

**PORT OF SEATTLE**  
**MEMORANDUM**

**COMMISSION AGENDA**

**Item No.**

5b

**ACTION ITEM**

July 24, 2012

**DATE:** July 13, 2012

**TO:** Tay Yoshitani, Chief Executive Officer

**FROM:** David Soike, Director, Aviation Facilities and Capital Program  
Wayne Grotheer, Director, Aviation Project Management Group

**SUBJECT:** South Satellite Heating, Ventilating, Air Conditioning (HVAC) Lighting and Ceiling Replacement Project CIP #C800376

**Amount of This Request:** \$6,500,000

**Source of Funds:** Existing and future Revenue Bonds and Airport Development Fund (for expense costs)

**Est. State and Local Taxes:** \$2,018,000

**Est. Construction Jobs Generated:** N/A

**Total Project Cost:** \$37,011,000 (including \$ 3,000,000 expense)

**ACTION REQUESTED:**

Request authorization for the Chief Executive Officer to proceed with the South Satellite Heating, Ventilating, Air Conditioning, Lighting, and Ceiling Replacement project and prepare design documents; perform project management and administration; and use Port crews to support site investigation needed to develop the contract documents. The funding request for this work is \$6,500,000, and the total project cost is \$37,011,000.

**SYNOPSIS:**

The purpose of this project is to provide energy efficient HVAC and lighting systems that meet current and future demands and are compatible with the Airport's Building Management Direct Digital Control (DDC) System. The project will replace and upgrade major portions of the 40-year-old HVAC system installed in 1971 and expanded in 1981, including air handlers, ductwork, terminal boxes, controls, pumps and piping, ceilings, signage, lighting, and power as required to construct a modern HVAC system. Anticipated annual energy savings from the upgraded HVAC system and lighting is \$155,000. This project is included in the 2012-2016 capital budget and plan of finance.

**BACKGROUND:**

The South Satellite was constructed in 1971. There have been a number of interior renovations over the years, but the core mechanical and electrical utilities of the original concourse have remained largely unchanged since 1971, except for changes needed for the 1981 expansion.

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Demand on the mechanical systems has approximately doubled since 1971, primarily from additional cooling load caused by new electronic systems, increasing passenger traffic, and small facility additions.

The project will expand the capacity of the system, improve energy efficiency, facilitate maintenance, and remove obsolete equipment and infrastructure.

### **PROJECT JUSTIFICATION:**

The project will address the following conditions that exist with the current HVAC systems:

- **Capacity:** The systems are not able to meet the cooling demands in high traffic areas when the outside average daily temperature exceeds about 60 degrees for more than a couple of days and are over capacity to meet current cooling demands during peak traffic periods. The system was designed and built in 1971 and surplus capacity was used in subsequent expansions, remodels, and rearrangements. A quick calculation indicates by early 1990 the cooling demand required 100% of the system capacity. Since 1990, the additional heat from electronics and the increase in passengers has significantly increased this demand. The overall HVAC system is no longer able to achieve acceptable environmental control in many areas of the Satellite.
- **Efficiency:** The controls for the systems are not compatible with the DDC system. Most of the systems and equipment are not connected to the DDC system and those that are provide only “on/off” status, with little ability to fine-tune the system to minimize energy use. Therefore, to maximize passenger comfort, the system is operated at its highest capacity.
- **Obsolescence:** The current South Satellite HVAC systems are obsolete dual-duct, constant-volume systems that have now exceeded their life expectancy of 25 years. The power distribution systems are made up of panels that are obsolete. Parts for much of this equipment are no longer available. As parts fail, the equipment is either taken out of service or repairs are made, which results in making the equipment operational at one setting, minimizing any opportunity for energy savings. Currently about 10% of the equipment is out of service or operating with field repairs.
- **Maintainability:** Terminal boxes are obsolete and in many cases have broken or missing parts that cannot be repaired or replaced. The controls for the various zones are pneumatic and are not connected to the Central Plant as are the modern controls, and many are unrepairable due to their age. Access for repair of terminal boxes requires removing the ceiling, lights, and ancillary systems.

### ***Project Objectives:***

- Install an energy-efficient, modern HVAC system in the South Satellite.
- Upgrade electrical, lighting, ceiling, and other systems affected by the HVAC replacement.
- Minimize disruption to the tenants.
- Improve comfort and air quality in the South Satellite.
- Complete the project on time and within budget.

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- Provide mechanical system capacity for the anticipated future increase in passenger volume.

### **PROJECT SCOPE OF WORK AND SCHEDULE:**

#### ***Scope of Work***

Upgrading/replacing the HVAC systems requires replacing fans, motors, controls, ducting, terminal distribution boxes, and associated piping, wire, and electrical service. As most of the ducting and terminal boxes are installed in the space above the ceiling, removal of the ceiling and lighting is required to replace the mechanical equipment.

Because of the amount of ceiling work and related extensive asbestos abatement, complete ceiling removal and replacement are part of the project. Lighting, signage, and communication systems also need to be part of the demolition work, and will be replaced as part of this project.

Scope will include the following:

- Convert the existing dual-duct air distribution into a common-supply air system. Existing duct capacity will be analyzed to establish design parameters and to determine limitations for extension and modifications. Duct cross-connections will be provided to support phasing.
- Calculate the HVAC loads to determine the HVAC system capacity based on current usage, future projects, and potential envelope upgrades. Final design capacity and design will include an added 20-percent extra capacity in equipment and delivery system.
- Install a replacement HVAC system including fan motors, pumps, piping, ducts, terminal boxes, and controls.
- Install additional mechanical penthouse(s) and associated HVAC equipment to add capacity and provide conditioned air during the phased construction.
- Provide new motor control centers, variable frequency drives, and power distribution to support new mechanical equipment.
- Modify the fire protection system (fire sprinkler and fire alarm systems) as required by the Fire Code.
- Replace existing ceilings, lighting, and signage.
- Renovate and complete finish work for hold room and passenger circulation areas.
- Design the primary structural support for the new mechanical, electrical, and architectural systems that are being installed as part of these upgrades.
- Design new or replace communication systems in affected areas.
- Develop and design the regulated materials management (RMM) demolition and work plan and contract documents and incorporate this information into the construction document phasing plans.

#### ***Schedule:***

Staff has negotiated a service agreement for the project design services and is ready to process a service directive to implement work as soon as Commission authorizes funding.

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Begin Design.....	August 2012
Bid Authorization.....	February 2014
Begin Construction.....	May 2014
Project Completion.....	July 2016

### **FINANCIAL IMPLICATIONS:**

Anticipated annual energy savings from an upgraded HVAC system and lighting is \$155,000. This estimate is based on comparison of the existing system that cannot be managed by the Airport's DDC system to modern systems connected to the DDC system.

RMM cost estimates are based on existing site information and will be updated after RMM work plan and project construction phasing is finalized.

<b>Budget/Authorization Summary</b>	<b>Capital</b>	<b>RMM Expense</b>	<b>Total</b>
Original Budget	\$27,500,000	\$0	\$27,500,000
Budget Increase	\$6,511,000		\$6,511,000
Revised Budget	\$34,011,000		\$34,011,000
Previous Authorizations	\$0	\$0	\$0
Current request for authorization	\$6,350,000	\$150,000	\$6,500,000
Total Authorizations, including this request	\$6,350,000	\$150,000	\$6,500,000
Remaining budget to be authorized	\$27,661,000	\$2,850,000	\$30,511,000
Total Estimated Project Cost	\$34,011,000	\$3,000,000	\$37,011,000

<b>Project Cost Breakdown</b>	<b>This Request</b>	<b>Total Project</b>
Construction	\$0	\$21,243,000
Construction Management	\$350,000	\$2,700,000
Design	\$4,000,000	\$4,800,000
Project Management	\$1,500,000	\$2,200,000
CPO	\$150,000	\$500,000
Permitting	\$50,000	\$100,000
Environmental, Legal and Airport direct	\$300,000	\$450,000
State & Local Taxes (estimated)	\$0	\$2,018,000
Total Capital	\$6,350,000	\$34,011,000
RMM	\$150,000	\$3,000,000
Total Project costs	\$6,500,000	\$37,011,000

### ***Budget Status and Source of Funds:***

The South Satellite Heating, Ventilating, Air Conditioning (HVAC) Lighting and Ceiling Replacement Project CIP #C800378 is included in the 2012-2016 capital budget and plan of finance as a business plan prospective project in the amount of \$27,500,000. The budget increase of \$6,511,000 will be transferred from the Aeronautical Renewal/Replacement CIP #C102166, a business plan prospective project, resulting in no net change to the Aviation capital budget. The RMM expense of \$150,000 will be absorbed within the 2012 operating budget. The remaining costs will be incurred in 2013 and 2014. The source of funds for this project includes existing

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2010 revenue bonds and future revenue bonds to be issued in 2013 as well as the Airport Development Fund for expense costs.

### **Financial Analysis Summary:**

<b>CIP Category</b>	Mechanical Infrastructure
<b>Project Type</b>	Renewal & Replacement
<b>Risk adjusted Discount rate</b>	N/A
<b>Key risk factors</b>	N/A
<b>Project cost for analysis</b>	\$34,011,000
<b>Business Unit (BU)</b>	Terminal
<b>Effect on business performance</b>	\$0.13 in 2017; however, no change from business plan forecast as this project was included in the plan of finance
<b>IRR/NPV</b>	N/A

### ***Lifecycle Cost and Savings:***

Analysis of the existing system will be initiated upon design authorization, and selection of new systems will depend upon lifecycle analysis. The designer will incorporate information from other recent studies as to how best to improve the building's energy efficiency and environmental sustainability and provide the most cost-effective system for future operation.

### **STRATEGIC OBJECTIVES:**

#### **Ensure Airport and Seaport Vitality**

Replacing and upgrading the 40-year-old HVAC systems in South Satellite will maximize asset utilization, achieve the highest efficiency and comfort for increased international traffic with the lowest carbon footprint, and facilitate long-term growth.

#### **Exhibit Environmental Stewardship through our Actions**

This project will install and provide means to manage and operate the Airport infrastructure in an economically and environmentally sound manner. It does so by:

- conserving energy,
- improving air quality, and
- meeting or exceeding energy code regulations.

#### **Advance this region as a leading tourism destination and business gateway**

The Port is a leader in moving people and plans to double international Airport traffic in the next 25 years. This project will provide the infrastructure investments at the South Satellite to help meet the increased utility capacity needed to achieve this Century Agenda goal.

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## **ENVIRONMENTAL SUSTAINABILITY:**

### **Sustainability Ideas to be Explored or Incorporated in Design:**

#### **Building and Design**

- Awnings/shading will be evaluated as part of the design for the windows facing the sun.
- Design will be evaluated for energy performance, operation of equipment and systems will be measured and verified against expectations, and all systems will be commissioned.
- Controls will be designed to meet Washington State energy code.
- A commissioning plan is required by Labor & Industries.
- The design will incorporate variable frequency drive motors.
- Lighting will consider use of light-emitting diode (LED) light fixtures.

#### **Materials and Resources:**

- Low-energy-use and low-maintenance light fixtures will be incorporated into the design.
- HVAC will be provided for mechanical control rooms to maintain an operating temperature range of 50°F to 90°F. This operating temperature will result in extended life of electrical and electronic components.
- Low volatile organic compounds (VOC) will be required for any adhesives or coatings.
- Asbestos in the South Satellite will be abated as needed for this project.

## **BUSINESS PLAN OBJECTIVES:**

This project is consistent with the Airport's business plan by:

- Maintaining and refurbishing Airport facilities in order to minimize long-term total cost of ownership.
- Minimizing the environmental impacts of our operations.
- Enhancing arriving and departing international guest experience.

## **TRIPLE BOTTOM LINE SUMMARY:**

This project helps the environment by reducing energy consumption at the Airport, improves facilities for our business partners, creates short-term construction jobs, and incorporates small business opportunities to encourage small business participation in a major project.

## **ALTERNATIVES CONSIDERED AND THEIR IMPLICATIONS:**

- Do nothing and continue to monitor failures and make repairs. Repairing the existing units has been costly and time consuming, causing extensive down time. This is not deemed acceptable from a customer service perspective or from a risk management perspective. The "Do Nothing" alternative results in continued customer service disruptions and increased maintenance costs. Many parts are no longer available and have to be custom manufactured, where possible. This is NOT the proposed alternative.

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- New Stand Alone Packaged systems. Rather than connecting to the Airport's central chiller and boiler plants, the new air handling units serving the South Satellite could be custom stand-alone rooftop units. This option is not proposed for the following reasons:
  - There is significantly more initial cost involved than buying new air handling equipment that connects to the existing central plant.
  - The stand-alone units would not be as efficient as the chiller plant.
  - There is more maintenance involved, since the stand alone units' cooling sections will need separate special maintenance.
  - The infrastructure for delivering chilled and hot water to the South Satellite is already in place.

This is NOT the proposed alternative.

- Replace the existing HVAC systems and install an additional system to increase capacity. These systems may be connected to the Central Mechanical Facility depending upon designers recommendations. **This is the proposed alternative.**

### **OTHER DOCUMENTS ASSOCIATED WITH THIS REQUEST:**

None.

### **PREVIOUS COMMISSION ACTIONS OR BRIEFINGS:**

- September 22, 2009—Commission was briefed on the condition of the HVAC systems of the North and South Satellites.
- May 3, 2011—Commission authorized the negotiation and execution of a professional services contract for design services. No funding was associated with this authorization.