COMMISSION
AGENDA MEMORANDUM **Item No.** 8a

ACTION ITEM **Date of Meeting** July 9, 2019

DATE: June 18, 2019

TO: Stephen P. Metruck, Executive Director

FROM: Jeffrey Brown, Director Aviation Facilities and Capital Programs
Wayne Grotheer, Director, Aviation Project Management

SUBJECT: Electric Utility Switching Project (CIP #C800699)

Amount of this request: $10,350,000
Total estimated project cost: $11,950,000

ACTION REQUESTED

Request Commission authorization for the Executive Director to: (1) increase the authorized funds for the Electric Utility Supervisory Control and Data Acquisition (SCADA) project in the amount of $10,350,000; (2) advertise and award a major works construction contract at Seattle-Tacoma International Airport; and (3) use Port crews and small works contracts to assist with the project. The total estimated cost of this project is $11,950,000.

EXECUTIVE SUMMARY

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 SCADA system will be installed throughout Sea-Tac Airport providing a complete, fault-tolerant control and data acquisition system. The SCADA system will serve 26 medium-voltage supply power distribution centers (12,470V– 480V) and two utility substations (12,470V) and will enable compliance with current electrical safety regulations.

The original project budget set before the start of project design was $9,650,000, with an authorized work project budget of $1,600,000. The new budget estimate is $11,950,000, an increase of $2,300,000. This budget increase includes additional scope: a new Electrical Command & Control Center room and Bow Lake substation upgrades required by Puget Sound Energy. In addition to scope additions, the project budget was determined to be insufficient to cover the construction and soft costs associated with the original scope of work.

Funding for this project was included in the 2019-2023 capital budget and plan of finance. The capital budget increase will be transferred from the Aeronautical Allowance #C800753 resulting in no net change to the Aviation Division capital budget.

JUSTIFICATION

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 electricity to all parts of the Airport.

SCADA systems perform four functions, (1) Data acquisition, (2) Networked data communication, (3) Data presentation, and (4) Control. The SCADA system provides a safe, reliable, and efficient method to operate, monitor, and control switchgear remotely. SCADA systems are crucial for at critical facilities such as airports and hospitals, since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.

Project objectives include the following:

- Personnel safety
- Minimize system downtime and associated operational disruption to the airlines and tenants, including significant reduction in time to recover from full loss of electrical power, by switching all power loads to the recently completed Alternate Utility Facility (AUF). The AUF provides 30 megawatts of standby power to Sea-Tac airport, more than enough power to fully support the airport's electrical requirements.
- 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
- Develop and add a new Electrical Command and Control Center (EC3) Room

This project is necessary to meet requirements within national electrical and 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. SCADA systems are used by industrial organizations and companies in public and private sectors to control and maintain efficiency, distribute data for smarter decision making, and communicate system issues to help mitigate downtime.

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 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/cm2. Personnel are prohibited from local operation of switchgear with arc flash energy above 40 cal/cm2.

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 a 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 and/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 least amount of disruption to the Airport while maximizing the lifecycle of switchgear and breakers.

The project scope has been increased to include a new Electrical Command and Control Center that will serve as the centralized location for the SCADA system. This remote monitoring and control of the 26 major equipment locations will allow for faster response time to power outages and will provide safety to our Electricians by removing them from the room that houses the equipment.

Another major benefit this SCADA system provides is the ability to efficiently and swiftly connect the north portion of the airport to the recently completed Alternate Utility Facility (AUF) which provides back-up power to the airport; this includes North Satellite and Concourse D. Without SCADA, airport electricians estimated it will take their group in excess of 8 hours to fully transfer the airport to AUF generator power. SCADA will provide the ability to transfer all airport load to the AUF within a few minutes.

Diversity in Contracting

Project staff is working with the Diversity in Contracting Department to outreach and set the woman and minority business enterprise (WMBE) aspirational goal.

DETAILS

Key features and benefits of the SCADA system:

- Permits the safe operation of the electrical power distribution system at Sea Tac Airport

- Allows quicker response to power distribution failures and outage events
- Allows remote monitoring and control at medium voltage power switchgear
- Metering upgrades to provide real time voltage, current, power and frequency information
- Enables the efficient use of the Alternate Utility Facility (AUF)
  - Efficient and rapid transfer of Airport load to the AUF facility during a power outage scenario.
  - Ability to "island" (disconnect) the airport from the primary utility (Puget Sound Energy) and power the airport from the AUF facility.
- Provides new Electrical Command and Control Center (EC3)
- Addresses arc flash concerns within the Airport's Medium Voltage System, as required per National Electrical Code (NEC) by providing for remote operation

Scope of Work

Since project conception and pre-design budget development the following new scope has been added to the project. (new unfunded project scope $1,550,000)

(1) The design and construction on an Electrical Command and Control Center (EC3). The EC3 will provide a single point of information collection, analysis, and power system dispatch for the Sea-Tac airport campus. The costs associated with this new scope are estimated at $650,000
(2) During design review with the local power utility it was determined that substantial work on the Bow Lake Substation (owned and operated by Puget Sound energy), which provides high voltage power to Sea-Tac airport, was required. Work includes indication of Port of Seattle breaker positions at PSE dispatch, reverse power relaying to prevent back feeding into the utility grid, and other construction activities necessary for the successful implementation of SCADA integration with the AUF facility. This work is estimated at $900,000.

Since pre-design budget development the original project scope was determined to be underfunded by $750,000.

The original project scope included:

Installing, integrating, configuring and testing 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 12,470V-480V power centers.

The SCADA system included 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. A new Electrical Command and Control Center will be built as a central point for system operation. Upgrades to metering will provide real time voltage, current, power and frequency information.

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. Furthermore, operational information will be monitored and recorded for each of the switchgear breakers controlled.

Schedule

Design complete	1st Quarter 2020
Construction start	2nd Quarter 2020
In-use date	2nd Quarter 2022

Cost Breakdown	This Request	Total Project
Design	$633,000	$2,233,000
Construction	$9,717,000	$9,667,000
Total	$10,350,000	$11,900,000

ALTERNATIVES AND IMPLICATIONS CONSIDERED

Alternative 1 –Do not implement a SCADA system

Cost Implications: $1,575,000 spent to date would need to be expensed

Pros:

(1) No Capital Expenditure

Cons:

(1) This does not meet code safety requirements for workers
(2) Electrical distribution maintenance or power outage recovery will require widespread electrical interruptions in power service including lengthy interruption to airport and airline operations
(3) Labor intensive medium voltage (12.5kV) switching operations
(4) No remote monitoring or control capability
(5) Lack of data acquisition
(6) Not integrated with Alternate Utility Facility (AUF)
(7) 8-hour minimum transfer time to AUF generator power without SCADA
(8) Does not address arc flash concerns within the Airport's Medium Voltage System, as required per National Electrical Code (NEC)

(9) No metering upgrades providing real time voltage, current, power and frequency information

This is not the recommended alternative.

Alternative 2 – Install a fully integrated SCADA system at individual substations, power centers, and distribution centers.

Cost Implications: Capital Cost $11,950,000

Pros:

(1) Permit the safe operation of electrical power distribution systems at Sea Tac Airport
(2) Minimize system downtime and associated operational disruption to the airlines and tenants through more efficient operation of the electric utility system
  (a) Allow quicker response to power distribution failures and outage events
  (b) Optimally balance electrical loads across the entire power distribution network
  (c) Remote Monitoring and Control at Medium Voltage Power Switchgear
(3) Enable the efficient use of the AUF
  (a) Ability to island the airport from Primary Utility
  (b) Ability to transfer to AUF generator power within minutes
(4) New Electrical Command and Control Center (EC3) room
(5) Upgrades to metering will provide real time voltage, current, power and frequency information.
  (a) Records event and meter data for historical reporting and analysis

Cons:

(1) Outages may be required to install system
(2) System will require resources and training to fully utilize capability

This is the recommended alternative.

FINANCIAL IMPLICATIONS

Cost Estimate/Authorization Summary	Capital	Expense	Total
COST ESTIMATE			
Original estimate	$9,600,000	$50,000	$9,650,000
Current change	$2,300,000	$0	$2,300,000
Revised estimate	$11,900,000	$50,000	$11,950,000
AUTHORIZATION			
Previous authorizations	$1,600,000	$0	$1,600,000
Current request for authorization	$10,300,000	$50,000	$10,350,000
Total authorizations, including this request	$11,900,000	$50,000	$11,950,000
Remaining amount to be authorized	$0	$0	$0

Annual Budget Status and Source of Funds

The Electric Utility Safety Switching Project #C800699 was included in the 2019-2023 capital budget and plan of finance. The budget increase of $2.3 million will be transferred from the Aeronautical Allowance #C800753 resulting in no net change to the Aviation Division capital budget. The funding sources will include the Airport Development Fund and revenue bonds.

In 2015, this project of $9.6M was approved by the airline through a Majority in Interest (MII) vote. The budget increase necessitates another vote. The project was presented to the Airport Airlines Affairs Committee (AAAC) on June 27, 2019 without any objections to project moving forward.

Financial Analysis and Summary

Project cost for analysis	$11,950,000
Business Unit (BU)	Electrical Utility (allocate to Terminal Building)
Effect on business performance (NOI after depreciation)	NOI after depreciation will increase
IRR/NPV (if relevant)	N/A
CPE Impact	$0.03 in 2022

Future Revenues and Expenses (Total cost of ownership)

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.

ATTACHMENTS TO THIS REQUEST

(1) Presentation slides

PREVIOUS COMMISSION ACTIONS OR BRIEFINGS

- August 4, 2015 – The Commission authorized $1.56 million for a design contract and preparation of design and construction bid documents for the Electric Utility Switching Project at Seattle-Tacoma International Airport. The commission also authorized use of port crews for the project. The total project estimate at that time was $1.6 million.