BURNS McDONNELL

PROPOSAL FOR

SUBSTATION A 20MVAR CAPACITOR BANK ADDITION – REVISION 3

SUBMITTED TO

INDEPENDENCE POWER & LIGHT

MARCH 31, 2021

March 31, 2021

Independence Power & Light
Jessica Fett
21500 E Truman Rd.
Independence, MO 64051

Re: **Letter of Intent | Proposal for Substation A 20MVAR Capacitor Bank Addition**

Dear Ms. Fett,

As a decades long partner with the City of Independence and members of the same community, Burns & McDonnell has a vested interest in your success. We are thankful and excited about the opportunity to propose engineering services for the Substation A 20 MVAR Capacitor Bank Addition project.

Burns & McDonnell has a proven approach, the right experience, and a firm commitment to make this project successful. We are confident in this commitment because we will provide:

Strong Value with Quality Work - IPL can be confident quality is being measured throughout all phases of the project. Our quality program starts in the office during design and continues to the field, where we are continuously working with your subcontractors and supporting construction throughout the duration of the project resulting in fewer issues in the field where it matters most.
Lump-sum Pricing – We took your feedback to heart on our last proposal and have found a better way to reduce our overall fee and provide cost certainty for this Substation A project. By performing the project on a total cost, lump-sum approach you will know the final price for the job and can plan your monthly cashflows for the duration of our work.
Depth of Experience and Team - Your substation is like the hub of a wheel - there's a lot riding on it. We'll make sure it can handle the load. Our engineers have the knowledge and experience to provide full designs, equipment parameters, and estimates necessary to evaluate the viability of a project. Our professional experience with project administration provides for a smooth continuum of activities necessary for the execution of a project through the conceptual, design, bid and construction phases.
Local Firm with Deep Root in Community - Just like you, we call Kansas City home and have since 1898. We have over 3,000 Burns & McDonnell employee-owners at our world headquarters in Kansas City to give IPL a consistent and close-by partner bringing decades of lessons learned, ideas, and tools for your success.
Long relationship with City of Independence - We've partnered with IPL on over 250 projects in the last 25 years including annual transmission assessments, telecommunications upgrades, and system wide relay settings. Our successful working partnership is a clear indication of aligned cultures and goals and we endeavor to continue growing our relationship.

Please feel free to contact us at mgomez@burnsmcd.com if you have any questions about our proposal. We appreciate your consideration and look forward to working with you in the years to come.

Sincerely,

Keegan Odle, PE
Substation Project Director

Miguel Gomez, PMP
Project Manager

9400 Ward Parkway \ Kansas City, MO 64114
O 816-333-9400 \ F 816-333-3690 \ burnsmcd.com

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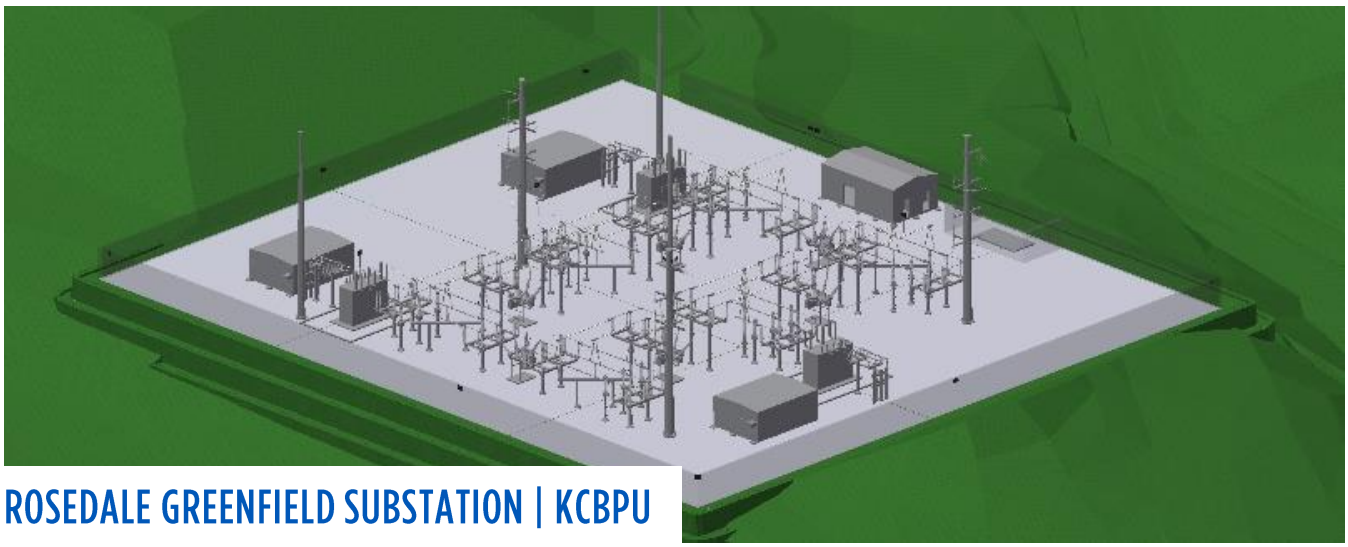
Experience & Reliability of Firm

From single relay replacements to full EPC greenfields, we've executed more than 4,500 substation projects in the last 5 years.

Burns & McDonnell has over 1,700 T&D professional resources in 18 offices worldwide.

Project Experience



ROSEDALE GREENFIELD SUBSTATION | KCBPU

Kansas City, Kansas

Burns & McDonnell provided engineering services for the new Rosedale Substation. The project consists of a new (6) position 161kV ring bus substation with (2) 161/13.2kV transformers. Each transformer will feed a new 15kV switchgear enclosure. The new substation will replace an existing substation and all existing 161kV transmission lines and 13.2kV distribution feeders will be relocated to the new substation. Burns & McDonnell's scope includes all design activities associated with greenfield substations, including design studies, 3D outdoor physical design, civil design, protection and controls, and major equipment procurement support, development of engineering standards and construction and equipment specifications. Burns & McDonnell provided public involvement, environmental and transmission line design services.

Project Reference

Client Name | **Patrick J. Morrill**
Contact | **(913) 573-9523**
pmorrill@bpu.com

Services Provided

Design studies
Physical 3D design
Civil/structural design
Protection and controls design
Equipment procurement
Standards development
Public involvement
Environmental & transmission line design

ELK JUNCTION SWITCHING STATION | WESTAR ENERGY

Elk City, Kansas

Westar requested professional engineering services from Burns & McDonnell for a 69kV, greenfield switching station located in the middle of the Dearing-Bee Creek Junction-Elk Junction-Montgomery 69kV loop (Near Elk City, KS). The new switching station serves a new 25MVA load addition to KEPCo territory, within the Independence area. The new Elk Junction switching station was built to 138kV standards but operates at 69kV. The new station consists of a 4-position ring bus with provisions to expand into a 6-position ring bus. The initial 69kV, 4-position ring bus accommodates the 69kV Montgomery line terminal, 69kV Bee Creek Jct. line terminal, 69kV Elk River line terminal, and 69kV Elk City line terminal.

Project Reference

Client Name | **Paul Huber**
Contact | **(785) 575-8420**
paul.huber@WestarEnergy.com

Services Provided

Physical 3D design
Civil/structural design
Protection and controls design
Telecommunications design
Relay settings design

Burns & McDonnell performed services for preliminary engineering, detailed engineering, and limited procurement/construction support for the installation of the new Elk Junction 69kV switching station. The design included physical design, foundation design, protection and control design, and relay settings. Westar utilized Burns & McDonnell's 3D design capabilities to create a comprehensive model of the entire substation using Autodesk Inventor. Additionally, construction-phasing of drawings and relay settings were performed to support temporary transmission line routing and cut-overs.

BARBER SUBSTATION | KCBPU

Kansas City, Kansas

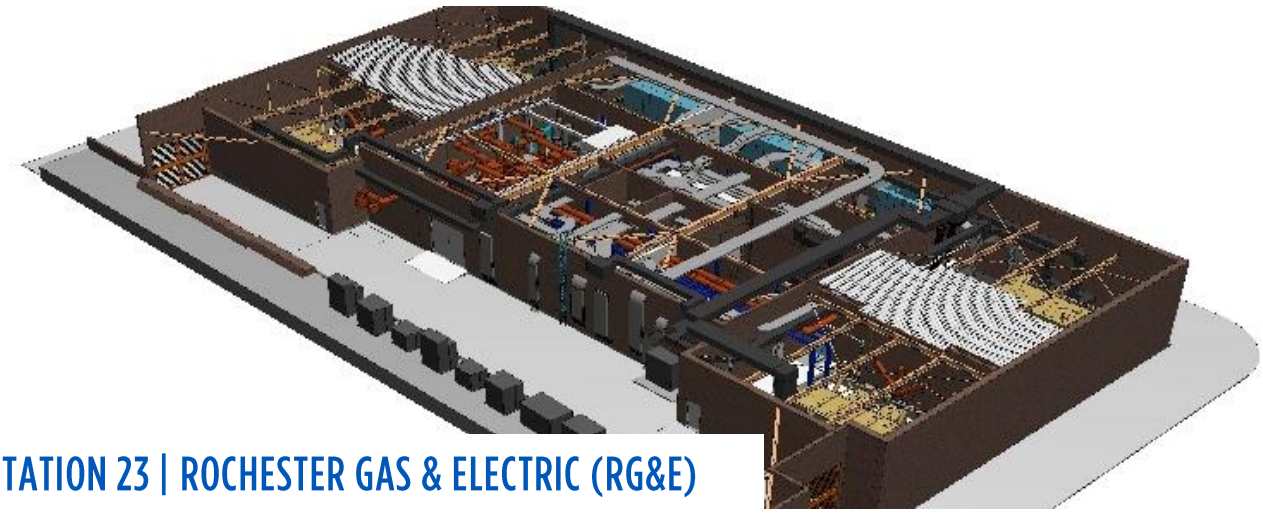
Burns & McDonnell provided engineering services for the 161kV ring bus modification project at the existing Barber substation. The project consists of a new 161kV breaker and a half bay to feed two new 161/13.2 kV power transformer. This is a remote end for the new Rosedale substation. A new 161 kV line position was also added to the existing bus. The existing 69kV Box Structure was removed and replaced with two new 13.2 kV Switchgear enclosures. . Burns & McDonnell's scope includeded all design activities associated with browfield substations, including design studies, 3D outdoor physical design, civil design, protection and controls, and major equipment procurement support, development of engineering standards and construction,equipment specifications and construction sequence support.

Project Reference

Client Name | **Patrick J. Morrill**
Contact | **(913) 573-9523**
pmorrill@bpu.com

Services Provided

Design studies
Physical 3D design
Civil/structural design
Protection and controls design
Equipment procurement
Standards development and
Construction sequence support



STATION 23 | ROCHESTER GAS & ELECTRIC (RG&E)

Rochester, New York

Rochester Gas & Electric (RG&E), a subsidiary of AVANGRID (an Iberdrola company), sought to improve electrical reliability to the downtown Rochester, New York, region. Burns & McDonnell provided conceptual and detailed engineering, procurement, and construction support for RG&E's US$150 million expedited Station 23 Gas Insulated Substation (GIS) project. Station 23 is a significant power source for the city's business district and upgrades to the station were required as part of RG&E's reliability program. The finished upgrades reinforce RG&E's downtown network with new transmission lines linking Station 23 and other stations and replaced older transformers with new, higher capacity equipment. Burns & McDonnell provided conceptual and detailed engineering, procurement, and construction support for the project.

Project Reference

Client Name | **Brian Alexander**
Contact | **(585) 771-4849**
balexander@rge.com

Services Provided

- Conceptual engineering
- Construction sequence development
- Substation engineering
- Overhead transmission engineering
- Underground engineering
- Communication and network engineering
- Procurement
- Construction support

Specific work involved the installation of a new, 115kV source at Station 23 that supplies the 34.5kV bus at Station 137, which has reduced the load on the Station 33 115/34.5kV transformer. Our team worked with RG&E and its appropriate vendors to design and install the layout of power transformers and GIS equipment for Station 23, including the installation of two 115/34.5kV transformers, two 115/11.5kV transformers, one 34.5kV Switchgear and four 13.8kV Switchgears. Other civil work included foundation and oil containment, and electrical works included raceway, conduit, cable, and bus duct system designs for the power transformers and switchgears, a control room, new DC systems, fiber communications network for new relays, and protection and controls for the new equipment.

Scope of Services

Project Approach & Understanding

Project Description

This project consists of adding a new 20MVAR capacitor bank to supply adequate reactive power to SPP at the existing 161/69/13kV Substation A. This substation is located at 21500 East Truman Road, Independence, Missouri. The 69kV yard is connected to a nearby power plant via auxiliary transformers. However, because the power plant is offline, the existing T1 and T1A auxiliary transformers will be removed to allow the installation of the new capacitor bank.

Optional pricing is being provided for removal of T2 and T2A transformers at east side of substation.

Physical Demolition Design (Item 1)

Provide physical demolition drawings showing the removal of the existing auxiliary transformers T1 and T1A, and associated control cables to the adjacent power plant. Scope includes the removal of the existing transformer foundation in case that new foundations are required.

Physical Design (Item 2)

- Analysis of the existing T1 and T1A transformer foundations to confirm adequacy to support new 69kV capacitor bank.
- Preparation of drawings for the installation of one (1) 69kV fuse-less capacitor bank, 350kV BIL, 20 MVAR. New capacitor back will be connected to the existing 69kV breaker and 69 kV box structure.
- Below grade cable raceways design required for the new 69kV capacitor bank.
- Grounding details to connect the new capacitor bank to the existing ground grid. All new equipment and structures will be connected to the ground grid in accordance with IPL specifications and vendor recommendations.
- Existing fence section located near the existing 69kV Bus will be modified to allow the installation of the new cap bank. Modifications include the relocation of the existing gate to comply with standard electrical and safety clearances.
- It is anticipated that a new 3-phase bus structure will be required to connect the new capacitor back with the existing equipment. The final location for this structure will be defined during detailed design.

Electrical Control Design (Item 3)

- Prepare demolition drawings for the control cables associated with the existing T1 and T1A auxiliary transformers.
- Prepare schematics and wiring diagrams required for the installation of a new capacitor bank protection panel in the existing control room, consisting of one (1) SEL-487V and one (1) SEL-501.
- Prepare communication schematics and wiring diagrams to integrate the new capacitor bank protection panel with the existing SCADA/RTU.

69kV Breaker Evaluation (Item 3.c)

Burns & McDonnell will perform a desktop level review of the specifications and vendor recommendations of existing 69kV circuit breaker that will be re-used and connected to the new capacitor bank.

Review will include verifying the breaker classification with nameplates and the manufacturer. The existing breaker is believed to be a Class C2 unit, which is the preferred IEEE classification and is defined as "very low probability of restrike when switching capacitive current under rated conditions.

Burns & McDonnell will work with IPL to compile the necessary data for the breaker manufacturer to determine the suitability of the existing breaker to be reused.

Information required by the manufacturer includes:

- Station one-line diagram
- System grounding (grounded/ungrounded)
- System parameters (Three-phase short circuit, inrush current magnitude and frequency)
- Capacitor ratings, and ratings of any included current limiting reactors
- Bank operation and arrangement (single, back-to-back, harmonic filtering, proximity to other banks)

This data will be compiled on the manufacturer's Capacitor Switching Questionnaire for manufacturer approval of the application. Other breakers and surge arresters in proximity are assumed to be compatible.

Prepare Protective Relay Settings (Item 4)

Burns & McDonnell will provide relay settings for three (3) protective relays as indicated in the scope of work. Burns & McDonnell will provide relay settings files in the native SEL RDB format and provide an Excel or Mathcad calculation document in PDF format.

- One (1) 69kV capacitor protection panel
- One (1) 69kV bus differential

Major Equipment and Structures Specification Development (Items 5 and 6)

Burns & McDonnell will prepare the technical procurement specifications for the following major equipment:

- One (1) three phase 69kV fuse-less capacitor bank, 350kV BIL, 20MVAR
- One (1) relay panel for 69kV capacitor bank protection
- Bus support structure

Burns & McDonnell will review bidder's submittals for conformance with IPL specifications and Project specific requirements. Summary of this review will be provided to IPL.

- The following will be included as part of the procurement packages to be developed by Burns & McDonnell:
    - Project Description
    - Scope of Supply

- Technical Requirements
- Procurement Schedule, describing submittal dates for IFR and Certified drawings, FAT tests and site delivery.

All major materials will be procured by IPL with detailed design support from Burns & McDonnell. Burns & McDonnell shall not procure any material or construction contracts.

Burns & McDonnel will provide engineering support during the procurement process, providing responses and clarifications to the questions issued by the bidders.

Engineering Site Visits (Item 7)

Burns & McDonnell will conduct site/office visits during the engineering phase of this project. Burns & McDonnell assumes at least three professionals for each visit. The following visits are included:

- Initial coordination meeting for project review (site visit) – 1 day
- Permitting review meeting with IPL – 1 day
- 30% review meeting – 1 day
- 70% review meeting – 1 day
- 100% review – 1 day

Construction Site Visits (Item 7)

Burns & McDonnell will conduct site visits during construction. Burns & McDonnell assumes at least two professionals for each visit. The following site visits are included:

- Pre-Bid Meeting with Construction Contract Bidders – 1 day
- Pre-Construction Meeting and Site Walkdown – 1 day
- Pre-Energization Site Walkdown – 1 day
- Final Commissioning Support on Site (1 Person) – 3 days

Construction Packages (Item 8)

The following construction package will be developed by Burns & McDonnell to support construction:

- Civil Construction Package – This package will include the construction scope for all the below grade facilities. The package content will include IFC drawings and bill of materials, as well as IPL construction specifications.
- Electrical Construction Package – This package will include the scope for the equipment and structure installation (above grade scope). The package content will include IFC drawings and bill of materials for the installation of all the major equipment, steel structures and protection and control panels.

In addition, the construction packages will include (as applicable) the following:

- Capital Cost Estimate
- IPL Testing and Commissioning requirements
- SCADA Coordination scope with IPL
- Construction sequence description
- Technical bid forms

Construction Bid Support (Item 9)

Burns & McDonnell has included forty (40) hours for coordination with IPL and construction bidders, during the construction bid period, to facilitate the proper understanding of the project requirements. Following the submission of the construction proposals, Burns & McDonnell will review the submitted proposals and provide a recommendation to IPL. This time will be spent reviewing the construction proposals and preparing the bidder recommendation. When reviewing, Burns & McDonnell will review & assess the submitted proposals for their technical (non-commercial) applicability to the included scope of work, pertaining only to the items necessary for the completion of this scope of work.

Construction Support (Item 10)

After issuance of the IFC package, Burns & McDonnell will remain available to support IPL with review of contractor technical submittals and technical support required to answer contractor requests for information related to the IFC package. Sixty (60) hours of engineering support has been included in the scope of services.

On-Site Engineering Support (Optional Item 11)

Burns & McDonnell will provide one (1) on-site engineering support resource for a 1-month construction period (effective construction time). It is assumed these hours will be worked no more than 8 per day and limited to weekdays only (excluding holidays). If IPL desires Burns & McDonnell on-site engineering support for greater than 8 hours per day, on weekends, or on holidays, requests for this must be made to the Burns & McDonnell project manager no less than 2 weeks in advance of requested dates.

While on-site, the Burns & McDonnell representative will observe the on-going construction activities and compare to the Issued for Construction drawings. If discrepancies are discovered, these will be brought to the attention of the IPL on-site construction superintendent for resolution. Any changes from the construction drawings will be submitted to the IPL representative for final approval.

By appointing an on-site representative, Burns & McDonnell does not assume responsibility for site safety (in part or in whole) or means and methods of the construction contractor(s). Burns & McDonnell is not responsible for providing test equipment, test plans, troubleshooting, and switching procedure.

It is assumed that IPL, or it's construction contractor, will provide a designated working space for the Burns & McDonnell on-site representative (assumed to be within an on-site construction trailer or comparable).

In addition to the labor costs for these services, costs associated with the mileage incurred for the Burns & McDonnell on-site representative will be required. These will be billed at the prevailing mileage reimbursement rate set by the Internal Revenue Service (IRS) for the date on which the mileage occurs. As of January 1, 2021, this rate is $0.56 per mile. The distance used for these expenses is 50 miles per day (25 miles each way), which is the approximate distance between the Burns & McDonnell headquarters location and the project site.

Energization Test Procedure (Item 12)

Burns & McDonnell has included eight (8) hours to develop a commissioning plan that will include an overview of the commissioning stages and activities, general description of commissioning activities that will occur during construction, energization, and post-energization, commissioning checklists and tests required, a process for approval by IPL to allow the equipment to be energized, and a process for approval by IPL and turnover of the equipment to IPL.

Test Document Review (Item 13)

Burns & McDonnell has included four (4) hours of engineering support to review equipment and relay/control test documentation prepared by IPL's testing vendor to verify tests are in conformance with the substation design documentations and IEEE standards.

Burns & McDonnell has not included any hours to perform or witness on-site testing, or to prepare any detailed test reports. Burns & McDonnell's review of equipment test reports does not certify or warranty the performance of any new or reused substation equipment or provide man-hours for final review of testing and functional performance testing prior to the energization of the equipment.

Conformed to Construction Record Documents (Item 14)

As part of the project closeout, conformed to construction record (as-built) drawings will be developed. IFC drawings will be updated after receiving construction records provided by IPL. It is expected that the construction contractor will certify their work was performed in accordance with the construction contract, specifications, documents, and drawings or otherwise clearly indicate any changes made and provide supporting information necessary to justify such changes.

Upon completion of the conformed to construction record drawings, an electronic copy of the design related materials to close out the project will be provided. Included in this package will be AutoCAD (.dwg) files of all the conformed to construction record drawings. Design assumes as-builts will not require professional engineering seal.

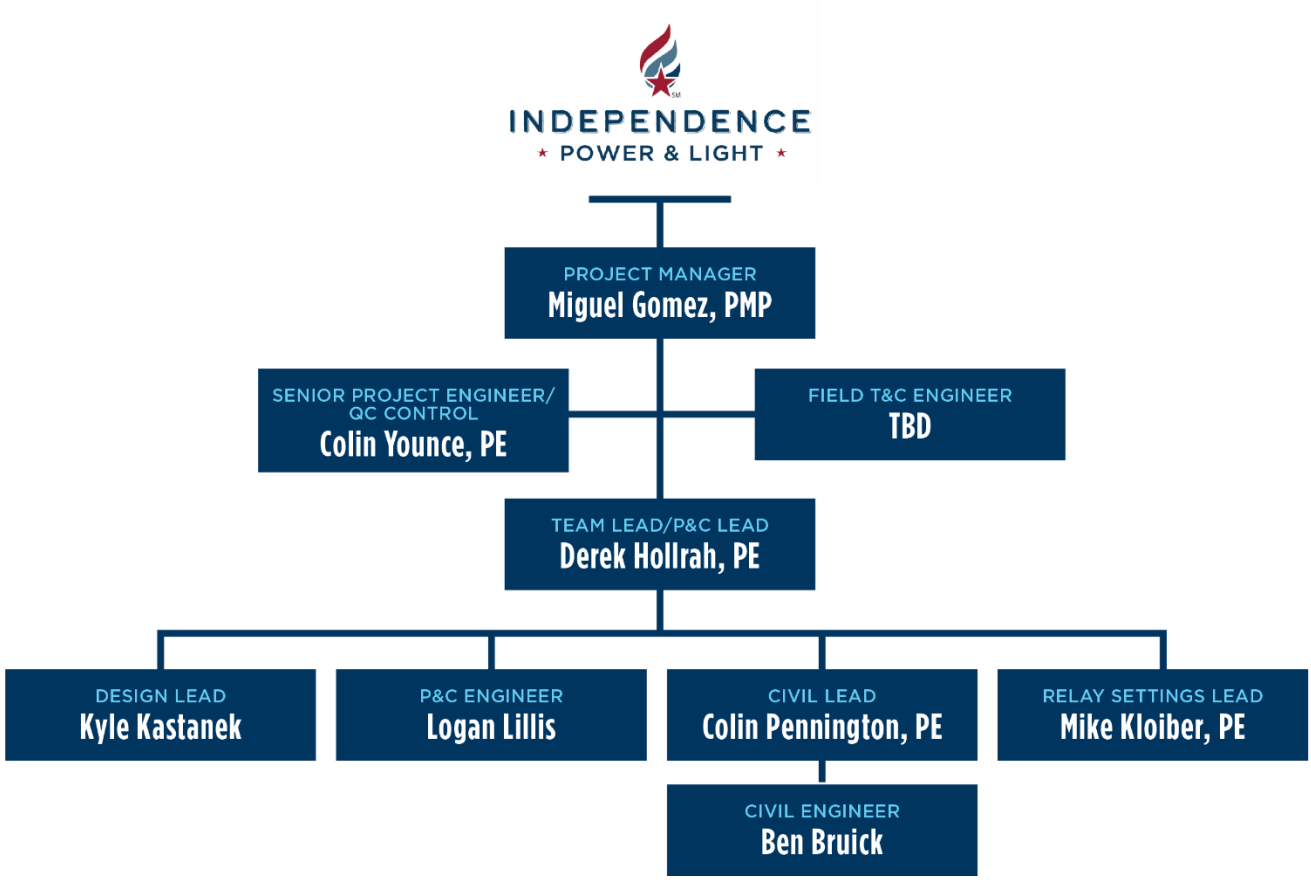
Engineering Estimate (Item 15)

A capital cost estimate will be developed by Burns & McDonnell. This estimate will include the following summary categories:

- Engineering
- Major equipment
- Minor equipment
- Construction
- Testing and commissioning services

Internal IPL services and indirect costs not listed will not be estimated unless coordinated between Burns & McDonnell and IPL.

Project Team Organization Chart (Item 17)



Please see Appendix A for our team's resumes.

Project Management

Project Meetings

Burns & McDonnell's project manager will provide general project administration, budgeting, invoicing, change management, risk assessment, and day-to-day management and coordination of the Burns & McDonnell effort. Burns & McDonnell will also develop and maintain a project design schedule including all key work packages, issue dates, and other major milestones related to the work.

Kickoff Meeting

An in-person project kickoff meeting will be scheduled following award of the project. The primary objective of this meeting will be to exchange requested information necessary to start detailed design, review the project plan and build consensus for next steps. Some of the key discussion items will be:

- Kickoff meeting site visit
- Review scope of work, schedule, and key project risks

- Discuss objectives and expectations going forward
- Identify project roles and responsibilities and define communication lines and protocol
- Identify and exchange information needed to perform the work

Project Review Meetings

Aside from the project kickoff meeting, Burns & McDonnell has also included three design stage project review meetings with IPL and key stakeholders. These meetings will be held to review submitted deliverables, discuss comments and solicit feedback on each package, discuss the overall project status. Each day-long meeting will be attended by key project members from Burns & McDonnell.

Preliminary Engineering Phase – 30%

Design Information Review

Upon commencement of the work, design information provided by IPL will be reviewed by Burns & McDonnell for use during the design. Burns & McDonnell anticipates the following information will be provided for use:

- Existing Station Drawings in CAD format and Calculations
- Existing Equipment Cutsheets
- Applicable Design Standards, Design Criteria, Templates, and/or Recent Project Examples
- IPL Standard Capacitor Bank and Protection Panel Specifications
- Existing Survey Data (if available)
- Existing Geotechnical Data (if available)
- Latest ASPEN model or CAPE database with the new cap bank modeled.
- Existing settings for the 69kV Bus Differential relay(s)
- Latest IPL relay setting standards for SEL-487V, SEL-501 and SEL-487B (assumed relay for the bus differential protection)

Design Criteria Document

During the 30% design phase, relevant design standards and information will be collected and documented into a project-specific design criteria document. This is an important step, establishing the technical criteria for the design moving forward.

The design criteria document will establish the following key design criteria:

- Project Description
- Electrical Design and Clearance Criteria
- Structural Loading and Design Criteria
- Foundation Design Criteria & Geotechnical Parameters

Protection Requirements and Major Equipment Ratings

- References

The preliminary design criteria document will be drafted and submitted for IPL review and comment during the 30% design phase as part of the preliminary engineering package and will be finalized during detailed engineering.

30% Physical Design

Burns & McDonnell will develop a preliminary station general arrangement showing the proposed locations for the new capacitor bank. During this phase, physical clearances with the existing equipment and access routes to the new capacitor bank will be evaluated. Burns & McDonnell will work with IPL engineers to select the location for the new 69kV capacitor bank during detailed design once certified vendor information is available. Burns & McDonnell will provide scope recommendations as applicable in case of impacts to the fence and/or access road during detailed design.

30% Electrical Design

As part of preliminary engineering, Burns & McDonnell will develop a preliminary relaying one-line diagram depicting the new capacitor banks relaying and metering philosophy. IPL protection standards to be followed for the capacitors bank protection panel.

A panel front view drawing will be created showing the major components for the capacitor bank protection panel. This new panel will be installed inside the existing control room

30% Civil Design

Burns & McDonnell will complete preliminary analysis of the existing T1 and T1A transformer foundations. To complete this task, existing foundation drawings and available geotechnical data will be used to complete the assessment. In case that the transformer foundation needs to be replaced, a demolition drawing will be provided for the existing foundation.

Burns & McDonnell will use the available foundation drawing to provide a demolition scope showing the removal of the existing T1 and T1A transformer foundations.

30% Design Phase Deliverables

Burns & McDonnell will provide the following deliverables during the preliminary engineering phase of the work:

- Draft Design Criteria Document
- 30% Design Package, including the following drawings:
- General Arrangement
- Relaying One-Line
- Capacitor Bank Protection Panel Front View
- Major Equipment Bill of Material (+12 weeks lead time)
- Foundation DEMO Plan (if required)

Detailed Engineering Phase – 70% Design

Design Criteria Document

During the 70% design phase, the design criteria document will be updated by incorporating commentary received from IPL's review of the draft submission completed during preliminary engineering.

70% Physical Design

The substation general arrangement will be updated to incorporate IPL comments and design criteria updates.

Upon update of the general arrangement, Burns & McDonnell will perform physical design activities associated with updating the existing grounding plan, conduit plan and details for changes associated with the equipment affected by this project.

During this time section views and details will be developed for the new equipment. Existing section views associated with T1 and T1A will also be updated. For this task to be completed, certified vendor information will be required from the capacitor bank vendor.

As additional details are developed, the station bill of material will be updated to capture required materials.

70% Civil/Structural Design

Burns & McDonnell will design the bus support structure and its foundations, along with the foundation required for the new 69kV capacitor bank. The capacitor bank foundation design will be based on preliminary or go-by reactions to be provided by the capacitor bank vendor. Both foundation designs shall be based on conservative geotechnical assumptions included in the Design Criteria Document previously submitted. Burns & McDonnell will update the existing foundation plan and provide preliminary foundation detail drawings.

70% Electrical Design

Burns & McDonnell will update the communications and relaying one-line drawings based on comments from IPL.

As the relaying one-line is finalized, Burns & McDonnell will then proceed with development of AC and DC schematics. Burns & McDonnell will incorporate available vendor drawings into DC schematics as final vendor drawings are made available.

Burns & McDonnell will work with IPL to identify project specific protection, communications, and metering requirements. Project specific coordination items will include SCADA, Communications, backup station power, and relay coordination.

70% Material Design

Station bill of material will be updated based on comments and detailed design. Minor material will be added to the bill of material as they are identified during detailed design. The bill of material will indicate if equipment is to be supplied by IPL or the construction contractor.

70% Design Phase Deliverables

Burns & McDonnell proposes to provide the following deliverables during the 70% detailed engineering phase of the work:

- Updated Design Criteria Document
- Updated General Arrangement
- Updated Relay One-Line

- Section View Drawings

AC/DC Schematics

- Capacitor Bank Protection Panel Front View
- Foundation Plan
- Foundation Details

Grounding Plan

- Conduit Plan
- Communication Diagram
- 70% Bill of Materials

Detailed Engineering Phase – 100% Design

100% Physical Design

Burns & McDonnell will make applicable updates to the general arrangement and section views based on comments from IPL at the 70% design stage. The grounding and conduit plans will also be updated and finalized to reflect any changes made during the 70% phase.

During this phase, the final bus/conductor connection details, grounding, conduit, and fence details will be developed and any material changes will be reflected on the station bill of material.

100% Civil/Structural Design

Foundation plan will be updated to reflect any changes during the 70% design review.

Upon receipt of final loading from capacitor bank vendor, Burns & McDonnell will finalize foundation designs.

100% Electrical Design

Relaying one-line, AC/DC schematics and communication drawings to be updated based on any comments from IPL during 70% design review.

Burns & McDonnell will utilize the updated AC/DC schematics to generate the equipment and panel wiring diagrams and cable schedule. Panel wiring diagrams will be provided to protection panel manufacturer for fabrication of the pre-wired panel.

Any equipment identified that will not be supplied by the capacitor bank vendor or capacitor bank protection panel, such as yard control cables, will be added to the station bill of material.

100% Material Design

Burns & McDonnell will finalize the bill of materials based on any comments and to reflect the current design package. Equipment will be indicated as owner or contractor supplied. Contractor supplied commodity materials for grounding and conduit (such as PVC and ground cables) will be listed as “lot.” Final takeoff for those items will be determined by the construction contractor.

100% Demolition Package

Burns & McDonnell will develop a demolition package utilizing existing station drawings and adding clouding/hatching and notes to indicate equipment that is to be removed. Physical demolition will include clouding of physical equipment to be removed. Below grade demolition package will include

clouding of below grade equipment to be removed and notes to indicate if equipment is to be removed or retired in place. In addition to the approach proposed for the physical demolition drawings, the protection and control demolition package will also include as applicable an "obsolete" note indicating that the drawings are no longer valid.

Detailed Design Phase Deliverables

Burns & McDonnell proposes to provide the following deliverables during the detailed engineering phase of the work:

- Updated Relay One-Line
- Updated Communications Diagram
- Updated General Arrangement and Section Views
- Electrical Connection Details
- Updated AC/DC Schematics
- Relay Panel and Equipment Wiring Diagrams
- Cable Schedule
- Nameplates and Signage
- Foundation Plan
- Foundation Details
- Grounding Plan and Details
- Conduit Plan and Details
- Final Bill of Materials
- Demolition Drawings
- Construction Specifications
- Relay Settings
- Energization Test Procedure

Detailed Engineering Phase – Issued for Construction (IFC) Package

Issued for Construction Package

Burns & McDonnell will make any final updates to the physical, civil and electrical design drawings based on comments from IPL at the 100% design stage.

After performing quality reviews on all drawings, Burns & McDonnell will sign, seal, and compile all applicable drawings and specifications into an Issued for Construction (IFC) Package, and issue for use by IPL's construction contractor. Design document submittals will be electronic (secure FTP site). No hard copies are anticipated to be required and is not included in this proposal.

Geotech and Survey

Burns & McDonnell has not included cost to subcontract a site survey and/or geotechnical investigation. The estimate assumes that all necessary survey and geotechnical information will be provided by IPL. In the absence of required data, Burns & McDonnell will make conservative assumptions based on publicly available data and will have IPL sign off on any such assumptions.

Substation Design Assumptions & Clarifications

Burns & McDonnell is committed to a flexible approach that meets the needs of the project. A thorough review of the project scope will be an important part of the kickoff meeting to confirm the assumed scope of work meets the needs of the project and IPL's expectations.

If there are additional tasks, Burns & McDonnell is confident the resources are available to support the project requirements. However, to remain within the proposed budget and schedule, the following assumptions and clarifications apply.

Site Development & Storm Water Design

Pricing included in this proposal assumes no alterations to the site ground slope. Limits of disturbance shall be minimal. No storm water design shall be conducted for this site.

Reused Equipment

Burns & McDonnell has not included time to develop 69kV breaker specification as that equipment is assumed to be re-used. Burns & McDonnell assumes all vendor drawings are available so that the existing equipment can be incorporated into the new substation yard drawings.

Substation Structure Loading Requirements

Pricing included in this proposal assumes that the 69kV box structure will not require any modifications nor will any additional structures or their associated foundations, beyond what is stated herein, be required.

Loads for capacitor bank steel structure (developed by vendor) and bus support structure shall be developed per ASCE 7-05 and ASCE 113. Fault current and X/R ratio will be provided by IPL.

Construction Schedule and Sequence

Final verification of the construction work outage sequence (CWOS) is the responsibility of IPL and/or the construction contractor. Phased drawing packages (physical, civil, structural, protection & control) are not included within this scope of work. All design packages will be provided depicting the final ultimate station layout. Detailed phased construction activities such as lift-land plans or similar are not included in this scope of work and are the responsibility of the construction contractor. Additionally, intermediate protection and control plans, relay settings, and associated wiring is not included in this scope or work.

IPL Equipment Specs

Burns & McDonnell assumes utilization of available IPL procurement specifications for the new 69kV Capacitor bank, steel structures and the new protection panel.

Construction Specs

Burns & McDonnell assumes IPL construction specifications will be used for the construction packages (above and below grade). Hours and cost have not been included for development of additional construction specifications.

Schedule

Burns & McDonnell has assumed the following regarding the project schedule:

Engineering activities will be completed over a 6-month period.
Construction activities will be completed over a 6-month period.
Client review cycles for drawing packages are expected to be completed within 10 working days of issuance.
All design inputs from IPL and material vendors are available to support proposed deliverable schedule. Delays in design inputs and vendor drawings will delay design packages.
Complete construction redlines will be made available to Burns & McDonnell within 1 month of the completion of construction and Conformed to Construction Records Documents will be completed and accepted not more than 1 month thereafter.

Environmental, Permitting, and Real Estate Support

Burns & McDonnell's proposed scope of work does not include work directly associated with routing, siting, permitting, real estate or environmental assessment.

Burns & McDonnell will not be responsible for permit application development. Burns & McDonnell may be required to provide design drawings upon request to IPL as requested for this effort. Agency meetings, public hearings, and public meetings will not require the attendance of Burns & McDonnell personnel.

Physical Design

Assumes no ground penetrating radar is needed and the existing drawings are assumed to be accurate
Assumes control cables associated with the existing power plant will be disconnected from the auxiliary transformer panels and abandoned in place. Existing record drawings in CAD format are required to complete these design tasks.
It is assumed that no bus modifications will be required to install the new equipment.
Assumes modification to the existing ground grid are not required. New equipment to be connected to the existing ground grid following vendor recommendations and IPL standards.
Assumes existing below grade raceways have enough spare capacity to support the control cable installation. Burns & McDonnell scope is to provide design for new conduits from the new capacitor bank to the existing trench/manhole connecting with the existing control room.
Assumes no lighting and/or lightning protection studies are required. Hours for the modification of the existing lighting and/or lightning protection systems are not included.
Existing station drawings are anticipated to accurately reflect below grade conduits/cables and other obstructions.
Optional scope has been provided for the replacement of the existing T2 and T2A auxiliary transformers. If this optional scope is approved, Burns & McDonnell assumes it will be executed in conjunction with the replacement of T1 and T1A auxiliary transformers.

Electrical Design

AC and DC load calculations are not included. It is assumed that the existing auxiliary services and panel have enough spare capacity to support the new loads resulted from the installation of the new 69kV capacitor bank and protection panel.

Relay Settings

Proposal assumes IPL will provide:

An accurate system model in Aspen or Cape software.
Existing relay settings for all relays at Substation A. This information will include any specific reclosing practices required by IPL standards and notification of any requirements for dead line or synchronous closing at all voltage levels.
Relay setting templates and calculation templates or will accept the relay setting methodology as developed by Burns & McDonnell as based on IEEE and general electric utility practice in the United States.

Assumes IPL is responsible for the SCADA points list. Any SCADA points that require specific relay settings will be described in the IPL SCADA points list and all necessary information provided to Burns & McDonnell at least 30 days before relay settings are required to be issued.

Studies

No system studies work is included in this proposal. Burns & McDonnell assumes that all continuous current, voltage and reactive power requirements, fault currents and site-specific design parameters will be provided to Burns & McDonnell in a timely matter that supports the design schedule.

Capacitor bank vendor will be provided system parameters as part of the technical specifications. The vendor is anticipated to determine surge arrester need and recommend size.

SCADA/Communication Equipment Programming

No time has been included for the development of SCADA points list, or configuration file development or programming of SCADA or communications equipment. Burns & McDonnell will work with IPL SCADA team to incorporate the IPL points list.

Vendor Submittals

Occasionally vendors may take multiple rounds of review to get their designs correct. For estimating purposes, it has been assumed that only a single review cycle will be required for vendor calculations and/or fabrication drawings.

Project Schedule

A well developed and maintained schedule is critical to project success. Burns & McDonnell is committed to working with IPL to develop an engineering schedule that supports IPL's planned construction and demolition efforts. Burns & McDonnell's understanding of the current working schedule is as indicated below. We look forward to further developing and confirming the schedule during the 30% design efforts.

DESCRIPTION	ANTICIPATED COMPLETION DATE
Engineering Contract Award	4/19/2021*
IPL to provide existing substation information	4/19/2021*
Site Visit	4/20/2021*
Engineering	
30% Design Package	5/24/2021
70% Design Package	6/29/2021
100% Design Package	8/24/2021
IFC Package	9/13/2021
Procurement	
IFB Package for Capacitor Bank and Relay Panels (Placeholder for final plan)	5/24/2021
Award Capacitor Bank and Relay Panels (Placeholder for final plan)	6/22/2021
Vendor drawings submittals (Placeholder for final plan)	7/23/202
Construction	
Anticipated Award of Construction Contract	9/30/2021
Anticipated construction start date/NTP issued to contractor	11/1/2021
Completion of Commissioning of Substation	4/30/2022
Project Close-Out	
Receive construction redlines	5/13/2022
As-Built Drawings	6/1/2022

* To be confirmed by IPL

Roles & Responsibilities

Project Manager

The project manager will be the primary interface with Independence Power & Light and is responsible for managing the project scope/execution, schedule, and budget with the goal of executing successful project for IPL and for Burns & McDonnell.

- Identify a detailed activity list to accomplish identified project objectives and deliverables
- Maintain clarity and alignment of client expectations to set a clear basis for identifying change triggers
- Manage overall resource assignments
- Final review of the Project Execution Plan
- Act as lead point of contact for travel and project site visits
- Conduct pre-task analysis for team present at site visits, if required
- Communicate project progress to client counterparts
- Review progress report and submit to client on a regular basis
- Host regular team/client coordination meetings
- Oversee all project financial responsibilities
- Manage overall design budget
- Review and send project invoices
- Update project forecasts

- Team representative
- Assist project team in addressing questions with the client
- Review/submit open items report summary on a regular basis
- Mentor/lead others on the design team to develop them throughout the life of the project

Team Lead

The team lead outlines the key engineering services to be completed to fulfill the project objectives and deliverables. They are responsible for the multidiscipline execution of all engineering deliverables.

- Coordinate with project manager to identify anticipated coordination, communication, and tracking needs to execute the proposed scope of work
- Clearly establish the delineation of the scope of work, and communicate to the project team
- Communicate design questions with Independence Power & Light
- Review assigned project staffing needs throughout the life of the project
- Communicate design specifications to equipment vendors, and respond to vendor inquiries regarding project specifications
- Provide technical guidance to electrical and civil engineers as they complete their tasks
- Update progress reports and schedules throughout the project
- Attend site visits to gather/document information, including design notes and pictures of the site
- Work with the relay settings engineer to incorporate all necessary protection specifications into the project protection requirements documents
- Coordinate with quality control engineer to oversee/perform necessary QC reviews
- Oversee and organize the submission of all engineering project deliverables, with assistance from others on the design team
- Mentor/lead others on the design team to develop them throughout the life of the project

Project Engineer/Quality Control

Success of a project often leans heavily on the planning and implementation of a quality design process. Planning is only as good as the ability to implement. The quality control engineer is responsible for the plans and actions taken associated with each step in the quality control process throughout the life of the project.

- Coordinate with project manager and engineering manager to perform high level scoping/risk analysis for project prior to project lead assignment after proposal development
- Review assigned project schedule to plan/coordinate quality control requirements for project deliverables
- Develop a quality plan for implementation of the required reviews
- Perform peer (Q4) reviews and constructability (Q6) reviews as necessary
- Monitor QA/QC progress for any QC reviews performed by others
- Attend follow-up QC page-turns to help determine alignment of relevant comments and adherence to client preferences
- Provide technical leadership/coaching to the design team through the oversight and assessment of review comment discussions

Relay Settings Engineer

The relay settings engineer will coordinate activities related to the data collection, power system modeling and development of protective relay settings.

- Create/modify power system model and perform relay coordination studies
- Create/modify relay setting calculations, and native relay setting files
- Create fault simulation files to support testing/commissioning of line relays
- Work with protection & control design team to fully develop protection systems
- Effectively communicate and coordinate project activities with project manager, engineering manager, clients, and others as needed

Electrical Engineer

The electrical design engineer will perform the required design tasks and calculations to prepare studies/reports, and work with the engineering manager and CAD personnel to modify/create project drawings and documents.

- Maintain an understanding of project schedule and project execution plan
- Communicate any design variances that may impact scope or schedule to Engineering Manager
- Assist engineering manager with the preparation of project planning documents and design basis manual
- Attend site visits as necessary to take notes, pictures, and document existing conditions
- Perform engineering studies/calculations to prepare project reports
- Work with the project civil engineer and drafter to make sure equipment plans and sections are accurate
- Perform full self-check (Q3) of completed engineering drawings, documents, calculations, studies, and reports
- Prepare quality control set of project deliverables for quality control engineer
- Assist with the production of professional, high quality project deliverables packages
- Incorporate any QC comments and client review comments into project drawings

Civil/Structural Engineer

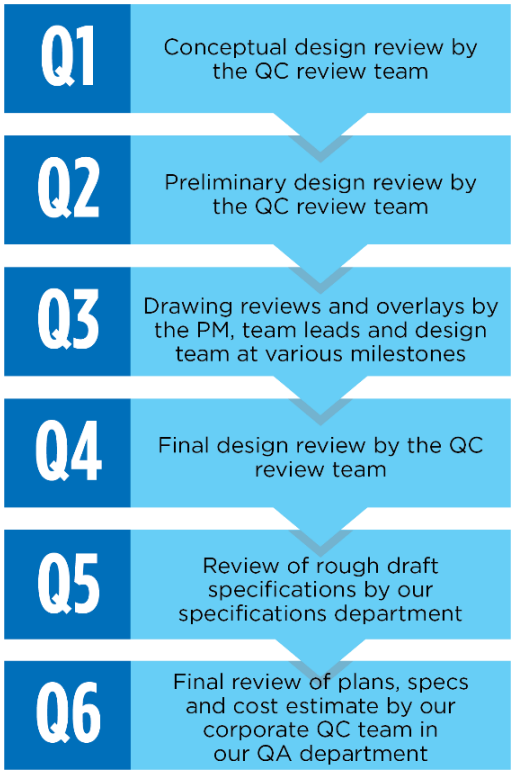
The civil/structural engineer will manage the civil design staff as the technical leader and workload/schedule coordinator.

- Review project schedules and assist with scoping efforts
- Communicate with engineering manager on resource needs
- Maintain an understanding of project schedule and project execution plan
- Communicate any design variances that may impact scope or schedule to engineering manager
- Assist engineering manager with the preparation of project planning documents and design basis manual
- Attend site visits as necessary to take notes, pictures, and document existing conditions
- Perform engineering studies/calculations to prepare project reports
- Work with the project electrical engineer and drafter to make sure equipment plans and sections are accurate

- Perform full self-check (Q3) of completed engineering drawings, documents, calculations, studies, and reports
- Prepare quality control set of project deliverables for quality control engineer
- Assist with the production of professional, high quality project deliverables packages
- Incorporate any QC comments and client review comments into project drawings

Quality Control

Delivering high-quality work is a cornerstone of our firm. Backing the skills, knowledge and experience of our professionals is our robust Quality Assurance/Quality Control (QA/QC) Program.



Providing the framework to confirm our project excellence, our QA/QC Program includes checks and balances based on lessons learned throughout our more than 121-year history and the experience of our employee-owners. We perform risk reviews to identify, assess and develop plans to mitigate risks and create project instructions, which include scope and responsibilities, schedule and budgets, and project-specific requirements. We build six-step internal quality reviews into project schedules that involve regular coordination meetings and evaluations by experienced professionals at strategic milestones throughout the design and construction processes.

Our projects often contract externally for supplemental professional services, suppliers of materials and equipment, and construction services. The quality control measures taken for subcontractors typically include prequalifying potential suppliers before bid and award; reviewing shop drawings and other submittal documents; prequalifying potential suppliers for major equipment and shop inspections; conducting a three-phase method of construction quality control; and reviewing and verifying testing records and other records of fabrication and construction. This approach allows us maximize design, specification and drafting efforts; comply with codes, standards, laws and regulations; and help you achieve your project goals within the established time, budget and technical feasibility.

Contract

Burns & McDonnell greatly appreciates the 25-year partnership with the City of Independence, and we look forward supporting IPL on Substation A and future projects. Burns & McDonnell proposes to complete this project under the negotiated Terms and Conditions between IPL and Burns & McDonnell.

Price

Burns & McDonnell proposes to provide design and construction support services on a lump-sum cost approach. Upon a successful award, the total fee based on the cost below with selected optional services will be divided evenly based on the project schedule and billed to IPL on a monthly basis.

The following provides a breakdown of the anticipated fees associated with the scope requested by IPL and assumptions indicated in this proposal:

SCOPE	LUMP SUM COST
Substation Design	
Physical/Electrical	$ 79,413.82
Civil/Structural	$ 22,933.60
Project Management	$ 25,793.78
Relay Settings	$ 7,590.45
TOTAL	$ 135,731.65

OPTIONAL SCOPE	LUMP SUM COST
Engineering Support	$ 17,830.13
On-Site Engineering Support	$ 30,802.61
Removal of T2 and T2A Transformers	$ 33,367.03
TOTAL OPTIONAL SCOPE	$ 81,999.77

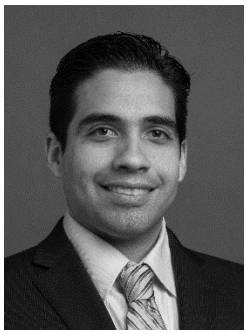
See below for the preliminary cashflow schedule. Final cashflow will be provided by Burns & McDonnell as the project scheduled is confirmed by IPL during the 30% design development.

Milestone	Proposed Payment ($)
June 2021	13,573.16
July 2021	27,146.33
August 2021	33,932.91
September 2021	27,146.33
May 2022	13,573.16
June 2022	13,573.16
July 2022	6,786.58
Total	135,731.65

APPENDIX A
RESUMES

MIGUEL A. GOMEZ PEREZ, PMP

Project Manager



Miguel is an electrical engineer specializing in the design of electric power substations. He has been involved in the design of multiple high voltage stations between 11.5kV to 345kV. His responsibilities include project management, engineering management, protection and control design, physical substation design, procurement and construction specification preparation, construction sequencing coordination, commissioning support and regular communication between clients and vendors.

EDUCATION

- MS, Project Management
- BS, Electrical Engineer

7 YEARS WITH BURNS & MCDONNELL

15 YEARS OF EXPERIENCE

Multiple Projects | Liberty Utilities – Empire Distric

Joplin | 2018-Present

Engineering Manager responsible for project management and engineering oversight for multiples projects for Liberty Utilities. Project scopes consists of multiple substation upgrades including site expansions, transformer replacements, breaker replacements, line exit additions and upgrades, relay replacements and other miscellaneous upgrades. Responsibilities include engineering management, staffing coordination, engineering scheduling, planning and scoping, cost estimating, program and engineering budgeting, change management, quality assurance and review, outage scheduling support, procurement coordination, engineering progress, and financial reporting.

Rosedale Area Reliability Project | Kansas City Board of Public Utilities (KCBPU)

Kansas City | 2016-2019t

Engineering Manager responsible for project management and engineering oversight associated with the new 161/13.8kV Rosedale substation and the remote end upgrades at the existing Barber and Armourdale substations for KCBPU. This includes engineering management, staffing coordination, program and engineering scheduling, planning and scoping, cost estimating, program and engineering budgeting, change management, quality assurance and review, outage scheduling support, procurement coordination, engineering progress, and financial reporting.

Station 23 New 115kV Downtown Source, Owner's Engineer | IUSA – Rochester Gas & Electric

New York | 2015-Present

Lead engineer responsible for the engineering oversight and substation engineering execution associated with Station 23. The project considered the installation of a new 115kV GIS in the existing building, four new 115kV transformers, replacement of the existing 11.5kV AIS equipment with new 34.5kV and 11.5kV GIS switchgears and new protection and control scheme. The responsibilities include engineering management, project schedule, project quality control, field visits for equipment verification at site and regular communication between clients and vendors.

Energizing the Future Program (EtF), Owner's Engineer | FirstEnergy Corp.

Ohio, Pennsylvania | 2014-2015

Lead engineer responsible for the external engineering oversight and substation engineering execution associated with over 20 EtF reliability projects. The Project scopes included the instillation of power transformers, new circuit breakers and

MIGUEL A. GOMEZ PEREZ, PMP
(continued)

switches, minor physical upgrades, as well as new protective relaying. The responsibilities included engineering management, project schedule, engineering and procurement cost estimates and budgets, procurement of major equipment, project quality control, field visits for equipment verification at site and regular communication between clients and vendors.

Station 251, Owner's Engineer* | IUSA – Rochester Gas & Electric

New York | 2012-2013

Lead engineer in the design of a new 115/11.5kV substation. The substation considered two 115kV bays in breaker and a half configuration, two 115/11.5kV transformers and a new 11.5kV indoor switchgear. The responsibilities included design of the new yard, the overall protection and control scheme modification as per client standards, relaying one-line diagrams, communication block diagrams, protection and control bills of material, relay panel physical layout, control enclosure physical layout, AC and DC relaying schematics, communication schematics, relay panel and equipment wiring diagrams, cable scheduling, equipment vendor schematic and wiring review, voltage drop (AC & DC), equipment and construction specifications and regular communication with the client.

Station 80, Owner's Engineer* | IUSA – Rochester Gas & Electric

New York | 2012-2013

Lead engineer in the design and commissioning of two new 345/115kV Autotransformers. The responsibilities included design and modifications of the existing yard section associated with the existing transformers, the overall protection and control scheme modification as per client standards, relaying one-line diagrams, communication block diagrams, protection and control bills of material, relay panel physical layout, control enclosure physical layout, AC and DC relaying schematics, communication schematics, relay panel and equipment wiring diagrams, cable scheduling, equipment vendor schematic and wiring review, voltage drop (AC & DC), equipment and construction specifications and regular communication with the client.

Station 49, Owner's Engineer* | IUSA – Rochester Gas & Electric

New York | 2012-2013

Lead engineer in the replacement of two 115/11.5kV and installation of a new 11.5kV GIS switchgear. The responsibilities included design and modifications of the existing yard section associated with the existing transformers, the overall protection and control scheme modification as per client standards, relaying one-line diagrams, communication block diagrams, protection and control bills of material, relay panel physical layout, control enclosure physical layout, AC and DC relaying schematics, equipment vendor schematic and wiring review and regular communication with the client.

Santa Lucia GIS Substation* | CORPOELEC

Maracaibo, Venezuela

Project engineer on an EPC project for a new Gas Insulated Substation. Overseeing the construction specification preparation, protection and control design, physical substation design, procurement and construction sequencing coordination for a new 138/24kV GIS in the metro area of Maracaibo (Venezuela). The project considered two 138/24kV transformers to be installed indoor, a new switchgear room in a separate building and control room. The substation protection and control scheme was design using IEC 61850 protocol for all the new IEDs.

MIGUEL A. GOMEZ PEREZ, PMP
(continued)

Grano de Oro Substation* | CORPOELEC
Maracaibo, Venezuela

Project engineer on an EPC project for a new Gas Insulated Substation. Overseeing the construction specification preparation, protection and control design, physical substation design, procurement and construction sequencing coordination for a new 138/24kV GIS in the metro area of Maracaibo (Venezuela). The project considered two 138/24kV transformers to be installed indoor, a new switchgear room in a separate building and control room. The substation protection and control scheme was design using IEC 61850 protocol for all the new IEDs.

Falcon State Power System Upgrades* | CORPOELEC
Maracaibo, Venezuela

Lead engineer for the conceptual Design of seven air isolated substations in 115kV and over 120 km of transmission lines for the expansion of the power system in the Falcon State, including project cost estimation, protection and control schemes applying the IEC 61850 protocol for all the new IEDs, 115kV, 34.5kV and 11.5kV major equipment specifications and construction sequence plan.

La Lago GIS Substation * | CORPOELEC
Maracaibo, Venezuela

Project engineer on an EPC project for a new Gas Insulated Substation. Overseeing the construction specification preparation, protection and control design, physical substation design, procurement and construction sequencing coordination for a new 138/24kV GIS. The project was located in a residential area of the city therefore a special architectural design was required to match the surrounding buildings. The substation considered two 138kV underground transmission lines, two 138/24kV transformers to be installed indoor, a new switchgear room in a separate building and control room on the upper level. The substation protection and control scheme was design using IEC 61850 protocol for all the new IEDs.

Jardín Botánico Substation* | CORPOELEC
Maracaibo, Venezuela

Project engineer on an EPC project for a new distribution substation and two 138kV transmission lines. The responsibilities included overseeing the construction specification preparation, protection and control design, physical substation design, procurement and construction sequencing support. The substation considered two 138kV transmission lines, two 138/24kV transformers and ten 10 24kV distribution circuits. The substation protection and control scheme was design using IEC 61850 protocol for all the new IEDs.

**denotes experience prior to joining Burns & McDonnell*

COLIN M. YOUNCE, PE

Senior Project En ineer/QC Control

Mr. Younce is a project engineering lead and electrical engineer. He has been involved in the design of a variety of high-voltage substations ranging from 12kV to 345kV. Mr. Younce's responsibilities include engineering management, protection and control design, substation physical design, coordination of communication between clients and vendors, procurement and construction specification development, procurement coordination, construction sequencing, field support, quality assurance and review, and technical guidance and support.

EDUCATION

- BS, Electrical Engineering
- Specialization in Power Systems

REGISTRATIONS

- Professional Engineer (IA, KS, MD)

12 YEARS WITH BURNS & MCDONNELL

12 YEARS OF EXPERIENCE

Multiple Projects | Liberty Utilities (Empire District Electric)

Missouri & Kansas | 2018 – Present

Project engineer providing oversight of detailed engineering and Owner's Engineer (OE) services for multiple substation projects for Liberty Utilities. Project scopes include digital fault recorder (DFR) installations on the 161kV transmission system, 161kV substation expansions, conceptual design and scoping for projects ranging from 12kV to 161kV, and OE review services for engineering designs by others. Responsibilities include planning and scoping, client coordination and communication, providing technical guidance and oversight to the multi-discipline engineering team, project quality control, engineering coordination, procurement coordination, engineering construction support, project scope development, and specification development.

Station 320 Lexington Substation Bulk Power Upgrades | Eversource Energy

Lexington, Massachusetts | 2020 – Present

Project engineer for the protection and controls upgrade of an existing 345/115/13.8kV substation to bring the facility into compliance with bulk power requirements and upgrade existing protection systems. Project involves the installation of a new control enclosure and requires a sequenced transition of protection and control systems over a series of six design and construction phases including temporary configurations. Responsibilities include supervision and management of the multi-discipline engineering team, project quality control, engineering coordination, construction support, resource management, and providing technical guidance and oversight to the engineering team.

Multiple Projects, Distribution Transformer Relay Upgrades | Exelon [PEPCO]

Maryland & Washington, D.C. | 2018 – 2020

Project engineer for a portfolio of transformer relay upgrade projects throughout PEPCO's 13kV distribution system. Project scopes included engineering and construction support for the upgrade of directional power relays for multiple 13kV switchgears and transformers at each substation. Each design typically consists of replacing numerous relays in each switchgear unit associated with a given transformer throughout the substation. Responsibilities included planning and scoping, providing technical guidance and oversight to the engineering team, project quality control, and engineering coordination.

COLIN M. YOUNCE, PE
(continued)

White Flint Substation No. 229, Phase 2 Detailed Design – Owner's Engineer | Exelon [PEPCO]

Rockville, Maryland | 2018-2020

Project engineer responsible for oversight of Phase 2 detailed design Owner's Engineer services for a new 69/13.8kV substation. Responsibilities included leadership, supervision and management of the multi-discipline engineering review team, project schedule, coordination and communication with the Engineer of Record, project quality control, providing technical guidance and oversight to the engineering review team, and regular coordination and communication with the client.

Confidential Client

USA | 2018-2019

Project engineer overseeing the conceptual scoping and design for a new 69/13.8kV substation. The project scope included a 4-position GIS bus arrangement, supplying four 69/13.8kV power transformers serving six bus sections of 13.8kV switchgear, arranged in a ring bus. The station supports eight 69kV transmission lines and forty-eight 13.8kV feeders, capacitor banks, or reactors. The substation is housed in a multi-story, architectural building, with each floor being dedicated to various functions and voltage classes. All lines and feeders enter the substation underground. Responsibilities included leadership, supervision and management of the engineering team and overall design, project schedule, coordination among engineering and architecture disciplines, project quality control, regular coordination and communication between client and vendors, project specification development, and project scope development.

Massey and Stevensville Substations, Line Bus Upgrades | Exelon [Delmarva Power & Light]

Maryland | 2018-2019

Project engineer responsible for oversight of detailed engineering for the upgrade and conversion of two existing line-tapped substations. Project scopes consisted of expanding or replacing portions of the 69kV yards in each station, to convert the sites to a line bus configuration. The conversion allows the stations to intercept existing transmission lines to further sectionalize each line to increase reliability and protection capabilities on the system. Massey Substation additionally included the complete replacement of the existing, undersized control enclosure with a new pre-fabricated modular enclosure. Responsibilities included supervision and management of the engineering team and overall design, project schedule, coordination among internal and external engineering resources, project quality control, regular communication with the client and procurement support.

Barber and Rosedale Substations | Kansas City Kansas Board of Public Utilities

Kansas City, Kansas | 2017-2019

Project engineer providing oversight of detailed substation engineering for the upgrade of one existing substation and design of one greenfield substation. Project scopes included installation or upgrade of 6-position ring bus, serving multiple 161/12kV power transformers and 161kV transmission lines. Responsibilities included supervision and management of the multi-discipline engineering team, project quality control, procurement support, and construction support.

Harrison Remote Ends Upgrades, Multiple Sites | Exelon [PEPCO]

Maryland & Washington, D.C. | 2017-2018

Project engineer responsible for oversight of detailed engineering for the upgrade of line relaying at four existing substations connected to the new Harrison Substation No. 038 by multiple 138kV transmission lines. The existing lines were being reconfigured due to the new station and require upgraded relaying to interface to the new relaying at Harrison Substation.

COLIN M. YOUNCE, PE
(continued)

Responsibilities included supervision and management of the engineering team and overall design, project schedule, coordination among internal and external engineering resources, project quality control, regular communication with the client.

White Flint Substation No. 229, Phase I Scoping & Design | Exelon [PEPCO]

Rockville, Maryland | 2017

Project engineer responsible for oversight of Phase 1 conceptual scoping and design for a new 69/13.8kV substation. Project scope included a 6-bay, 20-position breaker-and-a-half GIS bus arrangement, with three 69/13.8kV power transformers serving the 13.8kV switchgear. The station included provisions for a fourth power transformer, up to sixteen 69kV transmission lines, and up to twenty-four 13.8kV feeders, capacitor banks, or reactors. The GIS and switchgear portions of the substation will be fully enclosed within an architectural building, while the power transformers will be located in an open-air area within the facility. All lines and feeders will enter the substation underground. Responsibilities included leadership, supervision and management of the engineering team and overall design, project schedule, coordination among engineering and architecture disciplines, project quality control, regular communication between client and vendors, project specification development, and project scope development.

Darnestown Substation No. 225 | Pepco Holdings Inc.

Montgomery County, Maryland | 2015 – 2018

Project engineer for installation of new 69/13.8kV substation executed with Engineer, Procure, and Construct (EPC) methodology. Project scope included three incoming 69kV underground transmission line circuits, with associated circuit breakers and three 33.6-MVA, 69/13.8kV transformers, transitioning to indoor 13.8kV switchgear. The air-insulated, 69kV substation is within a 40-ft walled enclosure, combined with a two-story building housing the switchgear and future 13.8kV capacitor banks and reactors. Project is located in a largely residential suburban area of Washington DC and the building and enclosure are designed to be architecturally pleasing and conceal the utility function of the facility. Responsibilities included leadership, supervision and management of the engineering team and overall substation project design, project schedule, managing material procurement, coordination among engineering and architecture disciplines, project quality control; regular communication between client, vendors, and subcontractors, and construction support.

Greater Hartford Central Connecticut (GHCC) Program | Eversource Energy

Hartford, Connecticut | 2015 – 2018

Project engineer responsible for substation engineering oversight and execution. Program consists of upgrades at multiple substations and included site expansions, transformer replacements, breaker replacements, capacitor bank additions, line terminal upgrades and additions, relay upgrades, and other miscellaneous upgrades. Responsibilities included planning and scoping, quality assurance and review, engineering coordination, outage scheduling support, procurement planning and coordination, and technical guidance and support.

DEREK HOLLRAH, PE

Team Lead / P&C Lead

Derek serves Burns & McDonnell as an electrical engineer. He specializes in the design of electric power substations. His responsibilities include protection and controls design, physical substation design, procurement specifications, quality review, and field support. He is also specialized in technical guidance and support for large power transformers specifications, procurement, factory inspections and testing. He has worked on substations with voltage levels ranging from 4.16kV to 500kV.

EDUCATION

- Bachelors, Mathematics
- Bachelors, Electrical Engineering

REGISTRATIONS

- Engineer in Training (NE)
- Professional Engineer (KS)

10 YEARS WITH BURNS & MCDONNELL

10 YEARS OF EXPERIENCE

Rosedale and Barber Substations | Kansas City Board of Public Utilities

Kansas City, Missouri | Oct 2019 - Mar 2020

Project team. New greenfield design of an ultimate build out 6-position ring bus, serving multiple 161/12kV power transformers, metal-clad switchgear, and 161kV transmission lines. Responsible for client coordination, reviewing and sealing protection & controls packages consisting of AC and DC Schematics, one-line diagrams, communication block diagrams, relay panel and equipment wiring diagrams, and AC station service design.

Vallejo B 21/12/4kV Substation | Pacific Gas and Electric Company

Fresno, California

Project team to replace all transformers and switchgear. Project consists of two 21/12kV, 10/12.5 MVA autotransformers with load tap changers, two 21/4kV, 10/12.5 MVA transformers with load tap changers, and metal clad switchgear. Compact substation footprint in residential area necessitates extensive use of underground medium voltage cabling. Transformers designed with integrated protection via reclosers. Responsible for substation arrangement, developing protection and control schemes, creating indoor arrangement, Bill of Materials, construction sequencing, and vendor drawing reviews.

Interconnection Studies | Pacific Gas and Electric Company

Fresno, California

Project team. Create preliminary single line diagrams and cost estimates for Interconnection Studies part of the California ISO cluster study process. Receive technical portion of interconnection request and preliminary protection requirements. Utilize station drawings, PG&E standards, GIS, and other resources to verify protection and create preliminary designs. Simple designs consider for physical limitations in the substations and control enclosure rack space limitations. Identify required telecommunication or transmission line modifications for interconnection. Deliverable document includes expected substation modifications, cost estimates, and durations for each proposed interconnection to PG&E transmission assets.

Bergenfield 69kV GIS | Public Service Electric & Gas Co.

Bergenfield, New Jersey

Project team. New 230/69/13.8kV GIS substation. Project consists of a seven breaker 230kV GIS with two 230kV lines feeding three transformers. Two 230/13.8kV transformers powering a switchgear, and one 230/69kV auto-transformer feeding a four position GIS ring bus. Reviewed schemes and developed wiring diagrams for 230kV equipment and

connections to 13.8kV switchgear. Developed AC and DC schemes and cable schedule for 69kV ring bus and related auto-transformer.

Eagle 115kV Switching Station | Eversource Energy

New Hampshire

Project team. New 115kV four position ring bus substation designed for an ultimate breaker-and-a-half build. Eagle is constructed to BPS and IEC 61850 standards. Scopes of work consist of creating relay and control schematics, wiring diagrams, and cable schedules. Assisted developing logic diagrams and signal lists in accordance with IEC 61850 intra-substation communications standard. Responsible for reviewing wiring diagrams created by the relay panel manufacture. Related work includes updating various drawings at connecting remote sites. Assisted with updating the standard for GPS time signal distribution within substations.

ES South Meadow | Eversource Energy

Hartford, Connecticut | Feb 2020

Project team. 115kV line relay and pilot protection upgrades and new fiber optic communication path via SONET network. Lead team in developing protection and control schemes, creating control panel layouts and Bill of Material, and wiring diagrams. Cooperation with telecom Owner's Engineer.

KYLE A. KASTANEK

Design Lead

Kyle is an Electrical Designer. His responsibilities include completing detailed drafting and design of transmission and sub-transmission substations. He is experienced in non-EHV substations, above and below grade 2D/3D design, overhead transmission line, developing and implementing client both 2D/3D drafting standards, internal/external document management systems, material procurement, AutoCAD, MicroStation and Inventor.

EDUCATION

- AS, Applied Science

4 YEARS WITH BURNS & MCDONNELL

5 YEARS OF EXPERIENCE

Document Management | Liberty Utilities

Missouri | 2019-Present

Document Control Specialist creation of new document control system for Liberty Utilities. Creating new forms for Drawing Requests, drawing lists, drafting standards, and drawing naming conventions. Working with other consultants on behalf of Liberty Utilities to obtain documents that are not in Liberty's control. Archiving old processes and gaining full control of all documents for future.

Mill Street 161kV Substation | Kansas City Board of Public Utilities

Kansas | 2017-Present

Electrical Designer for creation of greenfield 161kV substation. Detailed 2D design of layout, equipment selection, above and below grade connections and conduits, part fit-up, ampacity ratings, bill of material for major and minor equipment, developing and implementing client standards and internal drawing control. This project required coordination with civil engineering on steel and grading as well as protection and controls or orientation and conduit location.

Rosedale 161kV Substation | Kansas City Board of Public Utilities

Kansas | 2017-Present

Electrical Designer for creation of greenfield 161kV substation. Detailed 3D design of layout, equipment selection, above and below grade connections and conduits, part fit-up, ampacity ratings, bill of material for major and minor equipment, developing and implementing client standards and internal drawing control. Coordination with civil engineering on steel and grading. This project required coordination with the client for Autodesk Inventor standards and implementing those standards into the designs.

Barber 161kV Substation | Kansas City Board of Public Utilities

Kansas | 2017-Present

Electrical Designer for creation of brownfield 161kV substation. Detailed 3D design of layout, equipment selection, above and below grade connections and conduits, part fit-up, ampacity ratings, bill of material for major and minor equipment, developing and implementing client standards and internal drawing control. Coordination with civil engineering on steel and grading. This project required coordination with the client for Autodesk Inventor standards and implementing those standards into the designs.

KYLE A. KASTANEK
(continued)

Thunderbird & Elk Junction 69kV Substations | Westar Energy

Kansas | 2016-2017

Electrical Drafter/Designer for greenfield 69kV substations. Detailed 3D drafting of layout, equipment selection, above and below grade connections and conduits, part fit-up and bill of material for major and minor equipment. This project required coordination with the client for Autodesk Inventor standards.

Montgomery & Chisholm 69kV Substations | Westar Energy

Kansas | 2016-2017

Electrical Designer for reliability upgrades breaker replacement. Detailed design of layout, equipment selection, above and below grade connections and conduits, part fit-up, ampacity ratings. This project required coordination with civil engineering on steel and grading, protection and controls for orientation and conduit location, and the client for Autodesk Inventor standards. Construction support was also provided for all active projects, including scope changes and redesign for construction limitations.

NYPA Smart Path 345kV | New York Power Authority

New York | 2015-2016

Electrical Drafter Lead for overhead transmission lines at 230kV. This included creating structure drawings, hardware drawings, and plan and profile drawings. This included understanding and interpreting client standards to create a border file as well as all layers and drawing naming convention.

115kV A-Frame Design | Dominion

Virginia | 2015-2016

Electrical Designer/Drafter Lead for overhead transmission detailing A-frame design. This required creating a detailed 3D design for civil engineers, checking bolt clearances for member fit ups and communicating any issues that may arise during construction. All members were designed with 3D drafting software to check all clearances and ensure that members would be able to be assembled in the field. Kyle was responsible for creating a complete manufacturer set of drawings as well as erection drawings for construction. This client was utilizing 2D and 3D design help to eliminate clearance issues, and, in turn, made a high-quality product.

Tower Modification 69kV-500kV | Dominion

Virginia | 2014-2016

Electrical Drafter Lead for overhead transmission detailing modifications to various tower types and voltage ranges. To achieve a more accurate detailed design, the towers were drawn in 3D, which required the ability to read old tower structure drawings. By doing this, Burns & McDonnell created a more accurate design with minimal calls from the field or client. The 3D drawings also aided in checking bolt clearances and member fit-up. Kyle created construction drawings for new members added to the tower, including showing removals from the old prints and additions from the manufacturer prints. This approach created a new drafting standard for the client.

Lutesville-Heritage | Ameren

Missouri | 2014-2015

Electrical Drafter Lead for 161kV overhead transmission lines. Kyle created structure drawings, hardware drawings and plan and profile drawings, including red-line markup changes and scope changes.

KYLE A. KASTANEK
(continued)

Vibratory Hammer Drawing Updates* | HPSI Inc.

Missouri | November 2013 – March 2014

Drafter Kyle created 3D models of Hydraulic Vibratory hammers from original 2D designs. This required the ability to read manufacture prints and to coordinate frequently with the fabricators to verify all aspects of the drawings and incorporate updates from the shop workers. Kyle worked with the shop and lead engineers to create the new 3D models that matched exactly the product leaving the shop. Upon completion of this project, all 2D prints were replaced with new 3D vibratory hammers, which included a detailed bill of material for each.

**denotes experience prior to joining Burns & McDonnell*

LOGAN LILLIS, ENV SP

P&C Engineer

Logan is an assistant electrical engineer at Burns & McDonnell with experience designing a variety of high-voltage substations ranging from 12kV to 345kV for utility clients across the country. Having experience with both microprocessor and electromechanical relaying and various station configurations, her responsibilities include detailed protection and controls design, regular communication between clients and vendors, quality assurance and review, and field support. Logan is also a certified Engineer in Training (EIT) and Envision Sustainability Professional (ENV SP).

EDUCATION

- Bachelors, Electrical Engineering

REGISTRATIONS

- Engineer in Training (KS)
- Envision SP

2 YEARS WITH BURNS & MCDONNELL

2 YEARS OF EXPERIENCE

161kV Asbury Substation #349 Windfarm Improvements | Liberty Utilities – Empire District

Sarcoxie, Missouri | Jun 2019 - Nov 2019

Protection & Controls Engineer. Logan assisted in the installation of a new 161kV transmission line, including the addition of a new line trap and tuner, 161kV circuit breaker, and new protection panel including primary, backup, and metering relaying. Responsibilities included design and modification to AC and DC schematics, one-line diagrams, relay panel wiring diagrams, control enclosure layout, protection and controls bill of material, wiring tabulations, conduit design, and construction support.

Dadeville Substation DFR Installation | Liberty Utilities – Empire District

Walnut Grove, Missouri | Jul 2020 – December 2020

Protection & Controls Engineer. Logan led the protection & control design of a new Digital Fault Recorder (DFR) panel to monitor the substation's three 161kV transmission lines. With both microprocessor and electromechanical relaying on site, she incorporated all necessary inputs to the Digital Fault Recorder in to meet all monitoring requirements. Project was performed on an EPC model. Responsibilities included design and modification to AC and DC schematics, one-line diagrams, relay panel wiring diagrams, control enclosure layout, protection and controls bill of material, wiring tabulations, development of technical specifications and procurement packages, technical review of vendor materials, and construction support.

Gate 1 Substation Scoping & Estimating | Liberty Utilities – Empire District

Missouri, USA | Feb 2019 - Nov 2019

Scoping & Estimating Engineer. Logan assisted in the scoping and estimating for Liberty Utilities program updates consisting of new construction and upgrading existing yards ranging from 12kV to 161kV. Upgrades encompassed multiple substations and included site expansions, transformer replacements, breaker replacements, line terminal upgrades and additions, relay upgrades, and other miscellaneous upgrades, as well as new construction. Responsibilities included planning and scoping, quality assurance and review, engineering coordination, and procurement planning and coordination.

LOGAN LILLIS, ENV SP
(continued)

Battery System Replacements | Pepco

Washington, D.C | September 2020-Present

Protection & Controls Engineer. Logan led the detailed design for multiple battery system replacements and the installation of battery monitoring systems for various substations across Exelon's Pepco utility. Responsibilities included design and modification to schematics, one-line diagrams, relay panel wiring diagrams, bill of material, technical review of vendor materials, and construction support.

Substation One-Line Audits | Exelon [Delmarva Power & Light, Pepco]

Hyattsville, Maryland | Apr 2020 -October 2020

Audit Engineer. Logan performed detailed reviews of station one-line diagrams for multiple substations across Exelon's Delmarva Power & Light and Pepco utilities. Responsibilities included verifying one-line drawings with site conditions, verifying ratings for conductors, relays, transformers, breakers, disconnects, and other equipment, and verifying impedance calculations.

Decatur Substation DFR Installation | Liberty Utilities – Empire District

Decatur, Arkansas | Jul 2020 - Present

Protection & Controls Engineer. Logan led the protection & control design of a new Digital Fault Recorder (DFR) panel to monitor the substation's two 161kV transmission lines. Project was performed on an EPC model. Responsibilities included design and modification to AC and DC schematics, one-line diagrams, relay panel wiring diagrams, control enclosure layout, protection and controls bill of material, wiring tabulations, development of technical specifications and procurement packages, technical review of vendor materials, and construction support.

Barber Substation | Kansas City Board of Public Utilities

Kansas City, Missouri | Apr 2019 - Mar 2020

Protection & Controls Engineer. Logan helped execute a major station redesign, including upgrade of 6-position ring bus, serving multiple 161/69/12kV power transformers and 161kV transmission lines. She worked to ensure a cohesive design between new and existing equipment both in the yard and in the control enclosure. Logan helped to create a phased construction schedule to allow critical segments of the yard to remain in service during installation. Responsibilities included design and modification to AC and DC Schematics, one-line diagrams, communication block diagrams, relay panel and equipment wiring diagrams, AC station service design, DC battery design, control enclosure layout, conduit design, protection and controls bill of material, and technical review of vendor materials.

COLIN PENNINGTON, PE

Civil Lead

Colin is a civil/structural engineer at Burns & McDonnell, specializing in civil/structural design for substations. Colin has been involved with the design of several substations in Canada and United States. His experience includes designing oil containment, steel, site grading, and foundations. His work includes use of design/analysis software packages including Autodesk Civil 3D, Mathcad, STAAD.Pro, RISA 3D, RISA Foundation, and several in-house design programs.

EDUCATION

- Bachelors, Civil Engineering
- Bachelors, Mathematics

REGISTRATIONS

- Professional Engineer (AR, MO)

7 YEARS WITH BURNS & MCDONNELL

8 YEARS OF EXPERIENCE

Greater Harford Central Connecticut Portfolio | Eversource Energy

Hartford, Connecticut | Nov 2014 - Present

Civil/structural engineer. Worked on design of 115kV and 345kV substation addition. Responsibilities include foundation

Jayhawk Switching Station | Evergy, Inc.

Fort Scott, Kansas | Apr 2020 - Dec 2020

Project team. Project responsibility include provide site grading design and the design of concrete drilled piers to support the clients standard structural steel for a new 138kV greenfield switch station. Additional responsibilities included preparing specifications, evaluating construction bids and cost, and providing construction support.

Watson Creek Substation Expansion | AltaLink

Jasper | Apr 2016 - Dec 2020

Civil/structural engineer. Worked on a 69/138kV substation expansion. Responsibilities include site grading/development for the site expansion and foundation design.

Various AltaLink Projects | AltaLink

Canada | Mar 2015 - Aug 2020

Civil/structural engineer. Worked on design of a multiple substation development which included two (2) new 138/245kV green field substations. Responsibilities include steel structure design, foundation design, and oil containment design.

Carlsbad Energy Center | NRG Texas Power LLC

Carlsbad, California | Jun 2015 - Aug 2020

Civil/Structural Field engineer. Worked on the construction and installation of new 138/240kV transmission and 230kV underground line to interconnect the new power plant to an existing substation. Responsibilities included overseeing the installation of foundations, transmission and substation structures, and underground transmission line

COLIN PENNINGTON, PE
(continued)

Okotoks Substation | AltaLink
Okotoks | Jul 2015 - Aug 2020

Civil/structural engineer. Worked on design of a 25kV/138kV substation upgrade. Responsibilities include steel structure design, foundation design, firewall design, and oil containment design.

161kV Asbury Substation #349 Windfarm Improvements | Liberty Utilities - Empire District
Sarcoxie, Missouri | Jun 2019 - Jan 2020

Civil and structural engineer. Project responsibilities included design of substation steel structures and foundations such as concrete drilled piers, and slab-on-grade type foundations.

161kV LaRussell Substation #382 Windfarm Improvements | Liberty Utilities - Empire District
Sarcoxie, Missouri | Jun 2019 - Jan 2020

Project team. Project responsibilities included design of substation steel structures and foundations such as concrete drilled piers, and slab-on-grade type foundations.

69kV Massey Substation Re-Build | Delmarva Power & Light Co.
Massey, Maryland | Apr 2018 - Jun 2019

Civil and structural engineer. Project responsibilities includes civil/structural design tasks related to a 69/138kV substation expansion. Task included design of structural steel to support electrical equipment and foundations such as concrete drilled piers or slab-on-grade type foundations.

Stevensville Line-Bus Upgrade | Delmarva Power & Light Co.
Stevensville, Maryland | Apr 2018 - Jun 2019

Project team. Project responsibilities includes civil/structural design tasks related to a 69/138kV substation expansion. Task included design of structural steel to support electrical equipment and foundations such as concrete drilled piers or slab-on-grade type foundations.

Chinook Power Station | Burns & McDonnell Canada Ltd.
Canada | Jun 2017 - Jun 2018

Civil and structural engineer. The Chinook Power Station is a thermal electric generating facility that will provide 345 MW of natural gas generation to the Canadian province of Saskatchewan. Project responsibilities included design support for a new 230kV switch station as part of the Chinook Power Station. Tasks include developing design drawings and specification for the design and installation of new structural steel support and helical pile foundations.

South and West of Edmonton Area Transmission Development, Saunders Lake Substation | AltaLink
Calgary | Nov 2015 - Sep 2017

Civil and structural engineer. Project responsibilities included design of a multiple substation development which included two (2) new 138/245kV green field substations. Responsibilities include steel structure design, foundation design, and oil containment design.

COLIN PENNINGTON, PE
(continued)

South and West Edmonton Area Transmission Development (SWEATD) | AltaLink

Calgary | Nov 2015 - Sep 2017

Civil and structural engineer. Project responsibilities included design of a multiple substation development which included two (2) new 138/245kV green field substations. Responsibilities include steel structure design, foundation design, and oil containment design.

Queensland 301s Substation Connection | AltaLink

Calgary | Dec 2012 - Mar 2017

Civil/structural engineer. Worked on AltaLink's new 138kV substation Queensland. Responsibilities include site grading design, permitting assistance, oil containment design, foundation design, and structure design including dead end loading diagrams.

Sunken Lake Substation | AltaLink

Calgary | Apr 2013 - Feb 2016

Civil/structural engineer. Worked on AltaLink's new 138kV substation Sunken Lake. Responsibilities include oil containment design, foundation design, and physical design review.

MIKE L. KLOIBER, PE

Relay Settings Lead

Mike is an electrical engineer specializing in protection applications in the substation department. His design responsibilities for protective and control systems include relaying, metering, instrumentation, and SCADA controls.

EDUCATION

- BS, Electrical Engineering

REGISTRATIONS

- Professional Engineer (MO, CT)

19 YEARS WITH BURNS & MCDONNELL

22 YEARS OF EXPERIENCE

Energizing the Future | First Energy Corporation

Ohio | 2014- Present

Project manager for multiple 69kV and 138kV relay replacement projects. Overseeing the writing of protection specifications and relay settings at over 275 substations and over 700 relays of varying types.

New England East-West Solution | Northeast Utilities Service Company

Connecticut | 2009-Present

Project manager for "bulk-power-station" conversion of the 115kV, five-bay breaker-and-a-half substation. This was the first station to implement NU's new IEC 61850 protection and control design standards. The project implemented the new communication, while simultaneously converting the station to meet the "BPS" primary/backup separation criteria. The conversion was rolled out in logical stages until the 115kV yard was fully converted.

Member of the Northeast Utilities Service Company (NUSCO) team tasked with evaluating IEC 61850 standard for use in new NUSCO substations and developing and designing the new protection and control standards implementing IEC 61850 standard.

Middletown-Norwalk | Northeast Utilities Service Company

Connecticut | 2005-2009

Protection and controls engineer provided high-level system design support as related to system protection for multiple 115kV and 345kV substation projects. Protection related work included implementing transmission line protection as in blocking schemes over power-line carrier, permissive over-reaching transfer trip over audio-tone, current-differential schemes utilizing fiber-optic communications, and direct-transfer tripping systems. Other protection systems included breaker failure protection, both high and low-impedance bus differential protection and transformer protection.

Commissioning Engineer overseeing protection and controls as related to construction sequencing. Developed and coordinated relay settings for over 200 digital and electromechanical relays including line, breaker, autotransformer, reactor, and bus protective relays. Designed and implemented temporary and final relay settings to protect critical system equipment during construction phasing. Created fault simulation files for testing and commissioning of transmission line relays. Provided native setting files for all digital relays.

MIKE L. KLOIBER, PE
(continued)

Pacific Gas & Electric Company
2003–2004

Project engineer for two engineer, procure and construct (EPC) projects related to Path 15. Designed the protection and controls for 500kV bay additions and relocation of existing 500kV lines. All 500kV lines were converted to single-pole operation. Line protection included four levels of relay systems and parallel transfer-trip schemes. Developed relay settings and developed and orchestrated the end-to-end testing for the new line protection. Project included on-site support during construction and testing for 500kV work and 230kV shunt capacitor bank installation.

American Transmission Company
2003

Developed and revised schematics and wiring diagrams for 345kV line relay upgrade terminal. Protection included primary carrier phase-comparison package, secondary permissive-overreaching transfer tripping scheme (microwave communications) and step-distance backup protection. Implemented dual direct transfer trip scheme using both SEL mirrored-bits technology and traditional carrier equipment. All relays interfaced with communications processor for substation integration.

Metropolitan Washington Airport Authority
2003

Project engineer role to engineer addition of two 15/35kV step-up transformers at Dulles International Airport. Two separate 15kV overhead feeds from the local utility dead-ended in the MWAA yard. The feeds were connected to pole-top disconnect switches then routed underground to respective transformer. The transformers were equipped with 35kV fused disconnects. Protection and control equipment was housed in a nearby building. Protection system was integrated into existing distributed control system.

Alabama Power Company
2001–2003

Designed protection and control system for 500kV four terminal breaker-and-a-half switching station. Design included single-line and three-line diagrams, schematics, wiring diagrams and communications schemes to RTU, digital fault recorder and sequence of events recorder. Protection for three of the terminals involved multiple fiber optic communication paths. Fourth terminal included carrier equipment for DCB and Dual Channel DTT schemes. Each line terminal had primary, secondary and backup protection schemes.

South Texas Electric Cooperative
2001–2002

Contract/design engineer for 138kV substation at 180 MW combined cycle plant addition. Yard equipment included four 75MVA GSU transformers, four breakers, bus capacitor voltage transformers, and control building. Generated design drawings and specifications for general layout, conduit, grounding, lighting, and controls. Designed protection and control systems and interfaced with plant controls. Developed relay settings for breaker and line protective relays.

MIKE L. KLOIBER, PE
(continued)

Hoosier Energy REC, Inc.

2001

Project involved creating template protection and control drawings for a power plant substation. The substation included a 161kV main-tie-main bus with transfer bus and a 69kV main-tie-main bus arrangement. Two 161/69kV autotransformers fed the 69kV yard. Template drawings were created for each 161kV transmission line, line breaker, tie breaker, transfer breaker, bus differential, 69kV transmission line, line breaker, tie breaker, and 161/69kV transformer. A typical template set of drawings included AC and DC schemes, breaker control scheme, panel layout, and panel wiring diagrams.

Illinois Power Company

1999-2001

Project manager/engineer for several 34.5kV and 138kV line relaying upgrades and digital fault recorder installations. Additional project involved transformer LTC upgrades for paralleling two dissimilar transformers. Along with revising schemes, wiring diagrams, and cable schedules, each project required creating a step-by-step installation procedure for use during construction.

City of Naperville-Department of Public Utilities

2000

Engineered design for three 138kV line relaying upgrades. Each terminal required replacing the existing panel doors with new relays pre-installed in replacement doors. Each of the three substations involved required creating a step-by-step installation procedure.

Ameren Intermediate Holding Company

1999-2000

Designed single-line and three-line diagrams, AC and DC schematics for 230kV plant switchyard. Switchyard consisted of four generation feeds to a collector bus with one transmission line out. Also generated relay settings for substation and power plant. Developed specifications, cable schedules, and equipment termination schedules. Assisted in design of switchyard layout, conduit plan, and equipment specifications.

Mid-American Energy Company

1998

Assisted in the development of electrical three-line, schematic, and wiring diagrams for a 161/69/15kV wind farm project. Developed relay and control panel layouts.

Nevada Power Company

1997-1998

Assistant electrical engineer for physical design of electrical layout details, lighting, conduit design, grounding details and materials list for equipment. Performed quality review of schematics for 138/230/345kV substations. Assisted in development of RTU schematics and wiring diagrams.

BEN BRUICK

Civil Engineer

Ben is an assistant structural engineer who has worked with several utilities across the Midwest and Northeast. He has experience on an array of projects ranging from simple substation upgrades to full greenfield build-outs. In his role, Ben specializes in the design of structural steel, concrete foundations, site grading and construction support. His work includes the use of design and analysis software packages such as RISA 3D, Sag10, and several in-house design documents. Ben has experience with both traditional engineering-only and EPC project delivery methods.

EDUCATION

- Bachelors, Civil Engineering

REGISTRATIONS

- ACI Concrete Field Testing Tech

2 YEARS WITH BURNS & MCDONNELL

2 YEARS OF EXPERIENCE

Seat Pleasant Switchgear Replacement | Potomac Electric Power Co.

Seat Pleasant, Maryland | Apr 2020 - Dec 2020

Assistant structural engineer. The project consisted of replacing a failed 4-kV mobile switchgear building and installation of firewall under emergent conditions. Project support was provided to assist in equipment installation, personnel and maintenance access, and outage support. Construction occurred Summer of 2020. Responsibilities included design of both shallow and deep foundations, coordination with vendors, and support of permitting efforts for an emergent switchgear replacement and firewall installation. Drilled pier foundations were designed in coordination with Burns & McDonnell geotechnical engineering. The project presented many challenges as the site was less than 1/20th of an acre yet required significant upgrades within its bounds.

Transource IEC Permitting | Transource Energy, LLC

Waynesboro, Pennsylvania | Jan 2020 - Aug 2020

Assistant structural engineer. The Independence Energy Connection (IEC) project is a new overhead electrical transmission project to increase consumer access to more affordable power in the region. The electrical transmission project will be built in two segments, East and West, totaling approximately 45 miles of transmission line in Pennsylvania and Maryland. The project also includes construction of two substations, Rice and Furnace Run, in Pennsylvania and upgrading two existing substations in Maryland. Responsibilities included the design of various 230kV and 500kV custom structures for two 500/230kV greenfield substations. Site conditions presented many challenges during design, including the need to span a switch structure over a 24-foot access drive, supporting 42-foot bus, and accounting for large, short circuit loading.

FEP - Mickleton | Atlantic City Electric Co.

Gibbstown, New Jersey | Mar 2020 - May 2020

Assistant structural engineer. Responsibilities included design of shallow and deep foundations for a 230/69/12kV substation security upgrade. Drilled pier foundations used to support new data enclosure were designed in collaboration with Burns & McDonnell geotechnical engineering.

BEN BRUICK
(continued)

XFRM Study - Sligo | Potomac Electric Power Co.

Silver Spring, Maryland | Dec 2019 - Jan 2020

Assistant structural engineer. Responsibilities included analyzing existing substation bays, transformer foundations and oil containment to determine the feasibility of replacing a failed transformer with a "standard spare" unit that could be installed in the timeframe of an emergency outage. Recommendations were provided to client as to how bays should be altered to bring existing conditions to conformance.

161kV Asbury Substation #349 Windfarm Improvements | Liberty Utilities - Empire District

Sarcoxie, Missouri | Jun 2019 - Jan 2020

Assistant structural engineer. Responsibilities included design of steel structures, both deep and shallow foundations, and construction support for the 161kV line upgrade. Drilled pier foundations were designed in collaboration with Burns & McDonnell geotechnical engineering. Construction-supporting tasks included review of various submittals (i.e., rebar, concrete, anchor bolts) and answering subcontractor questions.

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9400 Ward Parkway
Kansas City, MO 64114
burnsmcd.com