Project Background

► Princeton University connected to PSE&G at 26kV in two locations
  • Elm Substation
  • Charlton Substation

► 2018 Peak Load ~28 MW
  • Gas Turbine Generator
  • Solar

► PSE&G 26kV overhead distribution is at capacity
  • Future campus expansion limitation
  • Overhead distribution exposure
Design Goals

► Support Campus Expansion
  • Increase electrical capacity
  • Lake Campus, etc.

► Support Campus Goals
  • Sustainability
  • Redundancy – N+1
  • Reliability
  • Resiliency
  • Maintainability
  • Improve Campus Voltage Regulation
Project Scope

► Construct new 69kV Substation (69kV – 26.4kV)
  • Greater reliability at 69kV transmission vs. 26kV Utility O/H distribution system

► Reconfigure Charlton & Elm Substations to be served from new Princeton Substation
  • Overhead -> Underground Service

► Elm Substation Upgrades
  • Two new 12/16/20 MVA transformers
  • New 5kV switchgear

► Replace 5kV Switchgear at Dillon Gym
Project Team

► Princeton University
  • Technical & Operations Team
  • Construction Management & Project Management
  • Civil Construction

► Burns & McDonnell
  • Electrical
  • Structural
  • Communications/SCADA/Automation
  • HDD Design (Brierley)

► Van-Note Harvey
  • Civil Engineering/Local Codes
69kV Substation

► Location
  • Adjacent to existing PSE&G Station
  • Coordinated with expansion

► Ring Bus Design
  • High reliability

► Three 69kV transmission system connections
  • Geographically distinct

► Two 69kV:26kV 50/67/83 MVA transformers
  • 2-hour fire-rated separation wall
  • Oil containment
  • LTC – 26kV Voltage Regulators
69kV Substation

- 69kV Relay/Control House – University Owned
  - Utility Controlled 69kV Pass-Thru Yard (2 x 69kV Lines)
  - Future (3 x 69kV Lines)
- Two 26kV Switchgear Buildings - University Owned/Controlled
  - Main-Tie-Tie-Main
  - Relay & Synchronizing Panel
- Future Telecom Entrance Point
- Backup Generator
- Aesthetic Considerations
Horizontal Directional Drill

- Two 2000’ bores – 60’ deep
- 36” Diameter Holes
- 26kV - A & B Feeders
- Telecom
Elm Substation

- 26kV Service to new substation
  - Utility -> Owner-served

- Upgrade transformers
  - 12/16/20 MVA

- Replace 5kV Switchgear

- Synchronizing Panel

- Construction Phasing
Charlton Substation

- 26kV Service from new substation
  - Utility -> Owner-served

- Protective Relaying Upgrades

- Coordination of Utility Outage
Project Schedule

► 69kV Substation Energization: April 1st, 2019
► Charlton Substation Cut-Over: June 2019
► Elm Substation Cut-Over: Fall 2019
► Substantial Completion: Fall 2019
Considerations and Project Applications

► Utility Coordination – Early and Often!

► Aesthetics and Site Location

► Factory Equipment Testing

► Load Growth
  • Integration with Utility Master Plan

► Underground Utilities
  • Close coordination with Princeton
CREATE AMAZING.