PORT OF SEATTLE
MEMORANDUM

COMMISSION AGENDA
ACTION ITEM

Item No. 4b

Date of Meeting August 4, 2015

DATE: July 27, 2015

TO: Ted Fick, Chief Executive Officer

FROM: Dave Soike, Director, Aviation Facilities and Capital Programs
Wayne Grotheer, Director, Aviation Project Management Group

SUBJECT: Electric Utility Safety Switching Project (CIP #C800699)

Amount of This Request:	$1,560,000	**Source of Funds:**	Airport Development Fund and 2015 Revenue Bonds
Est. Total Project Cost:	$9,650,000		
Est. State and Local Taxes:	$617,000		

ACTION REQUESTED

Request Commission authorization for the Chief Executive Officer to: (1) execute a design contract and prepare design and construction bid documents for the Electric Utility Switching Project at Seattle-Tacoma International Airport; and (2) authorize the use of Port crews for preliminary work in support of the project. The total value of this request is $1,560,000 of an estimated total project cost of $9,650,000.

SYNOPSIS

This project will install an industrial computer system to allow for the safe operation, monitoring, and control of the electrical power distribution system at Sea-Tac Airport. This Supervisory Control and Data Acquisition (SCADA) system will be installed throughout Sea-Tac Airport providing a complete, fault-tolerant control and data acquisition system. The SCADA system will serve 22 high-voltage supply power distribution centers (12,470V– 480V) and two utility substations (12,470V) and will enable compliance with current electrical safety regulations.

BACKGROUND

The Seattle-Tacoma International Airport's 12,470V power distribution system is a complex network of transmission lines, substations, load centers, power centers, and switchgear that supply and deliver electricity to all parts of the Airport.

In 2014, new electrical safety regulations were enacted regarding arc flash hazards. Arc flash occurs when electrical power does not follow its intended path. The resulting explosion can cause serious injury or death. The new regulations require quantification of the inherent dangers

of arc flash events. To meet this requirement, the Port completed an arc flash hazard study and labeled all distribution equipment with the known arc flash hazard data. Roughly 50 percent of all 12,470V-480V power distribution centers were determined to have arc flash incident energy in excess of 40 cal/cm^2. Personnel are prohibited from local operation of switchgear with arc flash energy above 40 cal/cm^2.

This project was submitted to the airlines for a majority-in-interest vote. The project was approved.

PROJECT JUSTIFICATION AND DETAILS

This project is necessary to meet requirements within national electrical code and national electrical safety codes that are enforced by the Washington Department Labor & Industries. The benefits of this project include meeting code, ensuring worker safety, minimizing breadth and duration of future power outages, and extending lifespan of electrical circuits and breakers.

Using a SCADA system will provide the means and methodology for qualified personnel to operate switchgear remotely without unsafe human exposure to the arc flash hazard. In addition to the benefits of safe switchgear operation, the SCADA system will provide a means to monitor and respond to power distribution failures and outage events as they occur in real time. Sea-Tac Airport currently does not have a system that identifies power distribution events; electricians need to work back through the system to try to identify the source of the power interruption. The SCADA system will identify the source and root cause of current and potential future power interruptions in real time. This knowledge will expedite return to normal operations after an interruption.

In the current environment, if switchgear requires operations or maintenance activities, all power on that feeder circuit must be shut off at the main breaker. The power interruption will lead to major disruptions in power service and associated lengthy interruptions to airline and airport operations. Additionally, under current conditions it is not possible to perform preventive maintenance of the power distribution centers. The SCADA system will monitor and quickly identify and pinpoint problems or potential problems within the approximately 140 12,470V switchgear breakers located throughout the Airport. The monitoring of vital performance indicators will target which switchgear pieces need preventive maintenance and provide the lease amount of disruption to the Airport while maximizing the lifecycle of switchgear and breakers.

Project Objectives

The SCADA system will provide a method to safely operate, monitor, and control switchgear remotely. Project objectives include the following:

- Personnel safety
- Minimize system downtime and associated operational disruption to the airlines and tenants
- Optimally balance electrical loads across the entire power distribution network
- Record event and meter data for historical reporting and analysis

- Quickly identify and pinpoint problems or potential problems within the system

Scope of Work

The project will install, integrate, configure and test a SCADA system for the Airport's 12,470V power distribution network. The SCADA system will monitor and control switchgear breakers at the Airport's North and South Main Substations, the North and South Terminal Load Centers, the South Terminal Expansion Project distribution center and switches at twenty-two (22) 12,470V-480V power centers. The SCADA system includes an interactive Graphical User Interface that provides operators a dynamic display of the Airport's power distribution network and enables remote switching operations. The system will record event and meter data for historical reporting and analysis.

The SCADA system will be built on Programmable Logic Controllers installed at each of the substations, distribution centers, and power centers with digital input/output wired to each 12,470V breaker to provide remote breaker status and switching capability. In addition, operational information will be monitored and recorded for each of the switchgear breakers controlled.

Preliminary work includes activities such as site investigation, electrical room (escorting), asbestos remediation efforts, limited fiber optic cable installation, or other ancillary activities to support design.

Schedule

- Commission Authorization Design: 3rd Quarter 2015
- Commission Authorization Construction: 4th Quarter 2016
- Issue Notice to Proceed: 1st Quarter 2017
- Construction Complete: 3rd Quarter 2017

FINANCIAL IMPLICATIONS

Budget/Authorization Summary	Capital	Expense	Total Project
Original Budget	$9,600,000	$50,000	$9,650,000
Previous Authorizations	$40,000	$0	$40,000
Current request for authorization	$1,560,000	$0	$1,560,000
Total Authorizations, including this request	$1,600,000	$0	$1,600,000
Remaining budget to be authorized	$8,000,000	$50,000	$8,050,000
Total Estimated Project Cost	$9,600,000	$50,000	$9,650,000

Project Cost Breakdown	This Request	Total Project
Design Phase	$1,600,000	$1,600,000
Construction	$0	$7,433,000
State & Local Taxes (estimated)	$0	$617,000
Total	$1,600,000	$9,650,000

Budget Status and Source of Funds

The Electric Utility Safety Switching Project, C800699, was included in the 2015-2019 capital budget and plan of finance. The funding sources will include the Airport Development Fund and 2015 revenue bonds. The project will be incorporated into the Airport's electrical utility, so both capital and operating costs will be recovered through an internal utility charge allocated to the terminal. Therefore the costs show up as operating costs.

Financial Analysis and Summary

CIP Category	Renewal/Enhancement
Project Type	Infrastructure Upgrades
Risk adjusted discount rate	N/A
Key risk factors	
Project cost for analysis	$9,600,000
Business Unit (BU)	Electrical Utility (allocate to Terminal Building)
Effect on business performance	NOI after depreciation will increase
IRR/NPV	N/A
CPE Impact	0.02 in 2017

Lifecycle Cost and Savings

The life expectancy of the SCADA system is 40 years, with the programmable logic controllers and headend equipment needing upgrades every 10 years. The SCADA system not only enhances personnel safety but also quickly identifies and pinpoints problems or emerging potential problems within the system thus saving time and valuable maintenance resources.

STRATEGIES AND OBJECTIVES

The project supports the Port's Century Agenda objective of meeting the region's air transportation needs at Sea-Tac International Airport for the next 25 years by improving electrical safety. It also supports the Airport's strategic goal of operating a world-class international airport by ensuring enhanced utility reliability.

ALTERNATIVES AND IMPLICATIONS CONSIDERED

Alternative 1) – Maintaining Status Quo

Capital Cost $0

Under a status quo alternative, operations would continue as is with no changes. If switchgear requires operations or maintenance activities, all power on that feeder circuit is required to be shut off at the upstream switchgear location. This is not the recommended alternative.

Pros:

- No Capital Costs

Cons:

- This does not meet code safety requirements for workers
- Electrical distribution maintenance or power outage recovery will require widespread electrical interruptions in power service including lengthy interruption to airport and airline operations
- Limited ability to restore power quickly
- Continued deferral of critical switchgear maintenance

Alternative 2) – Local remote switching

Capital Cost $9-10M

Install remote switching equipment at individual substations, power centers, and distribution centers. This alternative has similar lifecycle costs compared to a fully integrated system, while providing greatly reduced functionality. This is not the recommended alternative.

Pros:

- Meets safety requirements

Cons:

- Cost is similar to full SCADA system without the benefit of centralized control, historical tracking, and diagnostics
- Intensive maintenance personnel involvement and time consuming switching operations
- Outages may be required to install system

Alternative 3) – Install SCADA system

Capital Cost $9.6M

Install a fully integrated SCADA system at individual substations, power centers, and distribution centers. **This is the recommended alternative.**

Pros:

- Meets safety requirements
- Minimize system downtime and associated operational disruption to the airlines and tenants through more efficient operation of the electric utility system
- Optimally balance electrical loads across the entire power distribution network
- Records event and meter data for historical reporting and analysis

- Quickly identify and pinpoint problems or potential problems within the system

Cons:

- Outages may be required to install system
- System will require resources and training to fully utilize capability

ATTACHMENTS TO THIS REQUEST

- None

PREVIOUS COMMISSION ACTIONS OR BRIEFINGS

- None