

**Board Report**

File #: 2016-0499, **File Type:** Contract**Agenda Number:** 12.

**FINANCE, BUDGET AND AUDIT COMMITTEE
APRIL 19, 2017
SYSTEM SAFETY, SECURITY AND OPERATIONS COMMITTEE
APRIL 20, 2017****SUBJECT: RED LINE VEHICLE EVALUATION OF ON-BOARD MIST FIRE SUPPRESSION
SYSTEM PROTOTYPE****ACTION: APPROVE CONTRACT AWARD****RECOMMENDATION**

CONSIDER:

- A. ADOPTING a Life of Project (LOP) Budget for \$1,407,900 for the Rail Vehicle Mist System Demonstration Project; and
- B. APPROVING the award and authorize the Chief Executive Officer to execute Contract No. OP3614100 to Knorr Brake Company, LLC for **one (1) prototype Red Line Heavy Rail Vehicle on-board mist fire suppression system** for a two-year period of performance for design, installation and evaluation of the systems for a fixed price amount of \$908,481 subject to resolution of protest, if any.

ISSUE

Metro places a high priority on the safety of our customers, the public and our employees. To that extent, there has been a constant focus on taking proactive measures to maintain our infrastructure and seek out innovative approaches to prevent casualties on our rail system. Underground tunnel fires are extremely dangerous to human health and safety because smoke accumulates very quickly in such a confined space. The severity of an underground fire is demonstrated by the Daegu subway fire in which an arsonist set fire to a train stopped at a station of the Daegu Metropolitan Subway in Daegu, South Korea. The fire occurred on February 18, 2003, and killed 192 people, while injuring another 151 people. Hence, there is a need to improve fire suppression technology industry-wide to mitigate against such consequences.

DISCUSSION

Metro is currently fully compliant with all fire safety design standards for subways. Although the interiors of modern rail vehicles utilize fire-retardant materials required by the National Fire Protection

Association Standard for Fixed Guideway Transit and Passenger Rail Systems 130 (NFPA), it is still possible for a life threatening fire to occur on board a rail vehicle. Items such as passenger clothing, luggage, computer bags, shopping bags, back-packs, etc. are routinely carried on board by passengers. These items add to the existing fuel source and raise combustion temperatures in a localized area to potentially overcome the fire-retardant properties of the vehicle's interior components, resulting in flash-overs. The open, non-compartmentalized nature of the passenger area means that a serious fire could potentially spread through an entire two car unit.

Such fuel sources are of variable flammability, unpredictable in quantity, and may be ignited by a variety of means, ranging from accidental to deliberate arson attacks using a flammable liquid as an accelerant. An arson attack is, of course, one of the worst case fire scenarios. The ease that an individual may obtain an accelerant and carry it onto a train underscores the threat. An arson fire has the potential to grow into a large fire that continues after the accelerant has been consumed, due to igniting other materials on-board the train.

The results of computational fluid dynamic modeling of smoke accumulation performed during the design of emergency ventilations systems for the three major capital projects (Crenshaw LRT, Regional Connector and Purple Line) demonstrated that even robust, intensive, active ventilation systems were insufficient to avoid significant casualties with a fast growing (i.e., arson type) rail car fire. The fans and airflow simply could not keep up with the expected smoke accumulation in the context of an accelerated fire and additional fans increase turbulence of the airflow and did not improve smoke removal by much.

Therefore, during the design stages of the Purple Line Extension (PLE), Metro's Capital Construction Projects Team requested a feasibility study to determine the practicality, safety, and economic return on investment of a fully integrated fire detection system coupled with a high pressure water mist fire suppression system to protect passenger areas within the permanently coupled, married-pair subway vehicles.

The consultants for the major capital projects analyzed the use of sprinklers within the tunnels, but determined that the initiation of the Emergency Ventilation System Fans, which have a very high air flow rate, could interfere with the ability of the sprinkled water to sufficiently douse the fire. The needed resources to maintain and test the tunnel sprinkler systems to meet Los Angeles Fire Department (LAFD) Regulation 4 standards, which require yearly testing of all systems, could present a severe operational impact and higher maintenance costs.

The search for another fire suppression option led to the evaluation of a rail-car based water-mist fire suppression system. The findings of this evaluation and basis for the staff recommendation are below.

Findings

A high pressure water mist system activated by smoke detectors provides the simplest, most cost-effective method for fire suppression and is an improvement over existing NFPA 130 compliant vehicle interior designs. The proposed system provides the following cost savings and fire, life, and safety benefits:

- Quick, automatic active response to any interior fire at the source (less than 60 seconds);
- Reduces fire spread and duration (safer for passengers);
- Reduces smoke levels (less smoke inhalation, reduced level of passenger panic);
- Reduces heat of combustion (suppresses fire, more comfortable for passengers);
- Water mist discharge does not harm passengers or require their evacuation;
- Safe and effective, even for electrical fires;
- More effective than on-board portable fire extinguishers (requires passenger application, may be vandalized or discharged);
- Effective even with passenger doors open;
- Reduces damage to the train;
- Reduces damage within the tunnel and the station which it has entered; and
- Augments facility-installed fire sprinklers for greater protection.

In consideration of this recommendation, the NFPA 130 Standard for Fixed Guideway Transit and Passenger Rail Systems for the USA was reviewed by the consultants and Metro Staff. NFPA 130 (2014 edition) states that on-board mist fire suppression systems have been successfully used on a number of passenger rail systems outside of the United States for the interior of passenger rail vehicles. The use of a fire suppression system may save lives during a fire, as well as provide the following benefits over station based systems:

- It offers the advantage of immediate intervention in the very incipient stages of a fire (as opposed to attacking the fire after the train reaches a station) and thus minimize casualties and property damage;
- It will provide protection for an on-board fire along the entire guide way, including a scenario in which a train on fire is stranded between stations;
- It is more economical than a station-based approach; and
- It will allow quicker restoration of service in the event of an on-board fire.

Prior to implementing the installation of a water-mist fire suppression system on Metro's heavy rail fleet, staff recommends a detailed operational assessment, demonstration, and cost evaluation. This assessment will include a pilot installation, system testing and regulatory requirements, capital costs to retrofit our fleet, vandalism and/or false activation risks, estimated lifecycle and lifecycle costs, system integration/software requirement among others. This pilot system will place Metro in an industry leadership position regarding subway fire safety innovation in the United States and reinforce Metro's safety first message. LAFD liaisons to Metro have been fully supportive of this concept from the beginning. If this demonstration is deemed successful, staff will return to the Board for a full implementation plan of the program on Metro's rail fleet.

DETERMINATION OF SAFETY IMPACT

Awarding this Contract for prototyping the on-board fire mist suppression system will significantly enhance our fire protection capabilities, increasing safety to Metro patrons, staff, and infrastructure.

FINANCIAL IMPACT

If Recommendation A is approved, an LOP budget will be established for \$1,407,900 under Project 498001. At this time, this project is funded in FY17 for \$70,000 in various cost centers, under Project number 498001 - Mist Fire Suppression System. It is anticipated that the demonstration will be completed in FY18. Future Costs to complete the demonstration and execute the remaining contract will be budgeted in future years. Since this is a multi-year project, the cost center manager and Corporate Safety DEO will be responsible for budgeting costs in future fiscal years.

Impact to Budget

The source of funds for the contract is Prop A 35%, which is eligible for rail capital projects and will maximize fund use based on funding allocation provisions.

ALTERNATIVES CONSIDERED

The Board may choose not to award this Contract for an on-board Mist Fire Suppression System. This choice is not recommended as the potential for significantly improving system safety and reducing future infrastructure cost would be ignored.

NEXT STEPS

Upon Board approval staff will execute the contract and issue a Notice to Proceed (NTP) to Knorr-Brake Company, LLC. At the conclusion of the evaluation period, but no earlier than 2019, staff will report to the Board with the results of the pilot program.

ATTACHMENTS

Attachment A - Procurement Summary
Attachment B - DEOD Summary

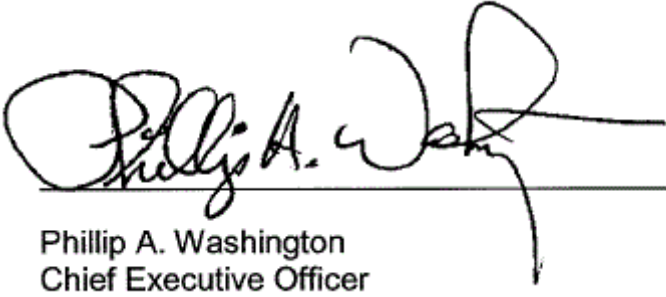
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