Project Overview

► Goal: Design & Build a new 138kV electrical substation to support UT Southwestern Medical Center
  • Safe
  • No Outages
  • Meet Schedule for New Buildings
  • Under Budget

► Part 1: Take a Load Off
► Part 2: This Land is Your Land
► Part 3: Down the Rabbit Hole
Part 1: Take a Load Off
University of Texas Southwestern Medical Center

► Research
  • Founded 1943 in Dallas, TX

► Education:
  • 3 Degree-Granting Institutions
  • 3,500 + students

► Clinical Care:
  • 80 specialties
  • 100,000 hospitalized patients
  • 2.2 Million outpatients
UTSWMC Utilities

- South Thermal Energy Plant (STEP)
  - Four – 3MW Natural Gas Generators

- North Thermal Energy Plant (NTEP)
  - Three – 3MW Natural Gas Generators

- Bass Thermal Energy Plant
  - One – 2MW Generator

- CUH Thermal Energy Plant
  - Five – 2.5MW Generators

- Chilled Water Peak Load: 50,000 tons (Capacity - 65,000 tons)

- Steam Peak Load – 400,000 PPH (Capacity - 500,000 PPH)
2019 Electrical Load

Peak Load: 51.6 MVA
Inwood Substation

► Completed in 2003.

► Two - 70 MVA transformers

► Distribution System – 13.8kV
  • Utility -> Customer Owned

► Estimated Load Growth of 60% over the next 5 years.

► 4 South Campus Feeders

► 4 North Campus Feeders
New Substation Design Criteria

► **N+1 Redundancy**
  - Transformers & Switchgear
  - Fire Wall Separation – Oil Containment
  - Maintenance Activities
    - Transparent to Patient Care/Research

► **Address Near Term Future Load Growth**
  - East Campus
  - North Campus

► **Reliability**
  - 500-year Flood – ASCE 24 Flood Design Class
  - Critical Patient Areas
  - Research
  - Generator Parallel Operation
Location, Location, Location

► North Campus Option
  • Distance to Transmission Line
  • Transmission Line Configuration
  • Far from Campus 15kV Distribution

► South Campus Option
  • Adjacent to two 138kV transmission lines
  • Near to 15kV South Campus Distribution
  • Flexible for future distribution
Project Site - Before
Part 2: This Land is Your Land
Design Challenges

► Utility Interconnection
► Land Ownership
► Underground Utilities
► Parallel Generators
Schedule

► 2017-01: Design Kickoff

► 2018-03: Major Equipment Purchase- Switchgear/Transformers Purchased

► 2018-12: 95% Construction Documents

► 2019-01: Mobilization/Building R Demolition

► 2019-11: Substantial Completion

► 2020-02: Final Cut-overs Complete
#DemoDay

- Demolition of Building R to make room for substation site.
Major Equipment Testing & Delivery
It’s Just 3-Phases – Right?

► Coordination between bus tap box and switchgear bus.

► Transposed Phases in Main Bus Section – reworked by vendor.

► Ties to Existing Sub and to existing switchgear
**HMI Controls**

- Local HMI Operation
  - Out of Arc Flash zone
- Remote status/alarm view
- Local/Remote switch on switchgear
Underground Ductbank Routing

► Listen to Your Contractors!

► Look for ways to simplify routing – easy when lines shown on a drawing.

► Trust, but verify
Construction Challenges

► Site Coordination

► Site Security/Theft Prevention

► Existing Ductbank

► Can’t Blink Campus
Part 3: Down the Rabbit Hole
Challenge Accepted!

- 1000 KCMIL Cable
- South Campus Feeders
- Inwood Substation Tie
Manhole Work
Manhole Work

► Arc Flash Mitigation – “Maintenance Mode”

► Air Quality Monitoring

► MOP Meetings with Owner, Subcontractor, and BMcD Team
Things We Did Well/Opportunities to Improve

► Things We Did Well

• Pre-purchase Major Equipment
• Delegated Design/Submittals
• Package Buyout
• Wiring Diagram Timing

► Opportunities to Improve

• Better Utility Coordination
• Document Control System
• Phasing Between Stations
• Pre-Cast vs. Cast-in-Place Walls
Before.....During......
(Almost) Finished Project
Questions?