COMMISSION
AGENDA MEMORANDUM **Item No.** 4c

ACTION ITEM **Date of Meeting** October 25, 2016

DATE: September 19, 2016

TO: Ted Fick, Chief Executive Officer

FROM: Michael Tasker, Senior Manager, Facility and Infrastructure
Wayne Grotheer, Director, Aviation Project Management Group

SUBJECT: Cargo 2 – 400 Hz In-ground Power Station Retrofit (CIP #C800247)
Cargo 6 – 400 Hz In-ground Power Station Retrofit (CIP #C800390)
2017 Airfield Pavement Project (CIP #C800483)

Amount of this request: $1,280,000
Total estimated project cost: $2,800,000

ACTION REQUESTED

Request Commission authorization for the Chief Executive Officer to advertise and execute a single construction contract to: (1) retrofit five existing 400 Hz in-ground power stations at Cargo Area 2 (CIP #C800247), and Cargo Area 6 (CIP #C800390), and (2) reconstruct a portion of the existing pavement at Cargo Area 2 (2017 Airfield Pavement Project – CIP #C800483).

EXECUTIVE SUMMARY

This project will improve safety conditions for in-ground power stations at Cargo Areas 2 and 6 and improve aircraft operating conditions at Cargo Area 2. Specifically, the construction contract will retrofit two 400 Hz in-ground power stations located at Cargo Area 2 and three located at Cargo Area 6; and replace a section of distressed asphalt pavement and adjacent broken concrete panels with Portland cement concrete pavement (PCCP) at Cargo Area 2.

The retrofit of five existing 400 Hz in-ground power stations with pop-up systems eliminates the potential for personnel to inadvertently step into an open vault and improves safety. The use of 400 Hz in-ground power stations to power aircraft while on the ground, rather than having air carriers run their auxiliary power units (APUs) reduces the emission of greenhouse gases and other pollutants and creates significant fuel savings for the airlines.

As part of an ongoing Pavement Management and Maintenance Program (PMMP), the 2017 Airfield Pavement Project will replace the pavement deteriorating from repeated use at Cargo Area 2. The replacement with PCCP will provide more structural support for safe and efficient aircraft operations. The pavement replacement program was included in the 2016 – 2020 capital budget and plan of finance.

The total value of this authorization request is $1,280,000 of an estimated total cost of $2,800,000. Savings from previously authorized Cargo 2 and 6 projects have been returned to fund the design and construction of the 400 Hz in-ground power stations retrofit. $220,000 was previously authorized for 2017 Airfield Pavement design.

JUSTIFICATION

The five existing 400 Hz in-ground power stations located at Cargo Area 2 and Cargo Area 6 were installed as a part of projects completed in 2015. Safety concerns have emerged since the stations were installed due to the vaults being open when in use and creating a risk of falls. Alternatives were evaluated during the design phase for these power stations which included hatch systems and pop-up systems. The hatch system was the recommended option at the time as it was perceived to have a lower risk of being hit by vehicles and had a lower cost. The existing 400 Hz in-ground power stations have not been placed into operation based on these safety considerations. Retrofits to the existing systems are needed to ensure safe operations. This is the first installation of such systems at Seattle-Tacoma International Airport.

For the hatch system, an operator needs to step into the vault and onto a grate in order to make cable connections to the receptacle. The grate was installed lower than the surrounding surface to provide space for the receptacle when the hatch system is closed. After the hatch systems were installed, Port Safety and Maintenance raised concerns about the potential for personnel to inadvertently step into the vault. The system will be operated by staff employed by the airlines or their contractors, which historically have a high rate of personnel turnover. Port Safety, Facilities & Infrastructure, Maintenance and Operations have determined that it would be impractical to institute training or operational measures and expect them to have long term effectiveness. Staffs' recommendation is to retrofit these power stations.

Retrofit alternatives were evaluated including other hatch systems and the pop-up system. The pop-up system was the recommended alternative based on the coordination with Port Facilities & Infrastructure, Safety, Maintenance and Operations, discussion with the industry and review of a similar system at King County Airport which has 400 Hz in-ground power systems installed. The pop-up system would have a beacon safety light installed to help prevent the system from being hit when it's extended. Since the pop-up system requires larger vaults than the existing vaults, one concrete panel at each location will need to be replaced for the retrofit.

Since the 400 Hz pop-up power stations are long-lead items, advanced procurement would facilitate the early start of construction so that the installation could be complete before the peak season for Cargo traffic to minimize the impact to operations. Five power stations will be procured by the Port and furnished to the contractor for installation.

The project will also replace a section of existing asphalt pavement and adjacent broken concrete panels with PCCP at Cargo Area 2. Additional aircraft parking positions have been added at Cargo Area 2. This resulted in aircraft parking on asphalt pavement not designed for such a load. The pavement is deteriorating from the repeated use and the replacement with

PCCP will provide the needed structural support. The 2017 Airfield Pavement Project is part of an ongoing pavement management program. Distressed panels that are deemed critical by Airport Operations and need urgent replacement could be added to this project.

Maintaining critical airfield assets supports the Port's Century Agenda objective to meet the region's air transportation needs at the Airport for the next 25 years. The pavement management program maintains the integrity of airfield pavements and efficient airport operations.

Three individual projects have been combined into a single construction project because of the similarity, proximity, and the timing of the work at Cargo 2 and 6 areas. The combined project results in a more efficient design, economies of scale, lower administrative costs and will minimize impacts to airfield operations from construction activities.

One of the Century Agenda goals is to use the Port's influence as an institution to promote small business growth and workforce development. Although some of this work may be specialized, Port staff will coordinate with Economic Development Division's Small Business Group to identify potential opportunities within the scope of work for small business utilization.

Given the location and limited magnitude of the combined project, a Project Labor Agreement (PLA) is not recommended.

DETAILS

Project Objectives

(1) Provide for safe operations
(2) Reduce the emission of greenhouse gases and other pollutants
(3) Maintain pavement on the airfield.

Scope of Work

(1) Retrofit two existing 400 Hz in-ground power stations located at Cargo Area 2 and three in-ground power stations at Cargo Area 6 with pop-up systems
(2) Replace distressed asphalt pavement and adjacent broken concrete panels with PCCP at Cargo 2 area.

Schedule

Activity	
Construction start	2017 Quarter 1
In-use date	2017 Quarter 2

Cargo 2 - 400 Hz In-ground Power Station Retrofit (CIP C800247)

Cost Breakdown	This Request	Total Project
Design	$0	$80,000
Construction	$0	$440,000
Total	$0	$520,000

Cargo 6 - 400 Hz In-ground Power Station Retrofit (CIP C800390)

Cost Breakdown	This Request	Total Project
Design	$0	$120,000
Construction	$0	$660,000
Total	$0	$780,000

2017 Airfield Pavement Project (CIP C800483)

Cost Breakdown	This Request	Total Project
Design	$37,000	$235,000
Construction	$1,243,000	$1,265,000
Total	$1,280,000	$1,500,000

ALTERNATIVES AND IMPLICATIONS CONSIDERED

Alternatives related to the Cargo 2 and 6- 400 Hz In-ground Power Station Retrofit

Alternative 1 – The Port would not retrofit the existing 400 Hz in-ground power system.

Cost Implications: $0

Pros:

(1) No additional cost.

Cons:

(1) Based on the decisions from Safety and Operations, the existing systems that use hatch vaults are not being used due to safety concerns. Air carriers will need to run their APUs to power aircraft while on the ground. The airport would not be able to reduce the emission of greenhouse gases and other pollutants by the installation of 400 Hz pop-up power stations. Air carriers would not be able to have significant fuel savings.
(2) If the existing 400 Hz in-ground power systems were to be used, there would be risks of fall incidents of workers operating the system and potential back injuries of workers connecting the cable to the receptacle.

This is not the recommended alternative.

Alternative 2 – Retrofit the existing 400 Hz in-ground power system with other hatch assembly.

Cost Implications: $779,000

Pros:

(1) Lower cost than the recommended Alternative 3.
(2) Eliminate safety concerns of fall incidents with a platform at the ground level.

Cons:

(1) Increase potential of back injuries with a platform at the ground level since the elevation of receptacles is relatively low. The cable is very stiff and heavy, which makes it difficult for connecting to the receptacle.

This is not the recommended alternative.

Alternative 3 – Retrofit the existing 400 Hz in-ground power system with pop-up system.

Cost Implications: $1,300,000

Pros:

(1) Receptacles are installed at a higher elevation, which facilitates the connections to the power and future maintenance.
(2) Beacon safety lights would be installed for protection of the pop-up system when it's extended.
(3) Eliminates safety concern.

Cons:

(1) Highest cost of final alternatives considered.

This is the recommended alternative.

Alternatives related to the 2017 Airfield Pavement Project

Alternative 1 –The Port would not replace the section of asphalt pavements at Cargo 2 with PCCP.

Cost Implications: $0

Pros:

(1) No additional cost.

Cons:

(1) Continued use of the pavement could result in potential Foreign Object Debris (FOD), and/or closure of the area to aircraft use.
(2) Potential impacts to aircraft operations

This is not the recommended alternative.

Alternative 2 – Delay the project beyond 2018.

Cost Implications: $1,600,000

Pros:

(1) No additional construction cost for 2017.
(2) No construction impacts to aircraft operations at Cargo 2 area in 2017.

Cons:

(1) Continued use of the pavement could result in foreign object debris (FOD), and/or closure of the area to aircraft use.
(2) This project would likely become a stand-alone project if it's delayed beyond 2018; this would result in contracting inefficiencies (higher total cost) and potential impact to aircraft operations.

This is not the recommended alternative.

Alternative 3 – Replace the section of asphalt pavements at Cargo 2 with PCCP.

Cost Implications: $1,500,000

Pros:

(1) Provide more structural support to aircraft parking at Cargo 2 for safer operations.
(2) Combining with Cargo 2 400 Hz In-ground Power Station Retrofit will benefit from a more efficient design, lower cost and less impact to operations.

Cons:

(1) Construction impacts to aircraft operations at Cargo 2 area in 2017.

This is the recommended alternative.

FINANCIAL IMPLICATIONS

Financial implications of Cargo 2 - 400 Hz In-ground Power Station Retrofit C800247

Cost Estimate/Authorization Summary	Capital	Expense	Total
COST ESTIMATE			
Revised budget	$7,047,875	$797,125	$7,845,000
Total cost to date	$6,410,972	$284,064	$6,695,036
Retrofit estimate	$520,000	$0	$520,000
Estimated savings after retrofit	$116,903	$513,061	$629,964
AUTHORIZATION			
Previous Authorizations	$11,747,875	$797,125	$12,545,000
Current request for authorization	$0	$0	$0
Total Authorizations, including this request	$11,747,875	$797,125	$12,545,000

Annual Budget Status and Source of Funds

Cargo 2 west hardstand project C800247 was completed in 2015 with total cost to date of $6,410,973. The additional costs will be funded with the Airport Development Fund.

Financial Analysis and Summary

Project cost for analysis	Revenue/Capacity Growth
Business Unit (BU)	Airfield Commercial Area
Effect on business performance (NOI after depreciation)	NOI after depreciation will decrease
IRR/NPV (if relevant)	N/A
CPE Impact	None

Financial implications of Cargo 6 - 400 Hz In-ground Power Station Retrofit C800390

Cost Estimate/Authorization Summary	Capital	Expense	Total
COST ESTIMATE			
Revised budget	$6,345,486	$0	$6,345,486
Total cost to date	$5,278,817	$0	$5,278,817
Retrofit estimate	$780,000	$0	$780,000
Estimated savings after retrofit	$286,669	$0	$286,669
AUTHORIZATION			
Previous Authorizations	$6,345,875	$132,125	$6,478,000
Current request for authorization	$0	$0	$0
Total Authorizations, including this request	$6,345,486	$132,125	$6,477,611

Annual Budget Status and Source of Funds

Cargo 6 hardstand improvements C800390 was completed in 2015 with a total project spending of $5,278,817. The additional costs will be funded with the Airport Development Fund.

Financial Analysis and Summary

Project cost for analysis	Revenue/Capacity Growth
Business Unit (BU)	Airfield Commercial Area
Effect on business performance (NOI after depreciation)	NOI after depreciation will decrease
IRR/NPV (if relevant)	N/A
CPE Impact	None

Financial implications of 2017 Airfield Pavement Project C800483

Cost Estimate/Authorization Summary	Capital	Expense	Total
COST ESTIMATE			
Program budget	$32,500,000	$0	$32,500,000
2017 cost estimate	$1,500,000	$0	$1,500,000
Remaining program budget	$31,000,000	$0	$31,000,000
AUTHORIZATION			
Previous authorizations	$220,000	$0	$220,000
Current request for authorization	$1,280,000	$0	$1,280,000
Total Authorizations, including this request	$1,500,000	$0	$1,500,000
Remaining amount to be authorized	$31,000,000	$0	$31,000,000

Annual Budget Status and Source of Funds

The Airfield Pavement Program for C800483 was included in the 2016-2020 capital budget and plan of finance with a budget of $32,500,000. This CIP will have an average annual budget of $6.5 million based on past pavement replacement expenditures. The design and construction for the 2017 work will be funded with future revenue bonds, to be issued in 2017.

Financial Analysis and Summary

Project cost for analysis	$1,500,000
Business Unit (BU)	Airfield Apron Area
Effect on business performance (NOI after depreciation)	NOI after depreciation will increase
IRR/NPV (if relevant)	N/A
CPE Impact	$0.01 CPE in 2017

Future Revenues and Expenses (Total cost of ownership)

The estimated life expectancy for this project is 20 years for pavements, 30 years for 400 Hz pop-up power stations and 30 years for transformers. Replacing pavement will result in maintenance cost avoidance.

ADDITIONAL BACKGROUND

Utilizing 400 Hz power, versus APUs, supports the Port's Century Agenda Goal to be the greenest, and most energy efficient port in North America. Reduce air pollutants and carbon emissions, specifically: -- Reduce air pollutant emissions by 50% from 2005 levels. -- Reduce carbon emissions from all Port operations by 50% from 2005 levels and reduce aircraft-related carbon emissions at Sea-Tac by 25%. Using 400 Hz power at aircraft parking positions is consistent with previous decisions to reduce noise and emissions.

The estimated annual emission savings of utilizing 400 Hz power versus APUs for a cumulative 360 hours of 747 or MD11 freighter aircraft operations is:

(1)	Hydrocarbon	0.1 tons/yr.
(2)	Carbon Monoxide	2.0 tons/yr.
(3)	Nitrous Oxides	0.5 tons/yr.
(4)	Carbon Dioxide	325 tons/yr.

ATTACHMENTS TO THIS REQUEST

Presentation slides

PREVIOUS COMMISSION ACTIONS OR BRIEFINGS

February 24, 2015 – Commission authorized the Chief Executive Officer to design, prepare construction documents, and implement advanced measures as necessary to replace distressed pavement and joint sealant for the 2016 Airfield Pavement portion of the 2016-2020 Airfield Pavement Program at the Seattle-Tacoma International Airport in the amount of $200,000.

October 8, 2013 – Commission authorized the Chief Executive Officer to advertise and execute a single construction contract comprised of Cargo 2 Hardstand Expansion (CIP #C800247), Cargo 5 Hardstand Construction (CIP #C800254), Cargo 6 Hardstand Improvements (CIP #C800390), and Airfield Pavement Replacement-Cargo 6 Apron (CIP #C102583).

September 25, 2012 – Commission authorized the Chief Executive Officer to design and prepare construction documents for the Cargo 6 Enhancements at Seattle-Tacoma International Airport. Commission also separately authorized the Chief Executive Officer to design and prepare construction documents for the demolition of a cargo building (Building 2) and for the enlargement of the hardstand in the Cargo 2-West area in the amount of $830,000.