

UT Southwestern Medical Center South Campus Substation

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CampusEnergy2020
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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

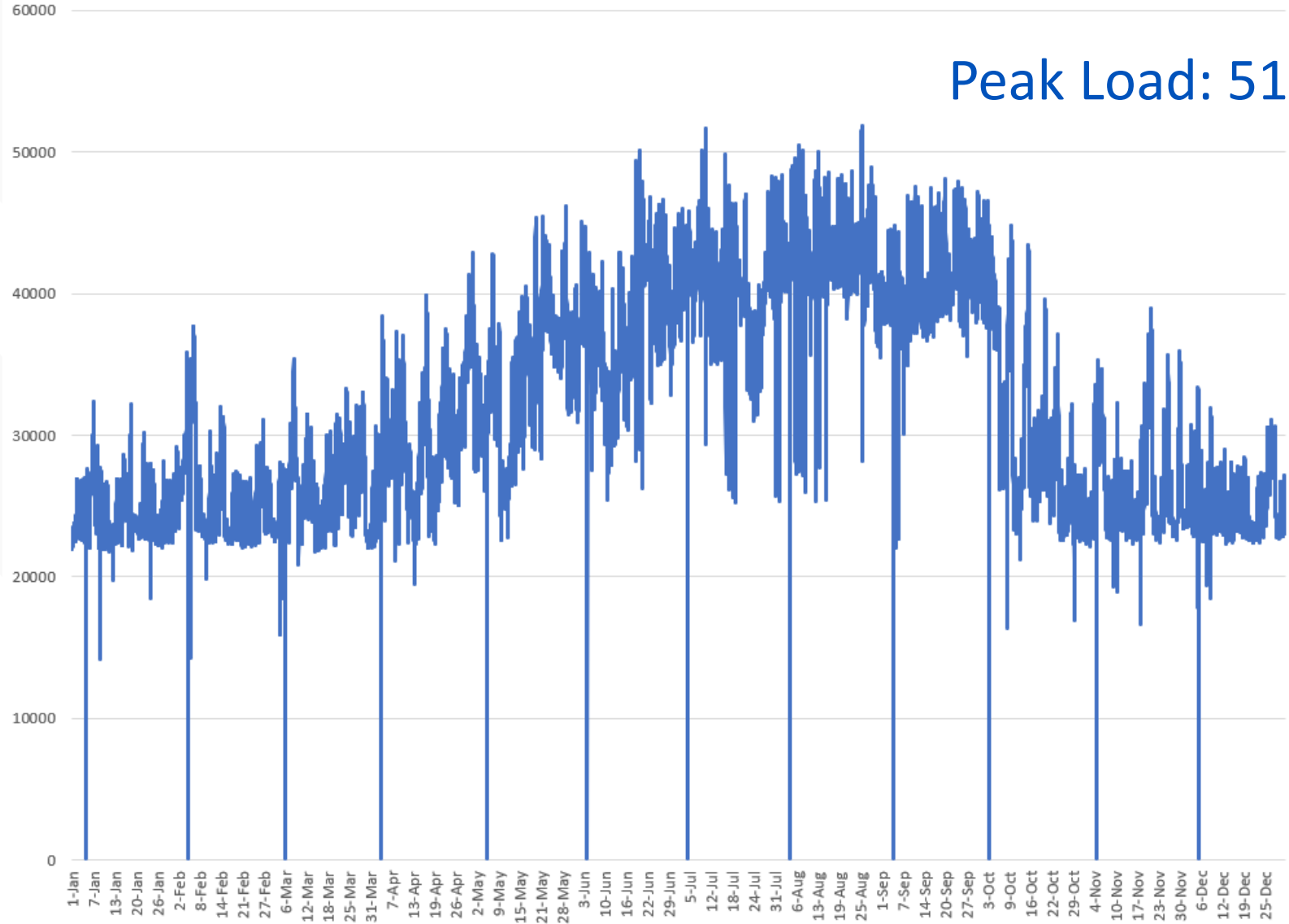


UTSWMC Utilities

- ▶ 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



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

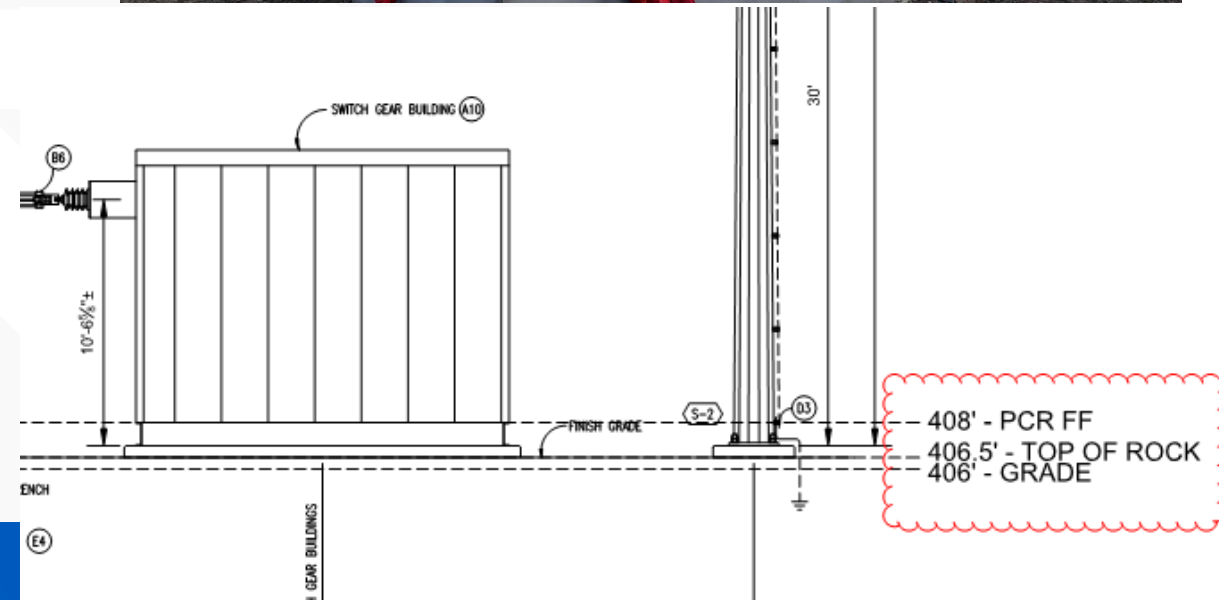
- Transformers & Switchgear
- Fire Wall Separation – Oil Containment
- Maintenance Activities
 - Transparent to Patient Care/Research

► 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



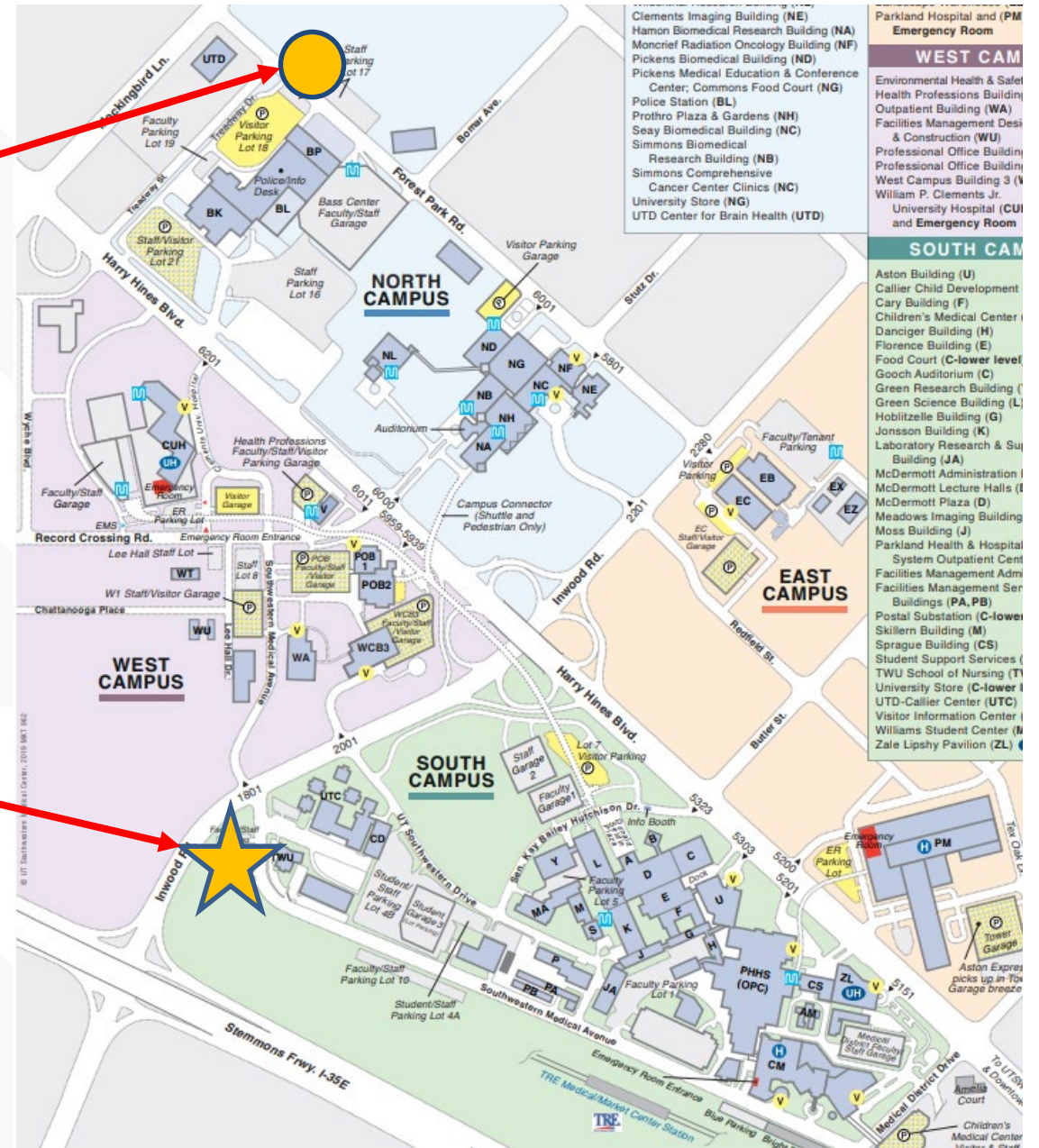
Location, Location, Location

▶ 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



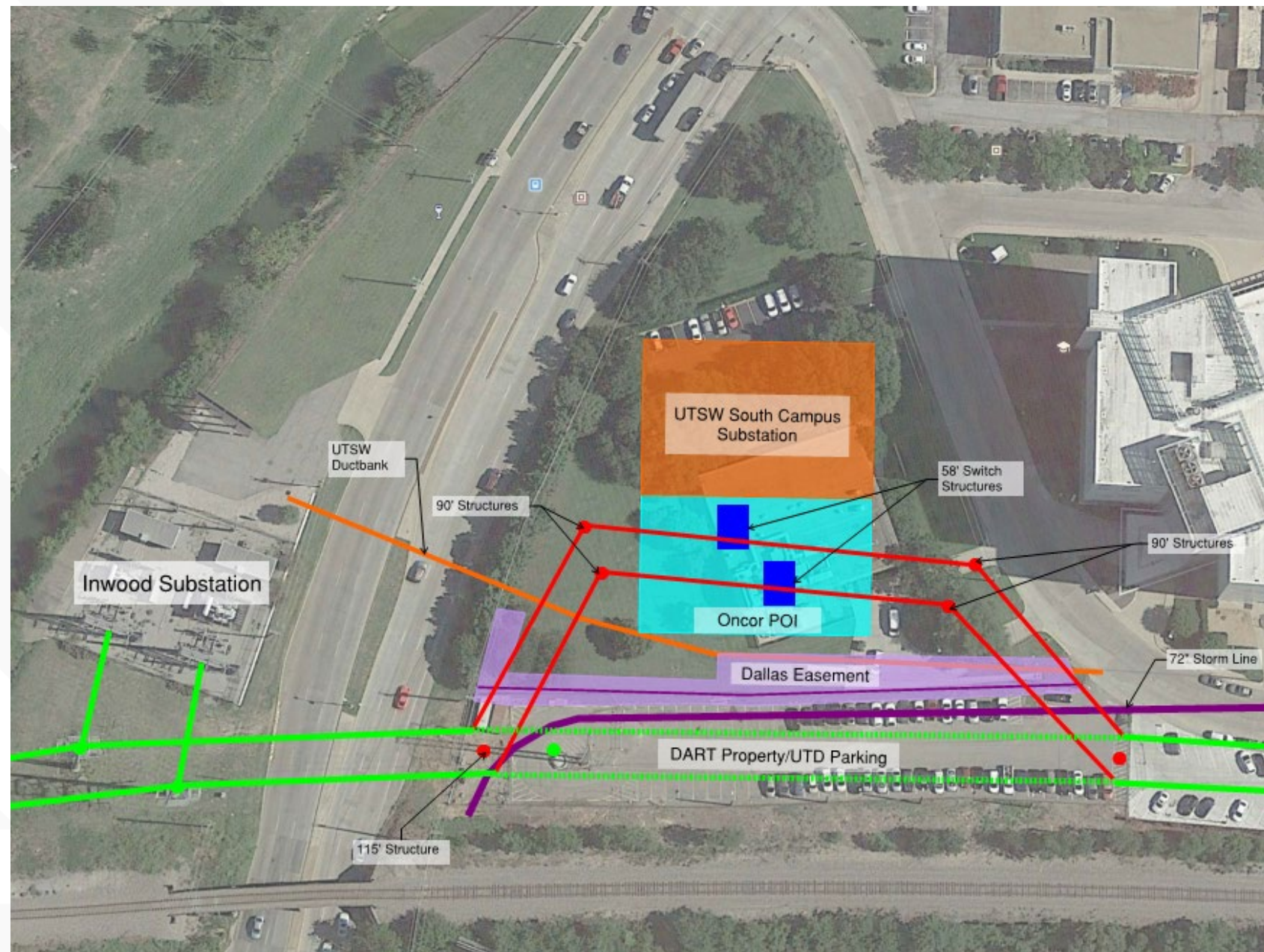
Project Site - Before



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.

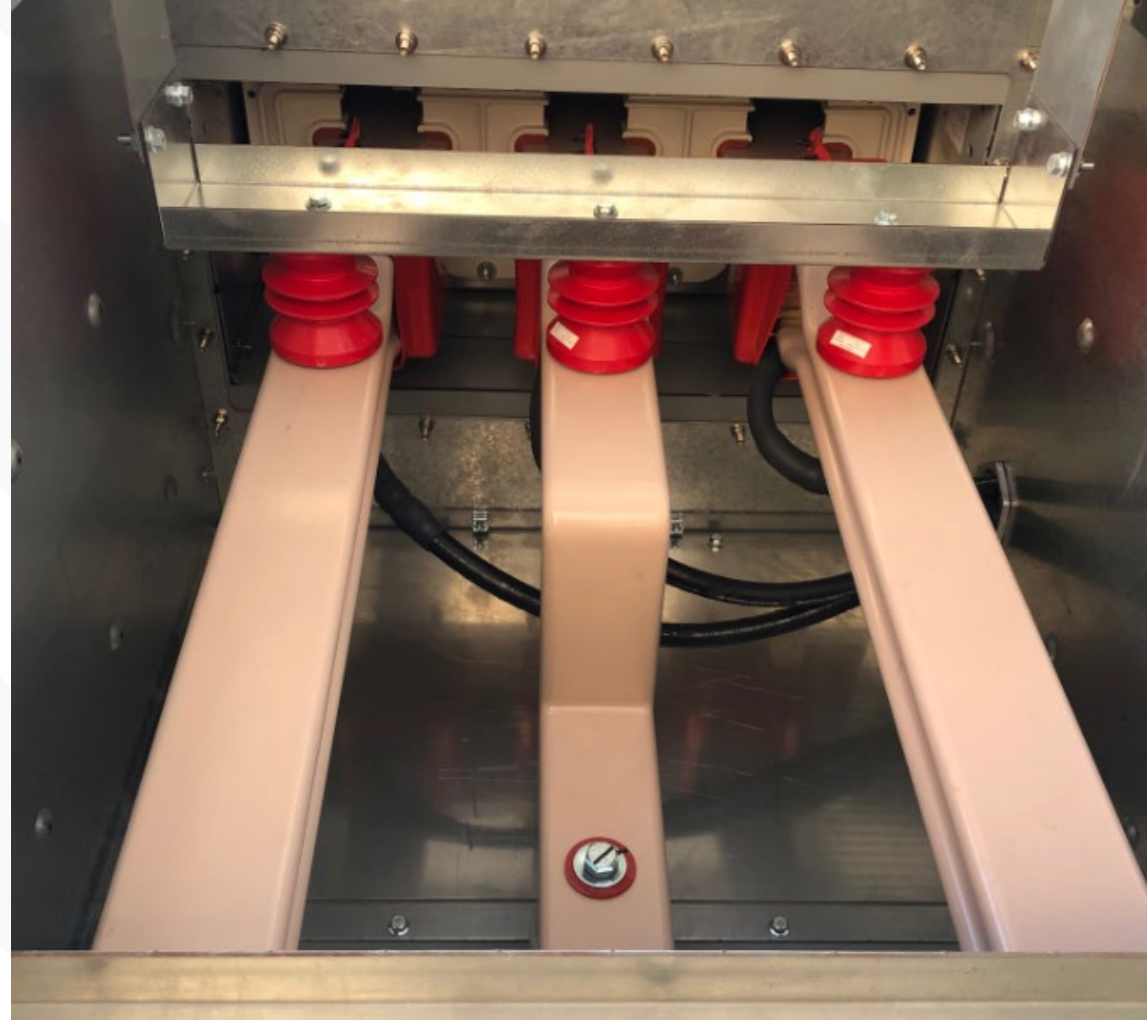


Major Equipment Testing & Delivery



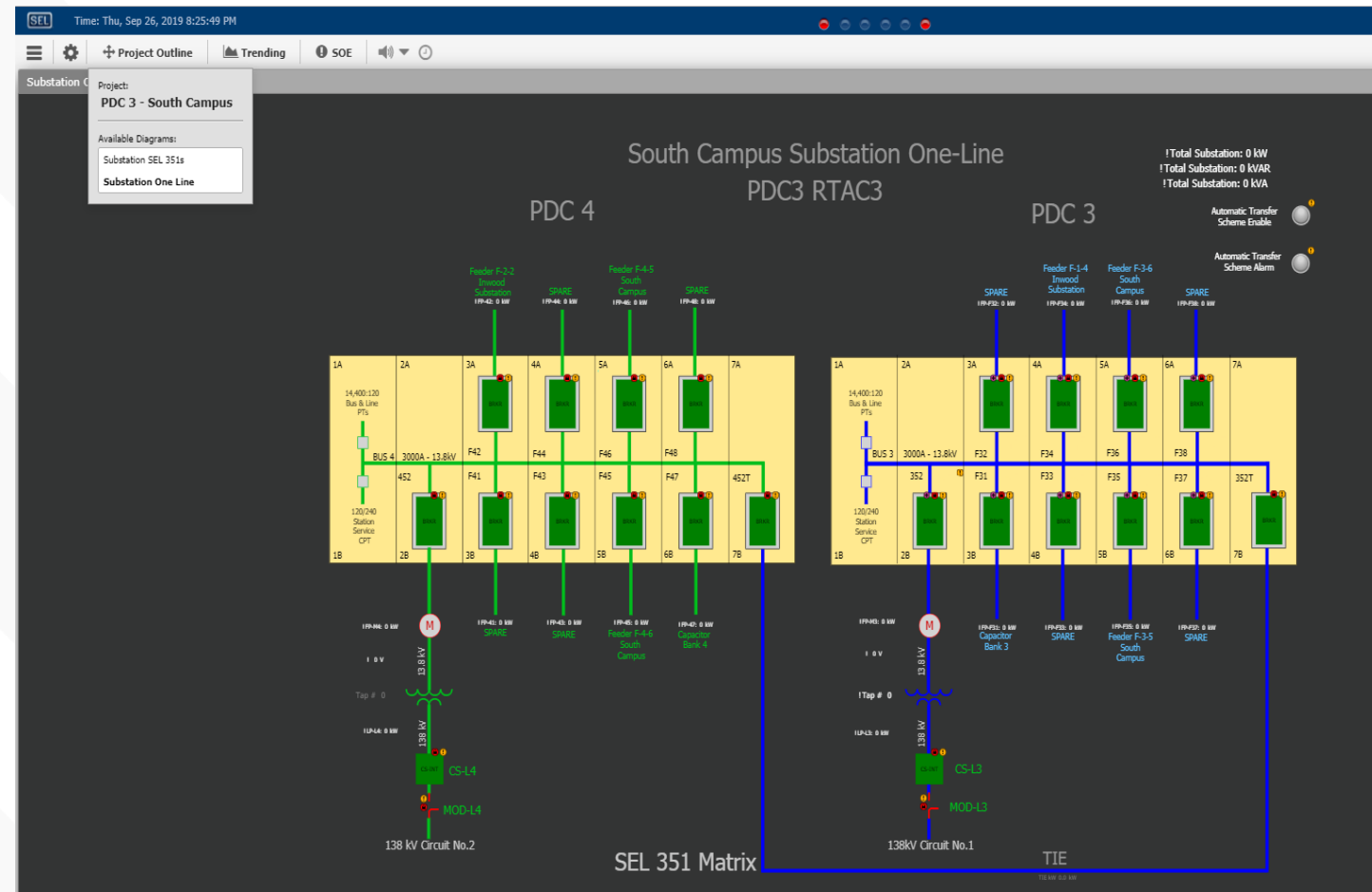
It's Just 3-Phases – Right?

- ▶ 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



Function: Breaker: Feeder:	LP-L3 138 kV Primary	Main-3 FP-M3	Cap Bank 3 31	SPARE 32	SPARE 33	INW-SUB 34 F 1-2	SCampus 1 35 F 3-5	SCampus 2 36 F 3-6	SPARE 37	SPARE 38	Tie (BKR452T) 352T
Va	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Vb	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Vc	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Ia	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Ib	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Ic	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
Ig	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
kW 3ph	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
kVAR 3ph	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
52a IN101 Trip LED	0 0	0 0	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

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



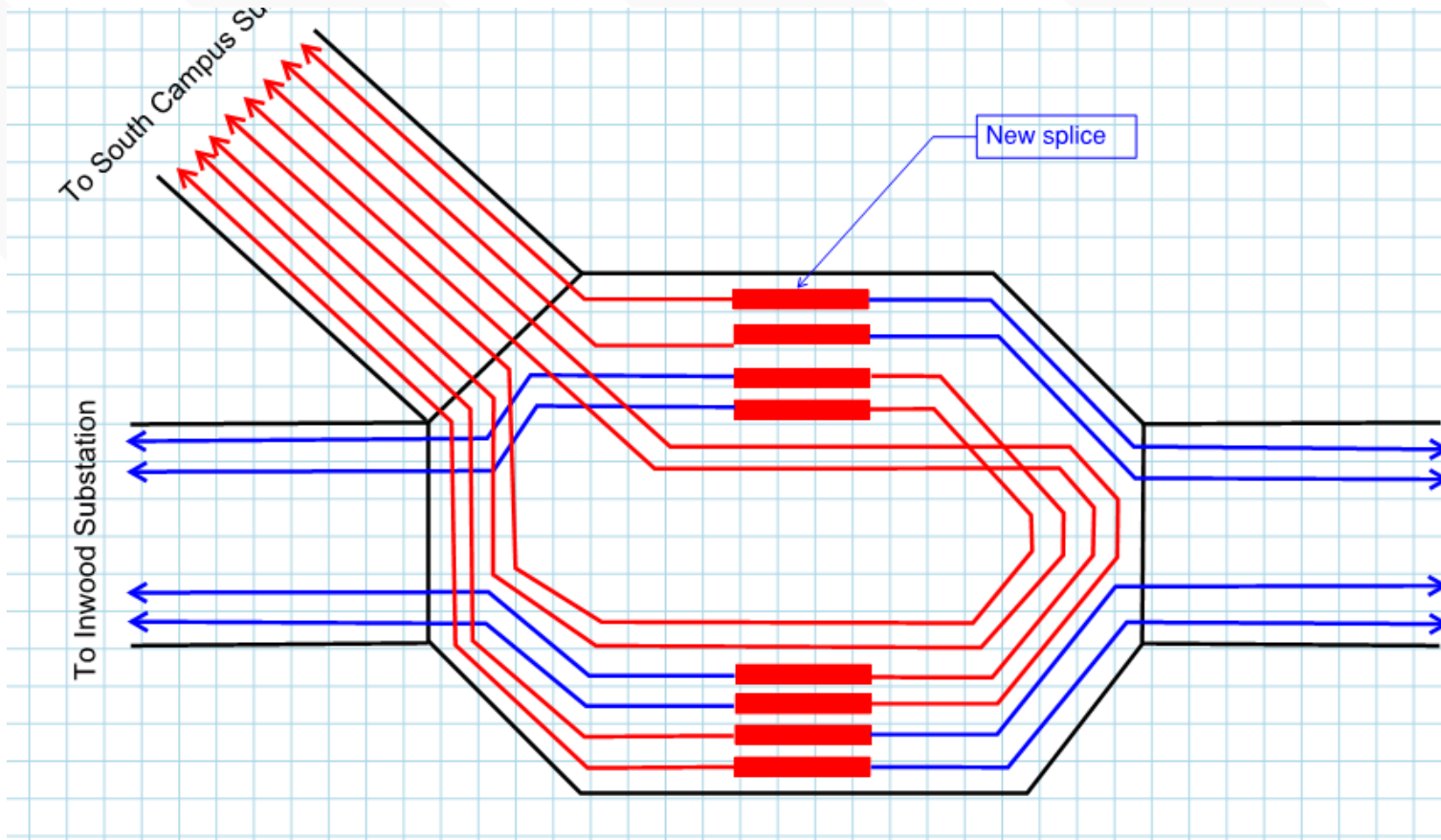
Part 3: Down the Rabbit Hole

Challenge Accepted!

- ▶ 1000 KCMIL Cable
- ▶ South Campus Feeders
- ▶ Inwood Substation Tie

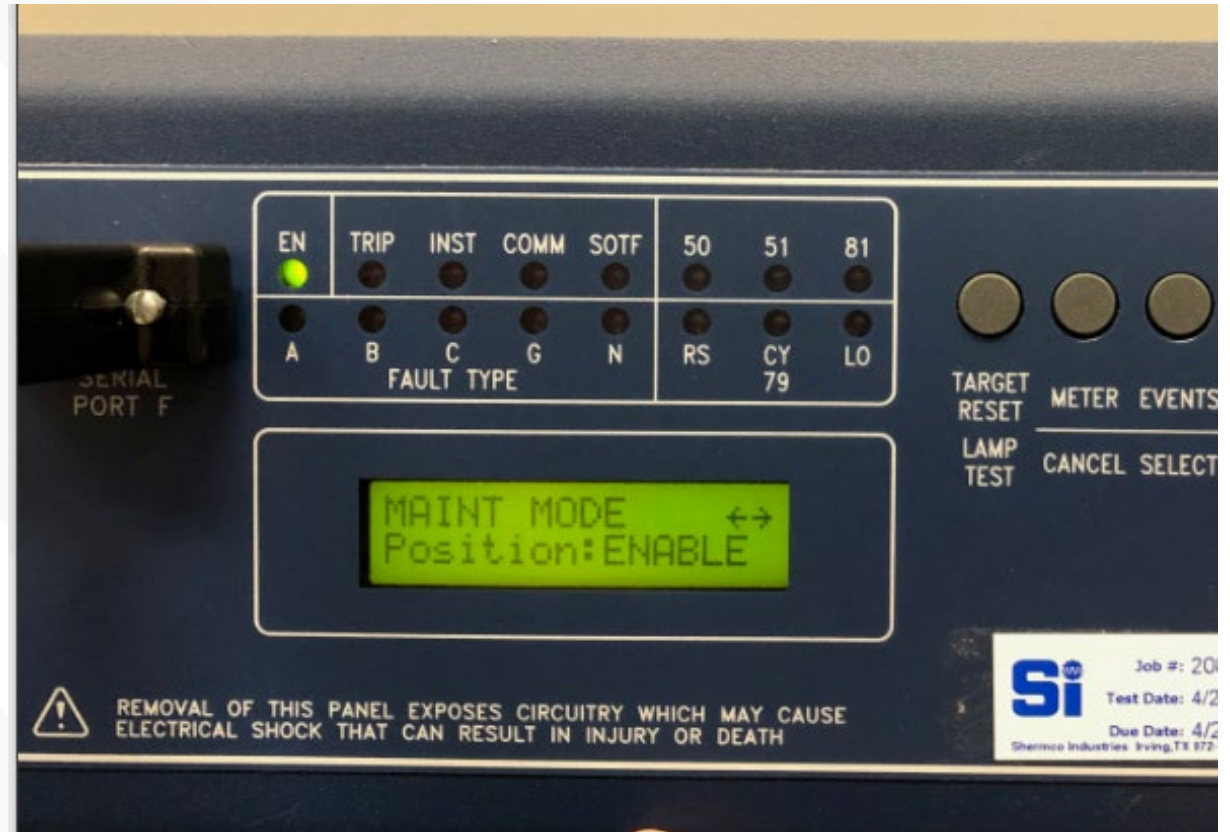


Manhole Work



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

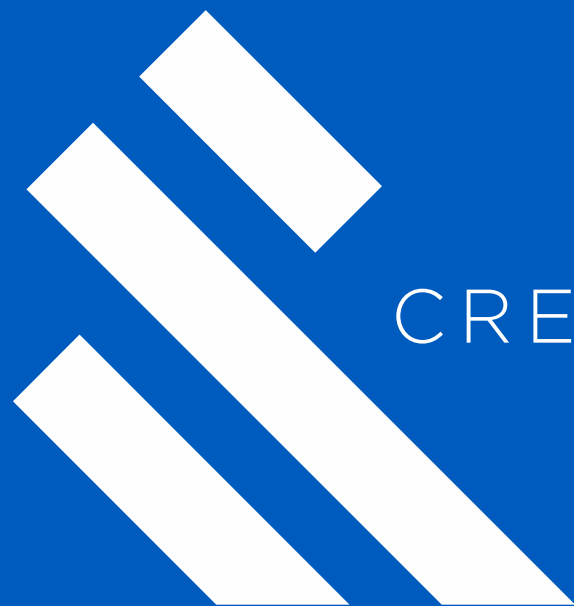
Before.....During.....



(Almost) Finished Project



Questions?



CREATE AMAZING.