MARCH 2, 2017

TO: BOARD OF DIRECTORS

FROM: JAMES T. GALLAGHER

SUBJECT: CONTRACT OP29199, BYD BATTERY ELECTRIC ARTICULATED TRANSIT BUSES AND CHARGING EQUIPMENT FOR DEPLOYMENT ON THE METRO ORANGE LINE

RECOMMENDATION

(REQUIRES 2/3 VOTE)

1. The Board finds that compliance with PUC sections 130232 and 130233 does not constitute a method of procurement adequate for the operation of prototype equipment and herewith directs the procurement of prototype buses under PUC section 130236 without further observance of any provisions regarding contracts, bids, advertisement or notice.

2. Authorize the Advanced Transit Vehicle Consortium President to Award and Execute a non-competitive contract with BYD Motors, Inc. (BYD), Los Angeles, CA for the purchase of five (5) prototype 60 foot articulated battery electric vehicles and charging equipment at a firm fixed price of $6,594,771, including applicable taxes.

3. Authorize a Contract Modification credit of $3,000,000 under Contract OP33202790, with BYD, Los Angeles, CA, for the buy-back of five (5) battery electric 40 foot vehicles delivered to Metro.

ISSUE

ATVC and Metro are committed to deploying zero emission vehicles and transitioning the Metro bus fleet to zero emissions as vehicle capabilities and fiscal capacity allow.

In October 2016, Metro’s Board of Directors directed staff to develop an implementation plan to use all electric buses on the Metro Orange Line (MOL) Bus Rapid Transit (BRT) by 2020 (Attachment C - Motion by Directors Garcetti, Krekorian and Antonovich,
October 27, 2016). Metro staff intends to present the requested implementation plan to the Board in April 2017.

To address the Board's directive, Metro plans to test various Zero Emission Bus (ZEB) technologies and charging strategies to determine which technology(s) best suit Metro's operational environments and needs. To maximize the evaluation of emerging technologies, Metro has developed a strategy to procure prototype vehicles under four separate contract awards; two procurements on a single source basis, and two competitive awarded procurements. This approval for a non-competitive procurement will address the first of the four contract actions.

The second prototype contract will be a single source to New Flyer for five 60' articulated ZEBs and en-route charging equipment utilizing a recently awarded FTA LoNo grant. The third and fourth prototype contract awards will be competitively procured under RFP OP 28367 Forty-Foot (40') and Sixty-Foot (60') Low Floor CNG or Zero Emission Bus Procurement. These other awards will be brought to the Board for consideration in Spring 2017.

**DISCUSSION**

**Metro Strategic ZEB Program**

ATVC and Metro are working to transform what is already one of the cleanest CNG transit fleets in the nation to an entirely zero emission fleet as quickly as technologically and fiscally possible.

Metro's strategic plans include transforming the MOL into a 100% ZEB line by 2020 followed by the Metro Silver line shortly after. The MOL BRT has been identified as the top candidate line to be converted to electric ZEB operation. The MOL operates on a 19 mile dedicated right-of-way, the line utilizes platform fare collection, and it operates at a higher average speed with less frequent stops. The operating profile of battery electric vehicles is well suited for this type of duty cycle. Passengers and residents along the line will benefit from the inherent quietness and zero emission aspects of these battery electric vehicles. Staff believes that placing BYD 60' articulated battery electric buses into service on the MOL will provide an ideal environment for demonstrating the capabilities of these zero emission electric vehicles.

Once the Orange and Silver lines have begun ZEB service, staff will continue to identify lines suitable for ZEB operation and implement those conversions. Eventually as the technical capabilities of vehicles advance and become more mature, a full conversion to ZEB will occur. Metro intends to only procure ZEB vehicles in the future.

Approval of this ATVC contract award and the second prototype contract under the FTA LoNo grant will provide the first vehicles necessary to convert the MOL to ZEB operation.
Background: Metro’s ZEB Experience

Under a contract with BYD that was competitively awarded in June 2013, Metro tested five BYD 40’ ZEBs. These buses were deployed at Metro Division 1 (Downtown Los Angeles) in April 2015. The operating performance of these initial 40’ prototype buses did not meet Metro’s daily operational requirements, and after a full year of operation, were removed from active revenue service at BYD’s request.

In February 2016, BYD presented ATVC and Metro with an unsolicited proposal to repurchase the five 40’ ZEBs in exchange for a $3,000,000 credit towards the non-competitive purchase of five new 60’ ZEB’s that utilize BYD’s latest generation technology and are manufactured to BYD’s improved quality standards.

Staff’s recommendation requests approval of the Contract Modification for the $3,000,000 proposed credit to be used toward the purchase of five new, 60’ battery electric buses that will be deployed on MOL BRT corridor.

Procurement Process

To procure the five 60’ prototype ZEB’s under a non-competitive procurement and to apply the proposed $3 million credit, the Board must first find that the normal competitive methods of procuring these ZEB’s are inadequate and that staff is directed to procure these prototype vehicles without observance of the normal competitive means. It is important to note that Metro is currently conducting two procurements for 40’ and 60’ ZEB’s that are following normal competitive methods. Those two competitive procurements are for up to five (5) 40’ and up to five (5) 60’ ZEB vehicles, with options that could total up to 100 40’ ZEBs and 100 60’ ZEBs.

Technical Improvements at BYD

To address the original quality and reliability issues experienced at startup in April 2014, BYD has undergone a transformation at their Lancaster, CA facility. BYD has added quality engineers and inspectors and implemented a quality assurance program that tracks each vehicle as it moves through the assembly process. BYD is also pursuing ISO 9001:2008 certification, which is expected to be complete by mid-2017. The five 60’ articulated buses proposed for Metro would be built in Lancaster and would meet BYD’s updated quality assurance requirements.

BYD has also gained significant experience manufacturing buses locally. They are currently manufacturing 31 60’ articulated buses at this facility for commercial orders with Antelope Valley Transit Authority and Albuquerque Rapid Transit, all of which are scheduled for delivery in 2017.

To address the suitability of their buses for Metro’s operating environment, recent technological advances in battery capacity (range), and improvements in engineering
and manufacturing capabilities at BYD are expected to provide next generation BYD articulated buses that are suitable for operation on high capacity BRT lines like Metro’s Orange Line.

**BYD Battery Technology | Safety**

BYD’s 60’ articulated buses are equipped with proprietary Lithium Iron Phosphate (LiFe PO4) batteries that offer a higher degree of safety over conventional Lithium Ion batteries. The BYD LiFe battery chemistry is not susceptible to thermal events (such as with the Samsung Galaxy 7 cell phone batteries). BYD batteries are non-flammable, non-combustible, and don’t overheat. BYD’s batteries offer a wide thermal operating range of -20°F through 140°F. Because they contain no caustic materials, heavy metals, or toxic electrolytes, they are also considered more environmentally friendly than most other Lithium Ion battery chemistries.

**BYD Prototype Experience**

The bus type being proposed will be a prototype, but will have previous test and service experience. BYD demonstrated an early 60’ battery electric prototype on Metro’s Orange Line in December 2014. During the demonstration the bus was positively received by the operators, maintenance personnel, and passengers. In service vehicle performance was good, particularly in areas of acceleration and top speed. The bus also provided a smooth and very quiet ride. This bus has now accumulated 40,000 miles in demonstrations across North America. BYD has built two additional units in their Lancaster facility. One of these 60’ buses was deployed to Altoona, PA for FTA’s mandatory new bus testing. The second 60’ bus was deployed to the Brazilian market. The new 60’ BYD prototype bus proposed for Metro will have a new, more powerful rear axle drive motor assembly.

**Metro Operating Environment**

While Metro learned a great deal about ZEB technology while testing the BYD’s 40’ ZEBs, the technology has advanced rapidly. Now, 21 months after those vehicles went into service it makes good business sense to test the latest generation of ZEB vehicles to fully assess the technologies against our operational environment and requirements.

**Cost/Price**

The purchase price, per vehicle, for the original 40’ BYD buses was $756,316. The average net cost per vehicle was reduced to $640,316 when Metro/ATVC received California Hybrid and Zero-Emission Truck and Bus Voucher credits. On June 2, 2016 BYD submitted an unsolicited offer to repurchase the 40’ BYD vehicles and give the ATVC a credit of $600,000 per vehicle to be used for the purchase of new BYD battery electric vehicles of ATVC’s choice.
DETERMINATION OF SAFETY IMPACT

There is no anticipated safety impact for operating zero emission electric buses on MOL. BYD is expected to utilize components and sub-systems that have been proven in heavy duty applications and have been mass produced, and used in buses currently in transit service.

Zero emission buses use high voltage electrical systems. While these systems are isolated from operator and passenger compartments, maintenance personnel will be provided with additional specialized training to ensure that they are prepared to maintain these higher voltage propulsion systems.

FINANCIAL IMPACT

Total LOP funding of $3.594 million is included in Cost Center 3320 - Vehicle Technology, in project 201071. There is $6.308 million programmed to cover expenses for purchasing these buses and other zero emission bus projects. Because this is a multi-year contract, the Cost Center Manager will be responsible for ensuring that future year funding is programmed.

Impact to Budget

There is no anticipated impact to the FY17 budget.

ALTERNATIVES CONSIDERED

Staff considered postponing this BYD project to purchase 60' ZE buses currently being solicited under RFP OP37267. This alternative is not recommended as it would delay the introduction of battery electric articulated buses into MOL. Further, it would limit Metro's ability to evaluate different technologies to determine which are the best fit for Metro's diverse operating environment. Metro does expect to purchase additional ZEB 60' buses under this solicitation, but there is no guarantee that BYD would prevail in this solicitation. If another vendor is selected for RFP OP38267, Metro would not be able to use the $3,000,000 buy back credit offered by BYD. Given the significant value of the buy-back credit, staff recommends buying these five articulated buses from BYD.

NEXT STEPS

Upon ATVC Board approval, staff will present this contract award recommendation to the Metro Board of Directors for ratification. When the Metro Board approves that ratification request, staff will obtain the $3 million credit, execute the new contract with BYD and issue a Notice to Proceed.

In the Spring 2017, staff will return to the ATVC Board with a request for a another non-competitive award to New Flyer for five prototype 60' articulated ZEBs and en-route charging equipment partially funded with a FTA LoNo grant award. Staff will return
again to the Metro Board with recommendations for additional prototype ZEB contract awards under a competitive procurement.

Prepared by: Steve Schupak, Program Manager, Electric Bus Program

ATTACHMENTS

Attachment B - Motion by Directors Garcetti, Krekorian and Antonovich, October 27, 2016

Copies: ATVC Board Members and Alternates
Phillip A. Washington, Metro CEO
Stephanie N. Wiggins, Metro Deputy CEO
Debra Avila, Metro Chief Vendor/Contract Management Officer
Jesus Montes, Metro Sr. Executive Officer, Vehicle Acquisition
John Drayton, ATVC Executive Vice President
ATTACHMENT A

ADVANCED TRANSIT VEHICLE CONSORTIUM
Los Angeles County Metropolitan Transportation Authority
One Santa Fe Ave., MS 63-4-1,
Los Angeles, CA 90012

JUNE 22, 2016

TO: BOARD OF DIRECTORS

FROM: JOHN DRAYTON
EXECUTIVE VICE PRESIDENT

SUBJECT: BYD ELECTRIC BUS BUY BACK PROPOSAL

RECOMMENDATION

1. Authorize the ATVC President to Accept BYD’s unsolicited proposal dated June 2, 2016 offering to buy back five (5) battery electric 40 foot vehicles for a credit of $3,000,000.

2. Authorize the ATVC President to negotiate a new sole source contract to purchase up to five (5) new 60 foot articulated battery electric vehicles and charging equipment at a cost not-to-exceed $6,670,000, including applicable taxes.

ISSUE

ATVC and Metro have been conducting a demonstration test of five BYD buses since June 2015. To date, performance has not met operational requirements, mechanical reliability has been subpar compared to typical CNG vehicles, and technological advances in manufacturing at BYD have made these five vehicles an ill fit for current Metro operation.

DISCUSSION

In June 2015 five BYD battery electric buses were put into service at Division 1 in downtown Los Angeles. Although BYD has been working hard to support this project, full integration of the ZEB’s into Metro’s operating environment has not been fully successful. Over the last 12 months, Metro accumulated a total of 36,000 miles in operation from Metro’s Division 1 in Downtown Los Angeles. Limited range between charges and poor hill-climbing ability of these buses severely limits the lines on which they may be operated. Additionally, the buses have experienced low reliability. Though these challenges are typical when introducing a new product in a new environment, it has significantly impacted these buses availability for service.
Given these challenges, operation of these buses was suspended April 2016. Metro and BYD are currently discussing options for BYD to buy-back these buses and to offer a credit for future ZEB buses.

On June 2, 2016 BYD submitted an unsolicited and unprecedented offer to repurchase the 40' BYD vehicles and give the ATVC a credit of $600,000 per vehicle to be used for the purchase of new BYD battery electric vehicles of ATVC's choice.

The Metro Orange Line has been identified as the top candidate line to be converted to electric operation. The Metro Orange Line operates on a dedicated right of way, utilizes platform fare collection, operates at a higher average speed due to less frequent stops, and has Metro owned terminus stations that can be retrofitted with en-route rapid charge equipment. The operating profile of battery electric vehicles is well suited for this type of duty cycle. Passengers and residents along the line will benefit from the inherent quietness of battery electric vehicles. Staff believes placing BYD 60' articulated battery electric buses into service on the Metro Orange Line will provide an ideal line for electric vehicles.

In December 2014 BYD brought their 60' articulated bus to Metro for a one week test on the Metro Orange Line. The overall performance of the vehicle was impressive, and the bus was positively received by the operators, maintenance personnel, and passengers. Vehicle performance was very good particularly in areas of acceleration and top speed; the bus also provided a smooth and very quiet ride.

**DETERMINATION OF SAFETY IMPACT**

There is no anticipated safety impact for operating zero emission electric buses on Metro's Orange Line. New Flyer is expected to utilize components and sub systems that have been proven in heavy duty applications and have been mass produced and used in buses currently in transit service.

Zero emission buses are expected to use high voltage electrical systems. While these systems are isolated from operators and passenger compartments, maintenance personnel will need additional specialized training to ensure they are prepared to maintain these higher voltage propulsion systems.

**FINANCIAL IMPACT**

Total LOP funding of $3 million is included in Cost Center 3320 - Vehicle Technology, in project 201071. For FY17, there is $6.308 million programmed to cover expenses for purchasing these buses and other zero emission bus projects. Because this is a multi-year contract, the ATVC President and the Cost Center Manager will be responsible for ensuring that future year funding is programmed.
Impact to Budget

There is no anticipated impact to the FY16 or FY17 budgets.

ALTERNATIVES CONSIDERED

1. Staff considered relocating the test to the new Division 13. This alternative is not recommended as it will incur additional infrastructure costs in relocating the chargers to that facility, and the routes do not substantially differ in profile from those at Division 1.

2. Staff considered initiating a new open procurement for 60' articulated battery electric vehicles. In June 2016 Metro issued a Request for Information and Qualification (RFIQ) to ascertain which transit vehicle manufacturers produce a battery electric 60' articulated transit bus. The results of this RFIQ indicate that only New Flyer and BYD currently offer this type of vehicle in the United States.

In April, Metro was notified of a grant award to purchase five New Flyer 60' articulated battery electric buses. Since New Flyer will provide the vehicles under this grant and the $3 million repurchase credit is only applicable to buses purchased from BYD, staff does not recommend this alternative.

Next Steps

Once the Board approves the actions requested in recommendations 1 and 2 above, staff will transfer title and deliver the five existing buses back to BYD. Then the ATVC President will negotiate a new sole source contract for the purchase of five 60' battery electric articulated buses from BYD, and return to the Metro Board for Approval.

Prepared by: Steve Schupak, Program Manager, Electric Bus Program

Attachment: A. BYD letter dated June 2, 2016 offering repurchase
B. Funding and Expenditure Plan

Copies: ATVC Board Members and Alternates
Phillip A. Washington, Metro CEO
Stephanie N. Wiggins, Metro Deputy CEO
James T. Gallagher, Metro COO
Jesus Montes, Metro Executive Director Vehicle Acquisition
### BYD Electric Buy Back Proposal

#### Funding/Expenditure Plan

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<tr>
<td><strong>Total Project Cost</strong></td>
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<table>
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<th>Sources of Funds</th>
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Initial sources of funding planned for Measure R 35%. Staff will apply other federal, state and local sources as they become available and applicable to project sources.
June 2, 2016

Mr. John Drayton, Executive Vice President  
Advanced Transit Vehicle Consortium  
One Gateway Plaza  
M/S 99-9-1  
Los Angeles, CA 90012

Re: Unsolicited Proposal for Repurchase of Five BYD Buses

Dear Mr. Drayton,

At a recent meeting with Mr. Gallagher and Mr. Montes, they shared LACMTA’s vision and continued interest in the evolution of battery powered transit buses.

LACMTA displayed great vision and courage by becoming an early adopter of this technology through the purchase of the first five long range battery electric buses through the Advanced Transit Vehicle Consortium.

While we believe the five buses were State of the Art product at the time they were ordered and assembled, it has become clear over the last several months that the buses are not meeting LACMTA’s expectations for range and overall reliability.

BYD Coach and Bus is committed to the success of the overall electric vehicle market as we believe that zero emission vehicles are one of the key cornerstones in the battle against global warming and in fostering the development of sustainable and renewable energy sources.

Further, BYD Coach and Bus holds as one of our core values that all owners of any of BYD’s technologies are 100% satisfied and it has become apparent through ongoing dialogue with LACMTA staff that the current group of five buses are not meeting that standard.

To remedy this situation BYD Coach and Bus would like to offer you the following unsolicited proposal involving these steps:

1. BYD Coach and Bus will purchase the five buses back from LACMTA for a price of $600,000.00 each.
2. To prevent any further investment of LACMTA staff resource, time, and energy we propose that the evaluation and operation of the buses be suspended and the buses be returned to BYD Coach and Bus on or before June 30th, 2016.
3. Upon mutual agreement to the steps outlined in this proposal BYD will post a credit to LACMTA’s account in the amount of $3,000,000.00 to be used against the purchase of new BYD buses of your choice.
4. BYD Coach and Bus will build and deliver the new bus selection in our plant in Lancaster CA. as buy America compliant buses and built to our most current configuration.
5. The new buses will be built in compliance to LACMTA and ATVC contract OP33202790 specifications and requirements, with the modifications attached to this agreement as Attachment A and will incorporate generational updates and upgrades.

At a minimum, the following advances in our technology will be integrated into the new buses:

- 280 amp hour batteries versus 200 amp hour batteries which means more energy and range in the same or less space
- 12 year unconditional battery warranty
- 100 kw continuous power wheel motors with 150 kw peak output versus the current 90 kw maximum output motors for 40 foot buses and 180kw motors for our 60 foot models translating to better hill climbing and better acceleration

We believe this plan of action will help maintain LACMTA’s position as a leader in helping to advance emerging vehicle technology by resuming an evaluation program based on current and relevant vehicle technology.

All of us at BYD Coach and Bus are dedicated to total customer satisfaction and this repurchase plan represents our dedication to you as our valued customer and we hope you will agree that this plan provides an acceptable process to restoring the ev program on a successful path.

Thank you very much for your consideration of this proposal.

Very Best,

Macy Neshati
Vice President,
BYD Coach and Bus

cc: James T. Gallagher, Metro Chief Operations Officer
    Jesus Montes, Metro Executive Director, Vehicle Acquisition
    Victor Ramirez, Metro Executive Officer, Procurement
    Steve Schupak, Electric Bus Program Manager
    Phil Rabottini, Sr. Engineer
Motion by:
GARCETTI, KREKORIAN and ANTONOVICH

October 27, 2016

Relating to File ID 2016-0778

APPROVE Motion by Directors Garcetti, Krekorian and Antonovich that the Board direct the CEO to report back on the following:

A. Develop an implementation plan to use all electric buses for the Orange Line Bus Rapid Transit Line by 2020. The plan shall include, but not limited to, the following:
   1. Total cost of electrification
   2. Eligible funding sources to address the costs
   3. Federal and State grant opportunities
   4. A schedule and transition plan

B. Report back on the feasibility to use all electric buses for the Silver Line. The report shall include, but not be limited to, the following:
   1. Type of electric bus
   2. Range requirements
   3. Charging and infrastructure needs
   4. A recommended schedule and transition plan