SWITCHGEAR REPLACEMENT: OVERVIEW & LESSONS LEARNED

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PRESENTATION OVERVIEW

• Project scope

• Overview of project activities

• Highlights and lessons learned
PROJECT SCOPE

• Replace station service switchgear

• Replace station service control switchboards

• Protective relay switchboard
SWITCHGEAR REPLACEMENT: OVERVIEW

NORMAL CONFIGURATION

TACOMA POWER
TACOMA PUBLIC UTILITIES
START DESIGN (JAN 2012)

- Key Design Areas
  - Cable inspection
  - Location and core drill
  - Breaker control scheme
  - Protective relay scheme
  - Anchoring
SWITCHGEAR REPLACEMENT: OVERVIEW

BID & AWARD

- Two attempts to secure vendor
- Awarded to a manufacturer using GE breakers
SWITCHGEAR INSPECTION

• Site inspection revealed insulator cracks, bus connection hardware issues, and workmanship issues
• Manufacturer replaced insulators on-site
• Re-inspection revealed new cracked insulators
CONTRACT TERMINATION

• Initiated insulator testing on-site
• Documented and sent report to manufacturer
• Negotiated with manufacturer to terminate contract
• End result was a full refund
RE-DO BID & AWARD

- Rewrote specification
- Vetted design with potential manufacturer
SWITCHGEAR REPLACEMENT: OVERVIEW

COLLABORATION

- Manufacturer visits Tacoma Power
- Tacoma Power visits factory
SWITCHGEAR REPLACEMENT: OVERVIEW

CUTOVER PLAN & RISK ASSESSMENT

- Multiple meetings with stakeholders
- Developed detailed cutover strategy
- Evaluated and addressed risks
- Created cable/ splice location plan
- Communication
SWITCHGEAR REPLACEMENT: OVERVIEW

SWITCHGEAR INSTALLATION & INTEGRATION

- Cowlitz River Project (TP) labor performed all construction activities
- Manufacturer’s technician performed Site Acceptance Testing
- Tacoma Power led commissioning of breaker control logic
- Resolved issues
- Protective relay schemes commissioned
SWITCHGEAR REPLACEMENT: OVERVIEW

SWITCHGEAR IN-SERVICE (OCT 2016)

- Start Design (Jan 2012)
- Bid & Award
- Switchgear Inspection
- Contract Termination
- Re-Do Bid & Award
- Collaboration
- Cutover Plan & Risk Assessment
- Switchgear Installation & Integration

Switchgear In-Service (Oct 2016)
HIGHLIGHTS AND LESSONS LEARNED

DESIGN

• Walkdown equipment and as-built drawings
• Review original equipment documents
• Review equipment anchoring requirements
• Engage experts
HIGHLIGHTS AND LESSONS LEARNED

BID & AWARD

• Understand the implications of procurement options
• Communicate what’s important to you
• Include hold points for detailed drawing review
• Include measurable performance requirements
• Evaluate need for performance bond
• Realistic schedule
HIGHLIGHTS AND LESSONS LEARNED

SWITCHGEAR INSPECTION AND TESTING

• Plan a thorough Factory Acceptance Test (FAT)
• Recommend sending design engineer and plant electrician to FAT
• Perform thorough site inspection
• Identify who provides commissioning test equipment
• Request field service technicians resumes
HIGHLIGHTS AND LESSONS LEARNED

CONTRACT TERMINATION

• Document and escalate issues promptly
• Initiate and perform tests, then document in report
• Keep stakeholders informed
• Use the T&Cs, contract, PO
HIGHLIGHTS AND LESSONS LEARNED

COLLABORATION

• Meet with the vendor to review design
• Visit the manufacturing facility to resolve issues
• Include craft persons in discussions
HIGHLIGHTS AND LESSONS LEARNED

CUTOVER PLAN AND RISK ASSESSMENT

• Start early to develop cutover plan
• Think through the details
• Review loads and the impact to facility during cutover
• Leverage existing contracts
• Get buy-in from stakeholders
HIGHLIGHTS AND LESSONS LEARNED

SWITCHGEAR INSTALLATION

• Tools and materials
HIGHLIGHTS AND LESSONS LEARNED

SWITCHGEAR INTEGRATION

• Identify roles & responsibilities within the team

• Purchase spare parts with the switchgear

• Review test results before factory field personnel leaves site

• Collaborate with plant staff

• Perform thorough testing

• Isolate protective relay outputs to avoid false trips
QUESTIONS?

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THANK YOU!

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