus RTU		87A/BS77 87A/BS99
209	G03	X			13 Ea	Schweitzer Overcurrent Relay, Type 351-6 Model #: 035161H45542X1 Firmware: Standard Additional 12 Std Outputs, 8 Inputs 3U Horizontal Rack Mount Power Supply: 125/250 Vdc or Vac Control Input Voltage: 125 Vdc Communications: Standard Plus DNP 3.0		50A/62A/79/R222, 50A/62A/79/R2222 50A/62A/79/R2, 50A/62A/79/R302 50A/62A/79/R308302, 50A/62A/79/R308 50A/62A/79/R3, 50A/62A/79/R1113 50A/62A/79/R111, 94A/5A/59A/BS77 94A/5A/59A/BS99, 94B/5B/59B/BS77 94B/5B/59B/BS99
210	G04	X			2 Ea	Schweitzer Overcurrent Relay, Type 351-6 Model #: 035161H4554XX1 Firmware: Standard Horizontal Rack Mount Power Supply: 125/250 Vdc or Vac, Control Input Voltage: 125 Vdc Communications: Standard Plus DNP 3.0		50A/62A/R21 50A/62A/R22
211	G05	X			4 Ea	Schweitzer Overcurrent Relay, Type 351AModel #: 0351A00H24554XXFirmware: Standard 2UHorizontal Rack MountPower Supply: 125/250 Vdc or Vac Control Input Voltage: 125 Vdc Communications: Standard		50A/51A/27A/59A/62C/CP1 50B/51B/27B/59B/CP1 50A/51A/27A/59A/62C/CP2 50B/51B/27B/59B/CP2
212	G06	X			6 Ea	ERLPHASE Distance Relay Model: L-PRO 2100-H-5A-125-0-0-XX.XX-60 Power Supply: 125 VDC Horizontal Rack Mount		21B/21NB/LN222, 21B/21NB/LN2 21B/21NB/LN302, 21B/21NB/LN308 21B/21NB/LN3, 21B/21NB/LN111
213	G07	X			2 Ea	ERLPHASE Bus Protection Relay Model: B-PRO 8701-H-5A-125-0-0-XX.XX-60 Power Supply: 125 VDC Horizontal Rack Mount, 3 units, 3RU each, 54 CT inputs		87B/BS77 (Ø,1,2,3) 87B/BS99 (Ø,1,2,3)
214	G08	X			4 Ea	RFL 9745 Teleprotection Channel Part Number: 9745 TSHN60GG00 Software Number: S0085 CD: 48503 & 48504		LINE 1 POTT/DTTA LINE 302 POTT/DTTA LINE 308 POTT/DTTA LINE 3 POTT/DTTA

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Line	BOM Item #	TRC	In-Grnd Const Cont	Above-Grnd Const Cont	Quantity	Description	Supplier	Notes
215	G09	X			29 Ea	ABB Test Switch, Type FT-19R Catalog #: FR3G014001001 Position A: R129A514G01 Position B: R129A501G01 Position C: R129A501G01		TS-1,2,3/21A/21NA/LN222, TS-1,2,3/21A/21NA/LN2 TS-1,2,3/21A/21NA/LN302, TS-1,2,3/21A/21NA/LN308 TS-1,2,3/21A/21NA/LN3, TS-1,2,3/21A/21NA/LN111 TS-1,2,3/21B/21NB/LN222, TS-1,2,3/21B/21NB/LN2 TS-1,2,3/21B/21NB/LN302, TS-1,2,3/21B/21NB/LN308 TS-1,2,3/21B/21NB/LN3, TS-1,2,3/21B/21NB/LN111 TS-1,2,3/87A/BS77 ,TS-1,2,3/87A/BS99 TS-7,8,9/87B/BS77 ,TS-7,8,9/87B/BS99 TS-1,2,3/50/51A/27A/59A/62C/CP1, TS-1,2,3/50/51B/27B/59B/CP1 TS-1,2,3/50/51A/27A/59A/62C/CP2, TS-1,2,3/50/51B/27B/59B/CP2 TS-1,2,3/50A/62A/79/R222, TS-1,2,3/50A/62A/79/R2222 TS-1,2,3/50A/62A/79/R2, TS-1,2,3/50A/62A/79/R302 TS-1,2,3/50A/62A/79/R308302, TS-1,2,3/50A/62A/79/R308 TS-1,2,3/50A/62A/79/R3, TS-1,2,3/50A/62A/79/R1113 TS-1,2,3/50A/62A/79/R111, TS-1,2,3/50A/62A/R21 TS-1,2,3/50A/62A/R22
216	G10	X			14 Ea	ABB Test Switch, Type FT-19R Catalog#: FR4G001000000 Position A: R129A501G01 Position B: Blank Position C: Blank		TS-4/21A/21NA/LN222, TS-4/21A/21NA/LN31 TS-4/21A/21NA/LN302, TS-4/21A/21NA/LN308 TS-4/21A/21NA/LN3, TS-4/21A/21NA/LN111 TS-4/21B/21NB/LN222, TS-4/21B/21NB/LN2 TS-4/21B/21NB/LN302, TS-4/21B/21NB/LN308 TS-4/21B/21NB/LN3, TS-4/21B/21NB/LN111 TS-1/86A/CP1, TS-1/86A/CP2 TS-1/86B/CP1, TS-1/86B/CP2
217	G11	X			13 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G001001001 Position A: R129A501G01 Position B: R129A501G01 Position C: R129A501G01		TS-4,5/50A/62A/79/R222, TS-1/EMS/R222 TS-4,5/50A/62A/79/R2222, TS-1/EMS/R2222 TS-4,5/50A/62A/79/R2, TS-1/EMS/R2 TS-4,5/50A/62A/79/R302, TS-1/EMS/R302 TS-4,5/50A/62A/79/R308302, TS-1/EMS/R308302 TS-4,5/50A/62A/79/R308, TS-1/EMS/R308 TS-4,5/50A/62A/79/R3, TS-1/EMS/R3 TS-4,5/50A/62A/79/R1113, TS-1/EMS/R1113 TS-4,5/50A/62A/79/R111, TS-1/EMS/R111 TS-1,2,3/94A/5A/59A/BS77, TS-1,2,3/94B/5B/59B/BS77 TS-1,2,3/94A/5A/59A/BS99, TS-1,2,3/94B/5B/59B/BS99
218	G12	X			6 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G001001000 Position A: R129A501G01 Position B: R129A501G01 Position C: Blank		TS-10,11/87B/BS77, TS-10,11/7B/BS99 TS-4,5/94A/5A/BS77, TS-4,5/94B/59B/BS77 TS-4,5/94A/5A/BS99, TS-4,5/94B/59B/BS99

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Line	BOM Item #	Responsible to Order			Quantity	Description	Supplier	Notes
		TRC	In-Grnd Const Cont	Above-Grnd Const Cont				
219	G13	X			4 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G014014014 Position A: R129A514G01 Position B: R129A514G01 Position C: R129A514G01		TS-1/87B/BS77/R222, TS-2/87B/BS77/R302 TS-3/87B/BS77/R3, TS-4/87B/BS77/R21 TS-5/87B/BS77/FUT, TS-6/87B/BS77/FUT TS-1/87B/BS99/R2, TS-2/87B/BS99/R308 TS-3/87B/BS99/R111, TS-4/87B/BS99/R22 TS-5/87B/BS99/FUT, TS-6/87B/BS99/FUT
220	G14	X			3 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G014000001 Position A: R129A514G01 Position B: Blank Position C: R129A501G01		TS-1/XDCR/R2222, TS-2/EMS/R2222 TS-1/XDCR/R308302, TS-2/EMS/R308302 TS-1/XDCR/R1113, TS-2/EMS/R1113
221	G15	X			8 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G014014001 Position A: R129A514G1 Position B: R129A514G1 Position C: R129A501G01		TS-7/87B/BS77/FUT, TS-8/87B/BS77/FUT TS-9/87B/BS77, TS-7/87B/BS99/FUT TS-8/87B/BS99/FUT, TS-9/87B/BS99 TS-1/XDCR/R222, TS-1/LN/222/MTR TS-2/EMS/R222, TS-1/XDCR/R2 TS-1/LN/1/MTR, TS-2/EMS/R2 TS-1/XDCR/R302, TS-1/LN/302/MTR TS-2/EMS/R302, TS-1/XDCR/R308 TS-1/LN/308/MTR, TS-2/EMS/R308 TS-1/XDCR/R3, TS-1/LN/3/MTR TS-2/EMS/R3, TS-1/XDCR/R111 TS-1/LN/111/MTR, TS-2/EMS/R111
222	G16	X			2 Ea	ABB Test Switch, Type FT-19R Catalog #: FR4G001001014 Position A: R129A501G01 Position B: R129A501G01 Position C: R129A514G01		TS-1,2/EMS/R22 TS-1/MTR/CP2 TS-1,2/EMS/R21 TS-1/MTR/CP1
223	G17	X			2 Ea	G.E. Co. Auxiliary Relay, Type HFA73 Model #: HFA73K1A Rating: 125 VDC, 21 Ohm Coil Mounting: Drawout Case Service: Short 87A High Impedance Unit		87AX/BS77 87AX/BS99
224	G18	X			4 Ea	G.E. Co. ON-OFF Switch, Type SBM Model #: 16SBMF2A08S1A3V1 6-Stage, 2-Position, Fixed Oval Handle Nameplate Engraving: OFF-ON, Escutcheon to read "PERMISSIVE"		43PTA/LN2 43PTA/LN302 43PTA/LN308 43PTA/LN3
225	G19	X			4 Ea	G.E. Co. ON-OFF Switch, Type SBMModel #: 16SBMF2A08S1A3V16-Stage, 2-Position Fixed Oval Handle Nameplate Engraving: OFF-ON, Escutcheon to read "TRANSFER TRIP"		43TTA/LN2,43TTA/LN302 43TTA/LN308, 43TTA/LN3

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226	G20	X			9 Ea	G.E. Co. Synchronizing Switch, Type SBM Model #: 16SBMB2A01R1A3N1145 Provide Keyed For Removable Handle In "OFF" Position Only Handle Model #: 23WW145 Escutcheon shall read "SYNCHRONIZING"		SS/R222, SS/R2222 SS/R2, SS/R302 SS/R308302, SS/R308 SS/R3, SS/R1113 SS/R111
227	G21	X			6 Ea	G.E. Co. Bus Auto Reclose Selector Switch, Type SBM Model #: 16SBMC5A21S1A1K1 5 Position, Maintained Contacts Provide Knurled Handle with Position Pointer Escutcheon shall read "RECLOSING SELECTOR"		43S/LN222, 43S/LN2 43S/LN302, 43S/LN308 43S/LN3, 43S/LN111
228	G22	X			2 Ea	G.E. Co. Bus Auto Reclose Selector Switch, Type SBM Model #: 16SBMC3G66S1A2K1 3 Positions, 3 Stages, Maintained Contacts Provide Knurled Handle with Position Pointer		43DB/BS77 43DB/BS99
229	G23	X			36 Ea	G.E. Test Device, Type PK2 Model #: 6422120G3 4 Pole Current Shorting (Provided by switchboard manufacturer)		TD-1,2,3,4/R222, TD-1,2,3,4,5,6/R2222 TD-1,2,3,4/R2, TD-1,2,3,4/R302 TD-1,2,3,4,5,6/R308302, TD-1,2,3,4/R308 TD-1,2,3,4/R3, TD-1,2,3,4,5,6/R1113 TD-1,2,3,4/R111, TD-1/R21 TD-1/R22
230	G23			X	16 Ea	G.E. Test Device, Type PK2 Model #: 6422120G3 4 Pole Current Shorting (For Differential Junction Boxes)		TD-1,2,3,4/R222, TD-1,2,3,4,5,6/R2222 TD-1,2,3,4/R2, TD-1,2,3,4/R302 TD-1,2,3,4,5,6/R308302, TD-1,2,3,4/R308 TD-1,2,3,4/R3, TD-1,2,3,4,5,6/R1113 TD-1,2,3,4/R111, TD-1/R21 TD-1/R22
231	G24	X			9 Ea	Electroswitch Auto/Man Control Switch, Type LSR Catalog #: 9203DD Series 24 Rating: 125 VDC low level control with interposing relay 3 decks; panel mount Nameplate Engraving: OFF-ON, Escutcheon to read: "RECLOSING" "ON-OFF"		RE-43A/M/R222, RE-43A/M/R2222 RE-43A/M/R2, RE-43A/M/R302 RE-43A/M/R308302, RE-43A/M/R308 RE-43A/M/R3, RE-43A/M/R1113 RE-43A/M/R111
232	G25	X			4 Ea	Electroswitch Lockout Relay, Type LOR Catalog #: 78PS03LA Rating: 125 VDC w/ blue and amber LED's Contacts: 3 decks, 6 NO, 6 NC		86A/CP1, 86B/CP1 86A/CP2, 86B/CP2
233	G26	X			11 Ea	Electroswitch Breaker Control Switch, Type CSR Catalog #: 88PD57LB Series 24 Control Circuit B, 125 VDC, 1 Sec. Time Delay (2) Red and (1) Green LED		RE01/R222, RE01/R2222 RE01/R2, RE01/R302 RE01/R308302, RE01/R308 RE01/R3, RE01/R1113 RE01/R111, RE01/R21 RE01/R22

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234	G27	X			22 Ea	Rectifier, General Purpose 1000 VRRM, 3 A Newark NTE5809		Service: Use with RE01's
235	G28	X			2 Ea	Basler BE1-59NC, Model#: A5EE2JD0S1F Rating: 120 VAC, 60 Hz, 125 vdc		59N/CP1 59N/CP2
236	G29	X			2 Ea	Rating: 25 Ohms, 225 Watts Ohmite L2225J25R Service: 59NC		Resistor for 59NC
237	G30	X			8 Ea	Bitronics MultiComm Meter Model #: MTWIE1B2C001N00 24-250 VDC/115VAC, DNP w/RS485 0-5A & 120VAC Inputs LED Display, Clear 4-wire face-plate, 60Hz		MTR/LN222, MTR/LN2 MTR/LN302, MTR/LN308 MTR/LN3, MTR/LN111 MTR/CP1, MTR/CP2
238	G31	X			9 Ea	Bitronics Transducer Model #: MTWIN3B2C000000 24-250 VDC/115VAC DNP w/RS485 0-5A & 120VAC Inputs Display: None, Face-plate: None, 60Hz		XDCR/R222, XDCR/R2222 XDCR/R2, XDCR/R302 XDCR/R308302, XDCR/R308 XDCR/R3, XDCR/R1113 XDCR/R111
239	G32	X			1 Ea	Novatech Communication Processor Model #: OrionLX-A14-B2-ENEN-MDM-XM1-IHV-HVxx-01-03-04-07-13-14-35-42-44-47-49-52-80-81-83-94-95-97-98		Orion LX-1
240	G33	X			1 Ea	Novatech Communication Processor Model #: OrionLX-A12-B4-ENEN-MDM-XM1-IHV-HVxx-01-03-04-07-13-14-42-44-47-49-52-80-81-94-95-98		Orion LX-2
241	G34	X			1 Ea	Novatech Communication Processor Model #: OrionLX-A16-ENEN-MDM-XM1-IHV-HVxx-01-03-04-07-13-14-35-42-44-47-49-52-80-81-83-94-95-97-98		Orion LX-3
242	G35	X			1 Ea	Novatech Communication Processor Model #: OrionLX-A14-B2-ENEN-MDM-XM1-IHV-HVxx-01-03-04-07-13-14-42-44-47-49-52-80-81-94-95-98		Orion LX-4
243	G36	X			6 Ea	Novatech Distributed Discrete I/O Module Model #: DDIO-SWER-B-WR-111-HV-42-Rack		DDIO-3/1, DDIO-3/2 DDIO-2/1, DDIO-2/2 DDIO-2/3, DDIO-4
244	G37	X			72 Ea	GE Led Indication Light, 70VAC, Amber LED, Clear Lens Cap GE Cat. No: 116B6708G47A73C4 Service: Live potential indication		Indicating Lights
245	G38	X			2 Ea	Ohmite or Equivalent 25W and larger. Dale or Equivalent 1W Metal Film		Resistors
246	G39	X			3 Ea	Rating: 220 Ohms, 1Watt		Resistors for RS485 Communication (In Relay Panels)
247	G39			X	1 Ea	Rating: 220 Ohms, 1Watt		Resistors for RS485 Communication (in Revenue Meter Junction Box)

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248	G40	X			1 Ea	Industrial Defender Gauntlet Gateway, Security-Enabled Model #: M-396-B-12BOW		Station Phone Line Switch
249	G41	X			1 Ea	GPS Clock Arbiter Systems Model #: 1084B w/ Antenna, 50' cable, opt 3, 4, 10		GPS Clock
250	G42	X			1 Ea	19" Human Machine Interface (Touchscreen) Fanless Panel Mount PC with PCI Isolated RS-422/485 Card & IRIG-B 125 VDC Transduction Model TR-5195F-PM Transduction Model TR-IRIG-A/B Transduction Model TR-422-IS		HMI
251	G43	X			1 Ea	Substation Computer GARRETTCOM Substation Computing Platform (SCP) Model SCP-SRV-001-H 733MHz, 2GB, 90-250 VAC/DC, SS Server		Wavewin Computer
252	G44	X			2 Ea	Ruggedcom Ruggedswitch RGS2100 Ethernet Switch Part no. RSG2100-R-RM-HI-HI-TX01-TX01-TX01-TX01-XXXX-XXXX-TX01-TX01-TX01-FX11		Ethernet Switch RSG2100-1 Ethernet Switch RSG2100-2
253	G45	X			1 Ea	Surge SuppressorModel #: TSS-200USOC RJ-11 6-pin Modular Receptacles ANSI C62 (8x20µS) T-R, T-G, R-G 20000Amps Surge Current 10x1000µS	Technicom, Inc	Surge Suppressor
254	G46	X			1 Ea	ES-242U Time Code & Frequency Distribution Amplifier BNC Connector Input & Output Loop-Thru Input, 12 Isolated Outputs, Auto Switchover to Backup Source 110-240 VAC, 50/60Hz		Time Code Distribution Amplifier
255	G47			X	18 Ea	BNC TEE Adaptor, Amp Part #: 221543-2 50 Ohm, Jack-Plug-Jack		BNC "T" Connector
256	G48				1 Ea	EMS RTU and Cabinet To be provided by Televent per National Grid specification		Remote Terminal Unit
257	G49	X			1 Ea	DFR and Cabinet TESLA Model 3000		Digital Fault Recorder
258	G50	X			10 Ea	120 VAC Power Strip Cat. No. BRXN080-15 4 Outlets (front & back), 19" Rack Mount, 1RU High		Outlet Power Strip
259	G51	X			30 Ea	19" wide rack mounted blank plate, 1 RU High		Panel Blank
260	G52	X			15 Ea	19" wide rack mounted blank plate, 2 RU High		Panel Blank
261	G53	X			9 Ea	19" wide rack mounted blank plate, 3 RU High		Panel Blank
262	G54	X			6 Ea	19" wide rack mounted blank plate, 4 RU High		Panel Blank
263	G55	X			2 Ea	19" wide rack mounted blank plate, 5 RU High		Panel Blank
264	G56	X			7 Ea	19" wide rack mounted blank plate, 6 RU High		Panel Blank

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265	G57	X			5 Ea	19" wide rack mounted blank plate, 8 RU High		Panel Blank
266	G58	X			8 Ea	19" wide rack mounted blank plate, 12 RU High		Panel Blank
267	G59	X			9 Ea	19" wide rack mounted blank plate, 13 RU High		Panel Blank
268	G60	X			8 Ea	19" wide rack mounted blank plate, 16 RU High		Panel Blank
269	G61	X			2 Ea	19" wide rack mounted plate, 3 RU High, 3 indication lights mounting in the center		Panel Mounting Plate
270	G62	X			10 Ea	19" wide rack mounted plate, 5 RU High, 3 indication lights mounting in the center		Panel Mounting Plate
271	G63	X			3 Ea	19" wide rack mounted plate, 3 RU High, one PK-2 test device mounting on left side		Panel Mounting Plate
272	G64	X			12 Ea	19" wide rack mounted plate, 3 RU High, two PK-2 test device mountings with one on right side and one on left side		Panel Mounting Plate
273	G65	X			3 Ea	19" wide rack mounted plate, 3 RU High, three PK-2 test device mountings with one on right side, one in the middle, and one on left side		Panel Mounting Plate
274	G66	X			4 Ea	19" wide rack mounted plate, 5 RU High, one LOR mounting on the left		Panel Mounting Plate
275	G67	X			4 Ea	19" wide rack mounted plate, 5 RU High, one SBM mounting on the left, three indicating lights mounting in the center and one SBM mounting on the right		Panel Mounting Plate
276	G68	X			2 Ea	19" wide rack mounted plate, 7 RU High, one BE1-59NC mounting in the center		Panel Mounting Plate
277	G69	X			2 Ea	19' wide rack mounted plate, 8 RU High, one HFA mounting in the center		Panel Mounting Plate
278	G70	X			2 Ea	19" wide rack mounted blank plate, 48 rack units high		Panel Blank
279	G71	X			2 Ea	Synchroscope, Yokogawa AB16 Cat. No. 120 452 AAAA Scale Marked "Slow – Fast"		Mounted on Sync Panel
280	G72	X			2 Ea	Indicating Frequency Meter Yokogawa AB16 Cat. No. 121 372 ANAN Scale Marked "55-65kHZ		Mounted on Sync Panel
281	G73	X			2 Ea	Indicating Voltmeter Yokogawa AB16 Cat. No. 121 071 PNPN Expanded Scale "100kV–130kV		Mounted on Sync Panel
282	G74	X			4 Ea	Synchronizing Lamps Dialight Model No. 031-3101-01-101 Large Synchronizing Indicating Lamp With #130V6W type S-6 bulb Screw Base Nameplate Marked "Running" & "Incoming"		Mounted on Sync Panel
283	G75	X			12 Ea	GE Led Indication Light, 120VAC, Amber LED, Clear Lens Cap GE Cat. No: 116B6708G45A73C4 Service: Live potential indication		Indicating Lights
284	G76			X		Terminal Block, 12 point, 600v, 30amp		GE, EB-25, 12 point with out cover or Engineering approval equal, provide submittal for approval
285	G77			X		Fuse block, pullout, 3 pole, 30A, 240V, Small Size for reduced space		Cutler Hammer #PFS-3333-S *No Substitutions*
286	G78			X		Fuse block, pullout, 2 pole, 30A, 240V, Small size for reduced space		Cutler Hammer #PFS-3322-S *No Substitutions*

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287	G79			X		Fuse Block, pullout, 3 pole 60 amp		Boltswitch #PH322 *No Substitutions*
288	G80			X		Terminal Block, 6 point, 600v, 30amp		GE, EB-25, 6 point without cover
289	G81			X		Terminal Block, 4 point, 600v, 30amp		GE, EB-25, 4 point without cover
290	G82			X	Ea	Terminal Block, Power Distribution, 1 pole, 600v, 200amp with studs (1/4-20x9/16"), standard din rail mount (35x7mm)		(For yard lighting circuits) Marathon #1321122 or Engineering approval equal, provide submittal for approval
291	G83			X	Ea	Terminal Block, Power Distribution, 1 pole adder, 600v, 200amp with studs (1/4-1=20x9/16")		(For yard lighting circuits) Marathon #1321122ADDER or Engineering approval equal, provide submittal for approval
292	G84			X	4 Ea	Terminal Block, Double Row, Mini, 5 point, 150V, 20 Amp		Marathon Special Products 100 Series, Catalog #105 or Engineering approval equal, provide submittal for approval (for Revenue Metering)
293	G85			X	2 Ea	Modular 8 Conductor RJ45 Surface Mount Jack: Houses 8 internal screw terminals. Includes double sided mounting tape and screws.		(for Revenue Metering)
294	G86			X	4 Ea	Test Switch, 10 pole, surface mount, 3 - single pole potential, 3 - load test jack double pole current element (right hand)		Meter Devices Company #110-1268 *No Substitutions* (for Revenue Metering)
295	G87			X	2 Ea	Utility meter box Meter Devices part no. 602-3060C13-1042	Meter Devices	(for Revenue Metering)
296	G88			X	2 Ea	Utility Meter auxiliary box Meter Devices part no. 602-3060C13-1042	Meter Devices	(for Revenue Metering)
297	G89			X	1 Ea	Fiber Optic cable Patch Panel, 24 strand, type st connectors		(for Control Room #1 Telephone Board)
298	G90			X	3 Ea	Fiber Optic cable splice box, 24 strand, type st connectors		(for mounting on take-off structures for terminating the OPGW wire) AFL Telecommunications p/n SB01 plus required options *No Substitutions*
299	G100	X			2 Ea	125VDC Batteries w/ Battery Rack		
300	G101	X			2 Ea	125VDC Battery Charger		
301	G102			X	2 Ea	Eye Wash Station, Self Contained, 15 minute constant flow		FendAll Pure Flow 1000, Grainger Cat. No. 6JD83 *No Substitutions*
302	G103			X	4 Ea	Eye Wash Station Refill Cartridges (package of two)		For FendAll Pure Flow 1000, Grainger Cat. No. 6JD84 *No Substitutions*
303	G104		X		2 Ea	Hydrogen Gas Sensor for the 125VDC batteries		Storage Battery Systems Inc Model HGDI-DR
304	G105			X	2 Ea	Hydrogen Gas Sensor Remote Display for the 125VDC batteries		Storage Battery Systems Inc Model HGDI-REM
305			X		2 Ea	Hazardous Area Exhaust fan for the 125VDC batteries	Dayton	
306	H01	X			9 Ea	115kV, 2000A, Circuit Breaker (Gas-SF6)	HVB AE Power Systems, Inc. c/o HASGO Power	Application Spec TRC103014A-BKR-RD07
307	H02	X			2 Ea	115kV, 2000A, Synchronous Circuit Breaker (Gas-SF6)	Mitsubishi Elec. c/o First Line Assoc.	Application Spec TRC103014B-BKR-RD07, For Capacitor Banks
308	H03	X			32 Ea	115kV, 2000A Manually Operated Group Disconnect Switch	USCO Power c/o EL Flowers	Application Spec TRC103014A-SW-RD07 (30) for Luther Forest (2) for Stone Break Road)

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309	H04	X			6 Ea	Voltage Transformer, 115000/115-69v, 600/1000: ratio	Trench c/o HASGO Power	See Voltage Transformer Specification 103014-VT
310	H05	X			18 Ea	Capacitor Voltage Transformer (CVT), 115000/115-69v, 600/1000:1 ratio, 550kV BIL, 2 windings	Trench c/o HASGO Power	See Capacitive Voltage Transformer Specification 103014-CVT
311	H06	X			6 Ea	Current Transformer/Voltage transformer (CT/VT), (2) 11500/115-69v, 1000/600:1 ratio VT, (1) 500/5 CT	GENERGY Corp.	See Current Voltage Transformer Specification 103014-CTVT
312	H07	X			12 Ea	Surge Arrestors, Station Class, Polymer, 76kV MCOV, Gray	Cooper Power c/o R.M. Clark Assoc.	See Surge Arrester Specification 103014-SA
313	H08	X			2 Ea	Capacitor Bank, 3 phase, 54MVAR, 115kV	Cooper Power c/o R.M. Clark Assoc.	See Outdoor Rack Mounted Capacitor Bank Spec No. 103014-CAP
314	H09	X			6 Ea	Reactors, 0.6mH, 0.23 Ohms	AREVA T&D	See Dry-Type Air Core Reactor Spec No. 103014-REAC
315	H10	X			1 Ea	Padmounted transformer, xxkV - 120/208v		AC Station Service
316	H11	X			1 ea	Padmounted transformer, 13.2kV - 120/208v		AC Station Service
317	J01	X			1 ea	911 Station Address Sign	W. S. Sign Design Corporation	Located at end of driveway
318	J02			X	42 ea	Danger - Keep Out Signs		
319	J03			X	8 ea	No Trespassing Signs		
320	J04			X	1 lot	Miscellaneous signs, labels, equipment markers		