Los Angeles County
Metropolitan Transportation
Authority
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Los Angeles, CA

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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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Phillip A. Washington
Chief Executive Officer

ATTACHMENT A

PROCUREMENT SUMMARY

RED LINE VEHICLE EVALUATION OF ON-BOARD MIST FIRE SUPPRESSION SYSTEM PROTOTYPE / OP3614100

1.	**Contract Number**: OP3614100	
2.	**Recommended Vendor**: Knorr Brake, Inc.	
3.	**Type of Procurement (check one):** ☐ **IFB** ☒ **RFP** ☐ **RFP–A&E** ☐ **Non-Competitive** ☐ **Modification** ☐ **Task Order**	
4.	**Procurement Dates**:	
	A. Issued: December 8, 2016	
	B. Advertised/Publicized: December 2, 2016	
	C. Pre-proposal/Pre-Bid Conference: December 19, 2016	
	D. Proposals/Bids Due: January 30, 2017	
	E. Pre-Qualification Completed: February 23, 2017	
	F. Conflict of Interest Form Submitted to Ethics: March 7, 2017	
	G. Protest Period End Date April 21, 2017	
5.	**Solicitations Picked up/Downloaded**: 10	**Bids/Proposals Received**: 1
6.	**Contract Administrator**: Susan Dove	**Telephone Number**: (213) 922-7451
7.	**Project Manager**: Leonid Bukhin	**Telephone Number**: (213) 922-7218

A. Procurement Background

This Board action is to approve Contract No. OP3614100 for the installation and design of a prototype on-board mist fire suppression system to be designed and installed on an A650 heavy rail vehicle. The purpose of this project and subsequent testing is to evaluate the reliability of such a system under revenue service conditions. Board approval of contract awards are subject to resolution of any properly submitted protest.

The RFP was issued in accordance with Metro's Acquisition Policy. This was a best value procurement, and the contract type is Firm Fixed Price.

Three amendments were issued during the solicitation phase of this RFP;

- Amendment No. 1, issued on December 19, 2016 for clarification of technical specifications and Non-Disclosure Agreement.
- Amendment No. 2, issued on January 11, 2017, to include a list of project drawings.
- Amendment No. 3, issued on January 13, 2017, to extend the proposal due date to January 30, 2017.

One proposal was received from Knorr Brakes Company, LLC. There were 10 plan holders and four firms that attended the Pre-Proposal Conference. Based on a market survey of the plan holders, including the firms that attended the Pre-Proposal Conference, it was clear that the highly specialized nature of this prototype equipment caused interested firms to decide not to submit proposals. The mist fire suppression system is a new rail car safety system that has not been proven in service in the United States. All known operational systems are located on rail cars in Europe and Asia.

B. Evaluation of Proposals

The Proposal Evaluation Team (PET) consisted staff from Metro's Corporate Safety Department, Rail Vehicle Engineering, and Rail Fleet Services. The PET convened and conducted a comprehensive technical evaluation of the proposal received. The proposal was evaluated based on the following evaluation criteria and weights:

Technical Strength and Approach	25 percent
Delivery Schedule	25 percent
Project management	10 Percent
Experience of the firm	10 Percent
Price	30 percent

The evaluation criteria are appropriate and consistent with evaluation criteria developed for similar best value procurements. Several factors were considered when developing these weights, giving the greatest importance to the firm's skills, staff experience, and price.

The RFP stated that contract award will be made to the proposer whose proposal meets the requirements of the RFP and is most advantageous to Metro based upon the proposal evaluation criteria. The initial proposal evaluation resulted in a series of clarifications to obtain further details.

Discussions and negotiations were conducted. The firm's project managers and key team members had an opportunity to present the team's qualifications and respond to the PET's questions. The discussions addressed the requirements of the RFP, experience with all aspects of the required tasks, and stressed each firm's commitment to the success of the project. Also highlighted were staffing plans, work plans, and perceived project issues. The team was asked questions relative to its proposed alternatives and previous experience. On February 20, 2017, a Best and Final Offer (BAFO) was requested.

The PET evaluated the initial proposal and the BAFO and determined that Knorr's proposal was advantageous to the LACMTA based upon the proposal evaluation criteria. Knorr's proposal met the RFP's requirements and demonstrated its expertise in Fire Mist Suppression Systems.

Qualifications Summary of Firm:

Knorr Brakes Company's German subsidiary, Knorr-Bremse AG, is the only known source that has a functional mist fire suppression system that is operational on a current operational rail car. The Knorr Brake Company's proposal includes direct support from its German subsidiary including the engineering, integration, testing and project management staff. This experience is critical because the scope of work requires the Contractor to retrofit a Metro Red Line vehicle that must remain in operation during the functional test period.

1	Firm	Average Score	Factor Weight	Weighted Average Score	Rank
2	**Knorr Brake**				
3	Technical Strength and Approach	73.33	25.00%	18.33	
4	Delivery Schedule	83.33	25.00%	20.83	
5	Project Management	86.67	10.00%	8.67	
6.	Experience/Past Performance	93.33	10.00%	9.33	
7	**Price**		30.00%	30.00	
8	**Total**		100.00%	87.16	

C. Cost/Price Analysis

The recommended price has been determined to be fair and reasonable based on an independent cost estimate (ICE), price analysis, technical evaluation, and fact finding.

	Proposer Name	Proposal Amount	Metro ICE	Negotiated or NTE amount
	Knorr Brake	$908,481	$572,700	$908,481

A technical evaluation was performed by the Project Manager to explain the difference between the proposed price and the ICE. The variance in the ICE is a result of increased proposed labor hours for activities that were not accounted for in the original estimate.

The initial ICE did not include labor and materials for the mock-up fire testing. This effort includes building the mock-up, installing the fire suppression equipment, pre-testing the system (4 days), and conducting four evaluation tests. Additionally, the mock-up testing will be performed in Germany.

The initial ICE did not contemplate the costs and logistics associated with designing

and engineering the system overseas, coupled with the additional costs needed to configure and implement the system for the US market.

Although, only one proposal was received, there was a reasonable expectation that two or more responsible offerors, competing independently, would submit technical and cost proposals in response to the publically advertised solicitation. The offer from Knorr was developed and submitted in a competitive environment with the expectation of competition.

D. Background on Recommended Contractor

Knorr-Bremse GmbH, the parent company of Knorr Brake Company, was founded in 1905. Knorr-Bremse GmbH developed air brakes for freight trains and became the largest brake manufacturer for rail vehicles in Europe.

The recommended firm, Knorr Brake Company, Inc. (KBC), has been in business for over 70 years. The firm is located in Westminster, Maryland. Knorr Brake Company is a manufacturer of Braking, Door, and HVAC systems for the Mass Transit Rail Industry. KBC is division of Knorr-Bremse, AG which is located in Munich Germany. Knorr-Bremse, AG is a leader in the design and manufacture of Brakes, Doors, HVAC, and on-Board OEM systems, aftermarket spare parts, overhaul and maintenance services for rail transit.

DEOD SUMMARY

RED LINE VEHICLE EVALUATION OF ON-BOARD MIST FIRE SUPPRESSION SYSTEM PROTOTYPE / CONTRACT NO. OP3614100

A. Small Business Participation

The Diversity & Economic Opportunity Department (DEOD) did not recommend a Small Business Enterprise (SBE) participation goal for this procurement based on the lack subcontracting opportunities. According to the Project Manager, this is a pilot test system for an On Board Mist Fire Suppression System for Heavy Rail Vehicles (OBVMFSS). To date, no transit agency has installed this type of fire suppression in North America.

B. Living Wage and Service Contract Worker Retention Policy Applicability

The Living Wage and Service Contract Worker Retention Policy is not applicable to this Contract.

C. Prevailing Wage Applicability

Prevailing wage is not applicable to this Contract.

D. Project Labor Agreement/Construction Careers Policy

Project Labor Agreement/Construction Careers Policy is not applicable to this Contract.