



Hazen and Sawyer
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March 9, 2018

Mr. John Goodman
Water Resource Department Safety Engineer
City of Greensboro
2602 S. Elm-Eugene St.
Greensboro, NC 27402-3136

Re: Proposal for 2018 Update of the City of Greensboro Electrical Safety Program

Dear Mr. Goodman:

Hazen and Sawyer is pleased to submit this scope of services and fee proposal for the 2018 update of the City of Greensboro electrical safety program. As stated in the scope document, Enpulse Energy (MBE firm) will support this effort as a subcontractor to Hazen. The scope consists of four tasks, described in the attached letter proposal:

- Task 1: Establish Arc Flash Study Procedures and Requirements
- Task 2: Establish/Update Safety Related Design Standards
- Task 3: Establish/Update Electrical Safety Standard Operating Procedures
- Task 4: City of Greensboro Arc Flash Studies for 2018

We appreciate the opportunity to continue to provide engineering services to the City of Greensboro.

Very truly yours,

Bryan Lisk, PE, CEM
Senior Associate

Proposal for 2018 Update of the City of Greensboro Electrical Safety Program

The City of Greensboro is moving to further develop their electrical safety program and adopt the 2018 version of NFPA 70E – Standard for Electrical Safety in the Workplace. NFPA 70E-2018 now clearly defines the intended applications for incident energy analysis with regards to arc flash labeling and PPE selection.

Hazen and Sawyer will provide the services described herein to support the City in establishing an up-to-date electrical safety program. Hazen and Sawyer will utilize Enpulse Energy (MBE subconsultant) to provide assistance with Task 3. Enpulse Energy's scope will be at least 10% of the overall project scope.

Task 1: Establish Arc Flash Study Procedures and Requirements

Hazen will develop documents that contains the arc flash study procedures and requirements that consultants and City of Greensboro employees shall follow on future electrical projects. The document will establish the following requirements:

- Delineation of responsibility for field work and electric utility data
- System data and documentation requirements
- Required power system modeling software
- Power system modeling requirements
- Equipment to be included for arc flash analysis and labeling
- Minimum level of investigation for arc flash incident energy mitigation
- Mitigation implementation requirements
- Arc flash label format and equipment labeling requirements, in accordance with the latest NFPA-70E requirements
- Study report format and information requirements
- Arc flash training requirements

Deliverables:

- Draft version of the guidance document, electronic format (PDF)
- Final version of guidance document, electronic formats (PDF and Word Document)

Meetings and Workshops:

- One four-hour workshop with City of Greensboro staff to review the document and receive comments

Task 2: Establish/Update Safety Related Design Standards

Hazen will develop documents that contains City of Greensboro electrical design preferences and requirements for water and wastewater facilities and infrastructure:

- Codes and standards compliance requirements
- Operating environment material requirements (indoor/outdoor, wet/dry/corrosive, explosive)
- Service entrance device location and configuration
- Protective device selection
- Guarding of live parts (e.g. insulated buswork, plastic or metal barriers, etc.)
- Minimum working clearances
- Equipment-specific items (disconnect switch locations, equipment protection, etc.)
- Commissioning and acceptance testing requirements
- Other design considerations to mitigate shock and arc flash hazards

Deliverables:

- Draft version of the guidance document, electronic format (PDF)
- Final version of guidance document, electronic formats (PDF and Word Document)

Meetings and Workshops:

- One four-hour workshop with City of Greensboro staff to review the document and receive comments

Task 3: Establish/Update Electrical Safety Standard Operating Procedures

Hazen will use the Water Resources Department SOP template provided by the City of Greensboro to develop a document that contains standard operating procedures for electrical safety.

- Description of Personnel responsibilities
- Description of City responsibilities
- Procedures for establishing qualified personnel
- Establishing an electrically safe working condition (i.e. lockout-tagout)
- Communication and documentation requirements for working on or near live parts (i.e. energized work permits)
- Procedures for working on or near live parts (e.g. shock/arc flash boundaries)
- PPE selection for working on or near live parts, in accordance with the latest NFPA-70E requirements
- Procedures for checking, testing, adjusting, and documenting protective devices

Deliverables:

- Draft version of the SOP document, electronic format (PDF)
- Final version of SOP document, electronic formats (PDF and Word Document)

Meetings and Workshops:

- One four-hour workshop with City of Greensboro staff to review the SOP document and receive comments

Task 4: City of Greensboro Arc Flash Studies for 2018

Hazen will update existing arc flash studies for the City of Greensboro to conform to the new standards set forth in Task 1, and perform initial arc flash studies for City facilities that have not yet been studied. New reports and arc flash labels will be provided and installed as part of the studies. Table 4-1 provides an outline of the facilities covered by Task 4.

Table 4-1: New and Updated Arc Flash Studies for City of Greensboro Facilities

Facility	New Study	5-Year/Major Work Study Update
Bledsoe PS		✓
Lake Brandt PS		✓
Lake Townsend WTP and PS		✓
Mitchell WTP		✓
Remote PS, Tanks (approx. 60 locations)		✓
New Garden PS	✓	
Battleground Tank PS	✓	

Definitions:

- **New Study:** Construction of a new power system model based on record documents and field investigation. Complete arc flash study in accordance with the requirements set forth in Task 1, including mitigation analysis, label application, and arc flash training.
- **5-Year/Major Work Study Update:** Full review of an existing arc flash model as required by NFPA 70E (five years major electrical work since previous arc flash analysis.) Complete arc flash study in accordance with the requirements set forth in Task 1, including mitigation analysis, label application, and arc flash training.

Deliverables:

- Draft versions of the study reports, electronic format (PDF)
- Final versions of the study reports, electronic format (PDF); copies of updated arc flash models

Meetings and Workshops:

- One four-hour workshop with City of Greensboro staff to review the arc flash studies and receive comments
- Two three-hour arc flash training sessions for City of Greensboro electrical personnel

Schedule and Fee

Based on the scope of work, we propose to perform these services for a not to exceed fee of \$150,000 over a period of 180 days after the notice to proceed. The anticipated fee to Enpulse Energy for their services is \$19,500 and is included in the total not to exceed project fee.