



**Los Angeles County Metropolitan Transportation Authority**  
**Automated Platooning Demonstration on the Los Angeles Metro Bus Rapid**  
**Transit System**

**Part 1 – PROJECT NARRATIVE AND TECHNICAL APPROACH**



**Metro**

Los Angeles County  
Metropolitan Transportation Authority

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Los Angeles, CA 90012-2952

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March 21, 2019

The Honorable Elaine L. Chao  
United States Secretary of Transportation  
U.S. Department of Transportation  
1200 New Jersey Avenue, SE  
Washington, DC 20590

**RE: AUTOMATED DRIVING SYSTEM DEMONSTRATION GRANT**

Letter of Commitment for Automated Platooning Demonstration on the Los Angeles Metro Bus Rapid Transit System

Dear Secretary Chao:

The Los Angeles County Metropolitan Transportation Authority (Metro) asks for your consideration of our request for \$8 million from USDOT's Automated Driving System (ADS) Demonstration Grants for Automated Platooning Demonstration on the Los Angeles Metro Bus Rapid Transit System (the "Project"). Metro is the Lead Applicant, implementing agency, and recipient of any ADS grant award. The Project scope of work consists of the procurement and retrofitting of four 40-foot electric buses with automated driving system technology, including project management and engineering costs, for testing and revenue service demonstration on the Metro Orange Line (MOL).

The Metro Orange Line (MOL) is one of the few full-service Bus Rapid Transit (BRT) lines in the United States and the first and only exclusive BRT in the State of California. Over 7 million passenger boardings and 46 million passenger miles were recorded on the MOL in Fiscal Year 2018. Metro is currently retrofitting the MOL to allow for en-route charging of its future electric bus fleet. The 20-mile MOL runs almost entirely along an at-grade, two-lane dedicated busway built within an abandoned rail right-of-way. Its 18 stations are similar in design to light rail stations. The MOL operates on a headway-based schedule and uses a pre-paid proof-of-payment fare system that is also accepted

by other transit providers in the region. Its route was designed to emulate many of the features that have made BRT efficient and successful around the world.

Although the MOL is already one of the busiest BRT lines in the country, its ridership potential is significantly restricted by multiple signalized at-grade crossings with high-traffic north-south arterial corridors. The railroad style gates along the MOL create delays and undercut the potential of the BRT system to provide an efficient and desirable alternative to driving along the US 101 highway. The MOL runs parallel and within one mile of US 101 for 13.5 miles in the San Fernando Valley. This segment of US 101 is the fourth most congested corridor in the State of California and includes two of the seven worst highway bottlenecks in the country. The MOL, which connects with the Metro Red Line subway at the North Hollywood Station, provides a travel alternative along a combined transit corridor paralleling US 101 for over 30 miles between the West San Fernando Valley and downtown Los Angeles. Implementing a solution for this severely congested corridor will require a multimodal approach beyond simply widening US 101 to add new lane miles, as previous efforts to expand the constrained right-of-way into residential areas has been met with fervent community opposition.

The Project provides an opportunity to address the ridership demand on the MOL and for improving overall on-board travel times, therefore encouraging existing users to continue using the service and attracting drivers who currently use US 101 and nearby roads to shift their mode of travel and use transit. Travel time improvements on the MOL will be achieved by testing ADS technology that allows reducing the spacing between electric buses and therefore, minimizes the amount of time that the railroad style gates are down. The testing and demonstration of ADS technology on the MOL will result in significant operational enhancements compared to manual platooning, which requires buses to remain at minimum 10 seconds apart to provide for sufficient and safe stopping distances should a bus in the platoon experience a failure. The use of the MOL's dedicated right-of-way also provides a closed environment for testing and demonstrating the safe integration of ADS in transit operations, as well as for addressing any challenges that enable the deployment of this technology in more challenging environments.

The Project is very timely, as the MOL will be undergoing major changes in the next few years to include the addition of railroad style gates at up to 35 intersections, as well as two grade separations. These changes will eliminate key cross-traffic conflicts and reduce about 26 million of annual vehicle miles of travel. It is also estimated that these changes will reduce travel time on the MOL by 29% and increase its ridership by 39%. The testing and demonstration of ADS technology on the MOL provides an opportunity for additional service operational enhancements on our BRT system, as well as for exploring expansion of its deployment as we complete our transition to a zero emission bus fleet by 2030.

NOFO # 693JJ319NF00001

Los Angeles County Metropolitan Transportation Authority Part 1

By submitting this grant application, Metro is committed to: i) contributing \$2 million in local funds (Proposition A, Proposition C, and/or Transportation Development Act) for the Project; ii) leveraging the Project's demonstration data and results in innovative ways; iii) providing data, participating in the evaluation of the safety outcomes of proposed activities, and assessing measures of effectiveness on mobility and safety; and iv) implementing the Project immediately after a grant award and completing it within four years. Metro also certifies that its proposed demonstration will meet all applicable safety standards and that it has the technical, legal, and financial capacity to implement the Project and comply with all applicable federal, state and local laws, regulations and requirements. Metro further certifies that it has the capability and capacity to take on the Project, including executive commitment, workforce capacity, degree of readiness, and data and performance management capabilities.

We appreciate your favorable consideration of our ADS grant request for the Project. Should you have any questions regarding this application, please contact Mr. Marc Manning at (213) 922-5871 or via email at [ManningM@metro.net](mailto:ManningM@metro.net) or Mr. Ashad Hamideh at (213) 922-5539 or via email at [hamideha@metro.net](mailto:hamideha@metro.net).

Sincerely,

A handwritten signature in black ink that reads "Jesus Montes". The signature is fluid and cursive, with the first name "Jesus" and last name "Montes" clearly legible.

Jesus Montes  
Senior Executive Officer, Vehicle Acquisition

<b>Project Name/Title</b>	Automated Platooning Demonstration on the Los Angeles Metro Bus Rapid Transit System
<b>Eligible Entity Applying to Receive Federal Funding (Prime Applicant's Legal Name and Address)</b>	Los Angeles County Metropolitan Transportation Authority One Gateway Plaza Los Angeles, CA 90012-2952
<b>Point of Contact (Name/Title; Email; Phone Number)</b>	Marc Manning Senior Director, Vehicle Engineering & Acquisition <a href="mailto:manningm@metro.net">manningm@metro.net</a> (212) 392-6896
<b>Proposed Location (State(s) and Municipalities) for the Demonstration</b>	Los Angeles, CA
<b>Proposed Technologies for the Demonstration (briefly list)</b>	Electric Transit Buses, Lidar, Radar, Cameras, V2X (V2C, V2I, V2V)
<b>Proposed duration of the Demonstration (period of performance)</b>	7/1/2019 – 7/1/2023
<b>Federal Funding Amount Requested</b>	\$8,000,000
<b>Non-Federal Cost Share Amount Proposed, if applicable</b>	\$2,000,000
<b>Total Project Cost (Federal Share + Non-Federal Cost Share, if applicable)</b>	\$10,000,000

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**I. EXECUTIVE SUMMARY**

**A. Vision, goals, and objectives**

The Metro Orange Line (MOL) will be undergoing major changes in the next few years to include the addition of railroad style gates at up to 35 intersections and grade separation of the Sepulveda and Van Nuys Station crossings. To accomplish this, the Los Angeles County Metropolitan Transportation Authority (Metro) needs to consider platooning buses to provide sufficient capacity at peak times to carry the anticipated passenger loads. In addition, headways will be widened to six minutes to ensure that traffic delays at cross streets are minimized. Metro is currently procuring 60 foot electric buses from New Flyer (40 buses) and BYD (5 buses) to operate on the Orange Line Bus Rapid Transit (BRT) line. The Orange Line operates on dedicated lanes from Chatsworth to North Hollywood. These buses will have J1772 chargers installed at Division 8 facility. These chargers will be utilized for depot charging. Additionally, there will be en-route SAE3105-1 chargers located at Chatsworth, Canoga, and North Hollywood Terminals as shown in Figure 1.

Metro will focus on the development of platooning along the Orange Line Corridor. To ensure the least impact to Metro's service, Metro would like to acquire new electric buses that are already integrated with automated technologies. Initially, the buses would allow for mono-brand SAE Level 3 platooning but Metro staff would work on a road map to allow for multi-brand Level 3 platooning. Ideally, the proposal could adapt dynamic passenger capacity needs but will maintain four-to-six-minute headways between platoons (i.e. platooning could be with two double-decker buses, one double-decker and one 40 foot bus, or multiple 40 foot buses). One of the goals of the program

would be to reduce the spacing between vehicles to minimize the amount of time that the railroad style gates are down blocking cross-traffic. Under manual platooning, buses must remain 10 seconds apart to provide for sufficient and safe stopping distances should the lead bus in the platoon experience a failure.

If feasible, Metro might also look at additional enhancements such as automated division operations (controlled environment owned and operated by Metro), automated SAE3105-1 en-route charging operations to optimize time to charge, and other options.



**Figure 1. Orange Line Electric Bus with SAE3105-1 Charging Station**



**B. Key partners, stakeholders, team members, and others proposed to participate**

Project Management will fall into two groups during the program. Metro's Vehicle Engineering and Acquisition Department will manage the project from inception to close-out and will work with all internal stakeholder groups (e.g. Transportation, Maintenance, Service Planning). When the project selects a Technical Partner via the Request For Proposals (RFP) process, the partner will assign a Project Manager to assist in managing the project. Additionally, Metro will ensure that other key external stakeholders (e.g. policy makers, the California Department of Motor Vehicles, customers) to ensure a successful pilot and future expansion of the project.

As part of the preparation for this grant opportunity, Metro released a Request for Information and Qualification (RFIQ). There was significant private sector interest in the RFIQ, with a total of six responses being received. These vendors could be future potential partners for the demonstration project.

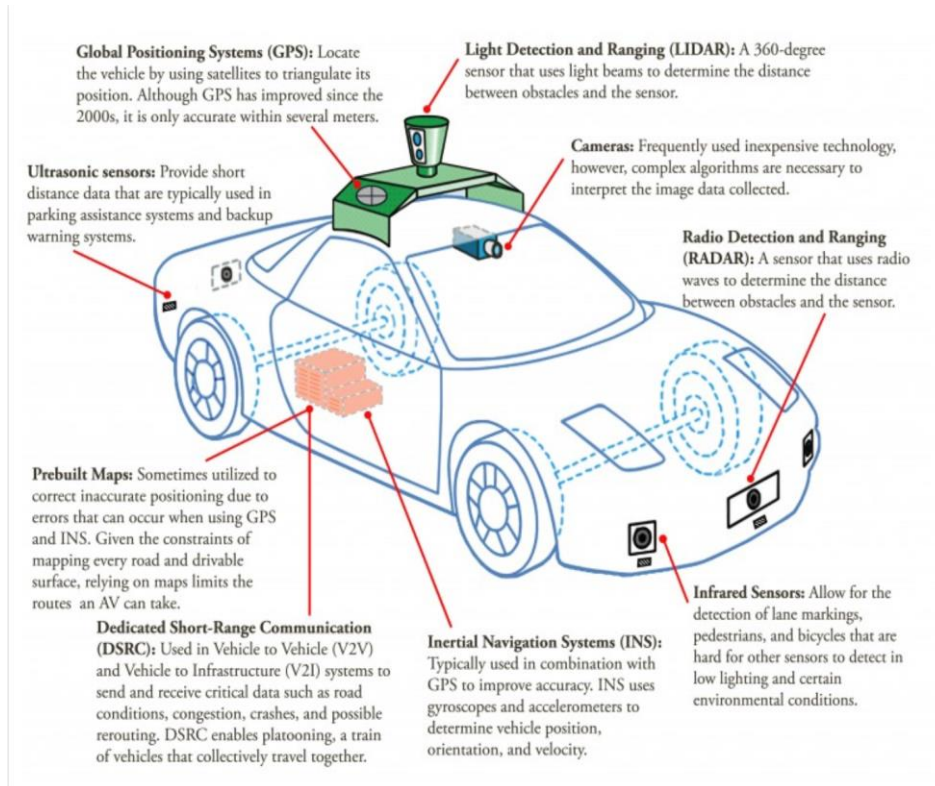
**C. Issues and challenges to be addressed, the technology(ies) that will be demonstrated to address the issues, and any quantifiable performance improvements that are anticipated**

The project will utilize the best methods on how to achieve successful operation ((through Vehicle to Vehicle (V2V), Vehicle to Infrastructure (V2I), Vehicle to Cloud (V2C) technology)) as shown in Figure 2. For V2V and V2I, the bus would need to deploy Dedicated Short-Range Communications (DSRC). For V2I, Metro would like to

place sensors on boarding platforms and utilize current Traffic Signal Priority (TSP) to help control the autonomous operations. For V2C, this would allow us to control the spacing of the vehicles to ensure platooning works with our vehicle scheduling system. In order to accomplish successful Level 3 operation, our partner would have to deploy the autonomous technologies identified in Figure 3.



**Figure 2. V2X Communications for BRT Operations**



**Figure 3. Autonomous Vehicle Technologies**

<http://css.umich.edu/factsheets/autonomous-vehicles-factsheet>

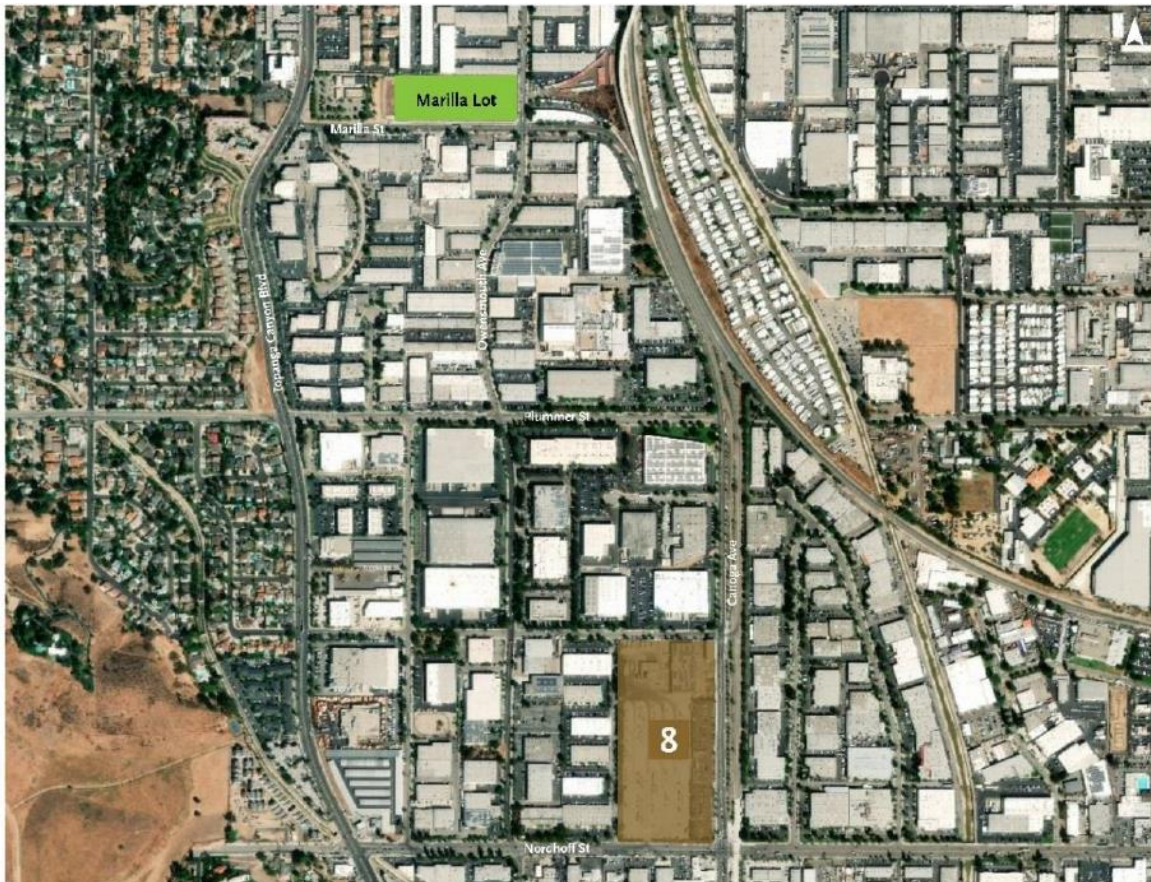
**D. Geographic area or jurisdiction of demonstration**

Vehicle Deployment would occur along the Orange Line as shown in Figure 4.

Additionally, some closed track testing might occur at Division 8 or the Marilla lot as shown in Figure 5.



**Figure 4. Orange Line Route Map**  
Note: A: Chatsworth, B: Canoga, & C: North Hollywood Station



**Figure 5. Marilla Lot and Division 8 Map**

**E. Proposed period of performance including a schedule for implementation and evaluation of the demonstration.**

Table 1. Proposed Period of Performance

<b>Task</b>	<b>Task Name</b>	<b>Start</b>	<b>Finish</b>
<b>1</b>	<b>Grant Submission and Award</b>	<b>12/21/2018</b>	<b>6/30/2019</b>
1.1	Funding Opportunity (NOFO) Number 693JJ319NF00001	12/21/2018	3/21/2019
1.2	METRO For Development and Testing of an Autonomous Electric Bus on a BRT System	2/27/2019	3/11/2019
1.3	Review Proposals and Award Grant	3/22/2019	6/30/2019
<b>2</b>	<b>Metro Platooning on Orange Line Project</b>	<b>7/1/2019</b>	<b>7/1/2023</b>
2.1	Kick-off Meeting with USDOT	7/29/2019	7/29/2019
2.2	Project Management Plan Submission	8/16/2019	8/16/2019
2.3	Data Management Plan Submission	9/20/2019	9/20/2019
2.4	Project Evaluation Submission	11/4/2019	11/4/2019
2.5	Advertised and Award RFP	7/10/2019	2/4/2020
<b>3</b>	<b>Bus OEM Integration and Delivery</b>	<b>2/5/2020</b>	<b>6/30/2021</b>
3.1	Engineering Integration by OEM	2/5/2020	10/13/2020
3.2	Vehicle Production	1/8/2021	2/18/2021
3.3	Route Modeling	2/5/2020	6/30/2021
<b>4</b>	<b>Vehicle Deployment</b>	<b>7/1/2021</b>	<b>7/1/2023</b>
4.1	Vehicle Deployment - Closed Track	7/1/2021	7/1/2022
4.2	Vehicle Deployment - Non-Revenue (Orange Line)	7/1/2022	12/1/2022
4.3	Vehicle Deployment - Revenue (Orange Line)	12/2/2022	7/1/2023
<b>5</b>	<b>Grant Required Reports &amp; Reviews</b>	<b>9/30/2019</b>	<b>4/30/2023</b>
5.1	Quarterly Progress Reports	9/30/2019	4/30/2023
5.1.1	2019 Q3 (Year 1 Q3) Report	9/30/2019	10/30/2019
5.1.2	2019 Q4 (Year 1 Q4) Report	12/31/2019	1/30/2020
5.1.3	2020 Q1 (Year 1 Q1) Report	3/31/2020	4/30/2020
5.1.4	2020 Q2 (Year 1 Q2) Report	6/30/2020	7/30/2020
5.1.5	2020 Q3 (Year 2 Q3) Report	9/30/2020	10/30/2020
5.1.6	2020 Q4 (Year 2 Q4) Report	12/31/2020	1/30/2021
5.1.7	2021 Q1 (Year 2 Q1) Report	3/31/2021	4/30/2021
5.1.8	2021 Q2 (Year 2 Q2) Report	6/30/2021	7/30/2021
5.1.9	2021 Q3 (Year 3 Q3) Report	9/30/2021	10/30/2021
5.1.10	2021 Q4 (Year 3 Q4) Report	12/31/2021	1/30/2022
5.1.11	2022 Q1 (Year 3 Q1) Report	3/31/2022	4/30/2022
5.1.12	2022 Q2 (Year 3 Q2) Report	6/30/2022	7/30/2022

5.1.13	2022 Q3 (Year 4 Q3) Report	9/30/2022	10/30/2022
5.1.14	2022 Q4 (Year 4 Q4) Report	12/31/2022	1/30/2023
5.1.15	2023 Q1 (Year 4 Q1) Report	3/31/2023	4/30/2023
5.2	Annual Budget Review	4/30/2020	5/15/2022
5.2.1	Year 1 Budget Review and Program Plan Submission	4/30/2020	4/30/2020
5.2.2	Year 2 Budget Review and Program Plan Review	5/15/2020	5/15/2020
5.2.3	Year 2 Budget Review and Program Plan Submission	4/30/2021	4/30/2021
5.2.4	Year 2 Budget Review and Program Plan Review	5/15/2021	5/15/2021
5.2.5	Year 3 Budget Review and Program Plan Submission	4/30/2022	4/30/2022
5.2.6	Year 3 Budget Review and Program Plan Review	5/15/2022	5/15/2022
5.3	Final Evaluation report Submission	3/30/2023	3/30/2023

## II. **GOALS**

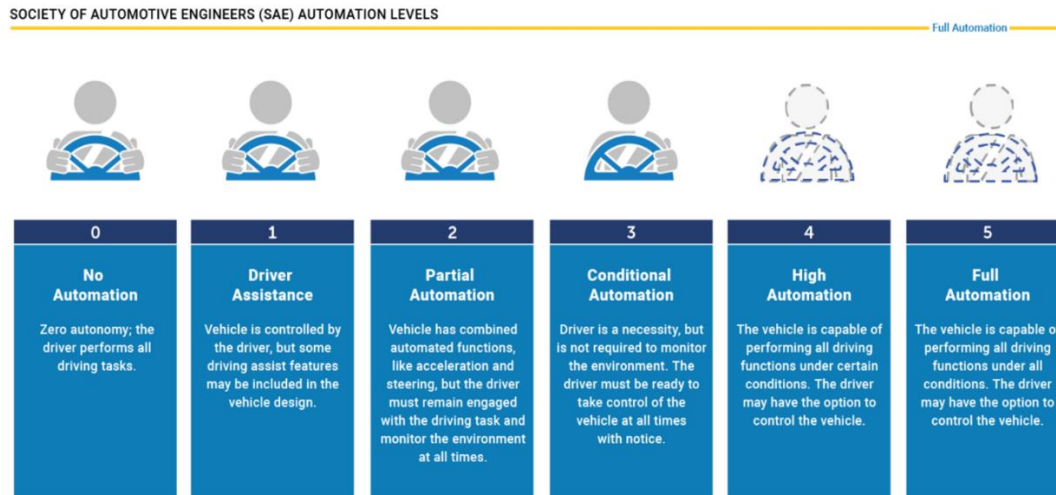
### A. **Safety**

Metro will help provide a closed environment via the private lots (e.g. Division 8) and dedicated right-of-way of the Orange Line BRT. If successful for Metro, then there are opportunities to deploy in more challenging test environments.

### B. **Data for Safety Analysis and Rulemaking**

Metro is committed to developing an appropriate Design of Experiments (DOE) approach to ensure the success of the project can be measured appropriately. Metro will ensure that there are appropriate “control” data sets in addition to data sets with autonomous vehicles deployed. Metro already has experience in developing a data set for Metro’s current project that deploys SAE Level 1 (See Figure 6) Collision Avoidance technology on Metro’s transit buses. Data will be shared per the approved Data Management Plan to ensure that appropriate analysis can be done which will help drive

future rulemaking.



**Figure 6. SAE Levels of Automation**

### **C. Collaboration**

In addition to collaborating with internal Metro stakeholders, Metro will work with the California Department of Motor Vehicles (DMV) and the California Highway Patrol (CHP) to ensure a successful implementation. Furthermore as part of the RFP, Metro will encourage partnerships to achieve the maximum amount of collaboration. Metro staff is involved in many external organizations (the American Public Transportation Association and the *Union Internationale des Transports Publics*, among others) and we will share our experience if Metro is awarded the grant. Additionally, Metro will try to engage external stakeholders through meetings, surveys, and other avenues.

### **III. FOCUS AREAS**

#### **A. Significant Public Benefit(s)**

This project will fund the first Autonomous Electric Transit Bus operation on a BRT System. The Orange Line operates on dedicated lanes from Chatsworth to North Hollywood and served approximately seven million riders in 2018. Orange Line buses cover approximately 1.9 million miles annually. Based on this ridership and mileage, the implementation could have a significant impact on future BRT projects.

#### **B. Addressing Market Failure and Other Compelling Public Needs**

Currently, there are no autonomous operation for transit buses projects in the United States. The market has been mainly focused on passenger vehicles and truck platooning. In other countries (for example, Singapore and Taiwan), they are developing autonomous transit bus projects. This project would help drive integration of this technology on North American transit buses. This project would support the diverse ridership of the Metro Orange Line. Additionally, every transit bus is wheelchair accessible.

#### **C. Economic Vitality**

Metro will ensure that these Federal funds support the U.S. industrial base through Buy American and other requirements. Recognizing Executive Order 13788, proposed projects must support economic vitality at the national and regional level, including advancing domestic industry and promoting domestic development of intellectual property.



**D. Complexity of Technology**

This project will help demonstrate vehicle automation utilizing L3 automation technologies.

**E. Diversity of Projects**

This project will serve the urban environment with public transportation.

**F. Transportation-challenged Populations**

All Metro buses are wheelchair accessible and come with the Q'Straint Wheelchair securement system for two wheelchair positions. Additionally, we have flip-up seats to accommodate the usage of walkers.

**G. Prototypes**

As mentioned in B, there are limited demonstrations of autonomous technologies deployed on transit buses. This study would deploy on a BRT route with a dedicated right of way. If necessary, Metro will apply for exemptions to operate in revenue service at the end of the test period.

#### **IV. REQUIREMENTS**

**A. Each demonstration must focus on the research and development of automation and ADS technology (per the SAE definitions), with a preference for demonstrating L3 or greater automation technologies.**

Metro's proposal would plan to operate in SAE Level 3. However due to current permitting process, there might be some geo-fenced areas where SAE Level 2 platooning would need to be deployed until regulations are modified. (See V.B.1 for more information)

**B. Each demonstration must include a physical demonstration; Modeling and simulation may be included activities; however, a physical demonstration is required.**

Metro plans on demonstrating both on closed courses as shown in Figure 5 and on the Metro Orange Line Right of Way as shown in Figure 4.

**C. Each demonstration must include the gathering and sharing of all relevant and required data with the USDOT throughout the project, in near real time. The Recipient must ensure the appropriate data are accessible to USDOT and/or the public for a minimum of five years after the award period of performance expires.**

Metro will meet the Data Plan Management requirements of the project. If selected for an award, Metro will negotiate and sign a mutually agreeable data sharing agreement with USDOT ensuring at a minimum the above-required data accessibility for at least the minimum defined period.

**D. Each demonstration must include input/output user interfaces on the ADS and related applications that are accessible and allow users with varied abilities to input a new destination or communicate route information and to access information generated by the ADS**

In order to appropriately show destination sign messages, the bus operator must input their route information. Therefore, this requirement is already part of the system. Additionally, the buses would be equipped with GPS to provide real-time information to our customers.

**E. Each demonstration must address how the demonstration can be scaled to be applicable across the Nation to similar types of road environments, and include an outreach task to share demonstration status, results, and lessons learned with other jurisdictions and the public, in furtherance of technical exchange and knowledge transfer**

Platooning is the easiest pathway to Autonomous full-sized transit buses. Metro has a dedicated right of way that enables a quicker entry and more controlled test environment. If this is successful, Metro would review ways to implement fully on the Metro Orange Line which utilizes 45 (forty-five) 60-foot transit buses. Additionally, Metro will review potential implementations in future BRT corridors. Furthermore, Metro would assist in validating this technology and bringing it more quickly to market. The

technology could then be deployed to other transit agencies with BRT networks and the findings could potentially be utilized for all transit buses and other heavy duty vehicles.

## **V. APPROACH**

### **A. Your technical approach to implement and evaluate the demonstration**

Metro solicited an RFIQ in order to identify partners for this grant. The information from this RFIQ was utilized to prepare this grant. If Metro is awarded the grant, Metro will solicit an RFP to get automated technologies to enable Level 3. Metro is currently procuring 60-foot electric buses from New Flyer (40 buses) and BYD (five buses) to operate on the MOL. The Orange Line operates on dedicated lanes from Chatsworth to North Hollywood. These buses will have J1772 chargers installed at Division 8. These chargers will be utilized for depot charging. Additionally, there will be en-route SAE3105-1 chargers located at Chatsworth, Canoga, and North Hollywood Terminals as shown in Figure 1.

Metro will focus on the development of platooning along the Orange Line Corridor. To ensure the least impact to Metro's service, Metro would like to acquire new electric buses that are already integrated with automated technologies. Initially, the buses would allow for mono-brand SAE Level 3 platooning but Metro staff would work on a road map to allow for multi-brand Level 3 platooning. Ideally, the proposal could adapt dynamic passenger capacity needs but will maintain four-to-six-minute headways between platoons (i.e. platooning could be with two double-decker buses, one double-decker and one 40 foot bus, or multiple 40 foot buses). One of the goals of the program

would be to reduce the spacing between vehicles to minimize the amount of time that the railroad style gates are down blocking cross-traffic. Under manual platooning, buses must remain 10 seconds apart to provide for sufficient and safe stopping distances should the lead bus in the platoon experience a failure.

If feasible, Metro might also look at additional enhancements such as automated division operations (controlled environment owned and operated by Metro), automated SAE3105-1 en-route charging operations to optimize time to charge, etc.

The project will utilize the best methods on how to achieve successful operation ((through Vehicle to Vehicle (V2V), Vehicle to Infrastructure (V2I), Vehicle to Cloud (V2C) technology)) as shown in Figure 2. For V2V and V2I, the bus would need to deploy Dedicated Short-Range Communications (DSRC). For V2I, Metro would like to place sensors on boarding platforms and utilize current Traffic Signal Priority (TSP) to help control the autonomous operations. For V2C, this would allow us to control the spacing of the vehicles to ensure platooning works with our vehicle scheduling system. In order to accomplish successful Level 3 operation, our partner would have to deploy the autonomous technologies identified in Figure 3.

**B. Your approach to address any legal, regulatory, environmental, and/or other obstacles to demonstrating the technology(ies), whether those obstacles be caused by Federal, State, or local requirements**

Metro has spoken with the California DMV and California Highway Patrol regarding Level 2 Platooning and operating transit buses at SAE Level 3 and above.

For SAE Level 2, Metro would be able to operate without any permitting necessary.

For SAE Level 3 and above, Metro would need to operate on a non-public road such as Division 8 and/or the Marilla Lot as shown in Figure 5. Due to the dedicated right of way of the Metro Orange Line (a non-public road), it is unlikely that any regulation would be needed to operate Level 3 or higher. If required to operate, current regulations would need to be updated to allow the California DMV to grant permits to vehicle manufactures over 10,000 Gross Vehicle Weight Rating (GVWR). Metro has had previous success in getting needed regulations for Orange Line operation. For instance, in 2015, California Assembly Bill 726 was approved to allow Metro to increase bus size from 60 feet to 82 feet on the Orange Line.

**1. Clearly address and explain if your demonstration will or may require exemption from the Federal Motor Vehicle Safety Standards (FMVSS), Federal Motor Carrier Safety Regulations (FMCSR), or any other regulation and, if so, your plan for applying for any necessary exemptions**

Since electric transit buses are compliant with FMVSS and all other state and local regulations, there are no concerns on any exemptions being necessary. The buses will be retrofitted with autonomous vehicle technology to enhance their performance. In fact, Metro's staff would work to ensure that future expected compliance is addressed. For example, FMVSS 141 is not required for electric transit

buses. Metro would work with the bus manufacturer to integrate technology on the buses to meet that standard.

**2. Clearly address and explain if your demonstration will or may require an exception under the Buy American Act or an exception to the terms of the NOFO Clause at Section F, Paragraph 2.J. entitled BUY AMERICAN AND DOMESTIC VEHICLE PREFERENCES. The clause: (1) requires compliance with the Buy American Act, 41 U.S.C. §§ 8301–8305, as implemented at 48 C.F.R. Subparts 25.1–25.2; and (2) requires that the Recipient not expend grant funds to purchase a motor vehicle unless the final assembly of that vehicle occurred in the United States**

Per Metro's RFIQ, there was no concern highlighted on meeting Buy America requirements. Per the Partners identified in the RFIQ, approximately 80 percent of the cost was attributed to U.S. Labor rates for AV integration and new electric buses that are already Buy America compliant. Therefore, it is not expected that any waiver will be necessary when the partner is identified as part of the RFP process.

**C. Commitment to provide data and participate in the evaluation of the safety outcomes of proposed activities, and note measures of effectiveness in other arenas, such as mobility**

Data shall be made available as required by the Grant and the Law ((California Public Records Act (California Code Government Code, §6250 et seq) and Freedom of Information Act (FOIA)). Metro staff will work with Partners to identify data that should have restricted access. The Draft Data Management Plan is addressed in Part 3 of this submission.

**D. Approach to risk identification, mitigation, and management**

Metro staff will ensure the best partner is awarded via an RFP process to ensure a successful partnership is created. Furthermore, Metro will develop various plans (Project Management Plans) and schedules to ensure goals and deadlines are being met. As for the risk of new technology introduction, Metro will work with the partner to develop a Preliminary Hazard Analysis (PHA) and Failure mode and effects analysis (FMEA) to ensure the design of the autonomous technology has a higher chance of successful operation. Furthermore, Metro will ensure that a training plan is developed to ensure successful deployment and operation of the technologies. As for the transit bus, Metro would select a proven electric bus that has already passed FTA's Altoona testing. Finally, Metro will have all charging stations deployed to successfully operate the buses prior to their arrival.

**E. Approach to contribute and manage Non-Federal resources (cost share) proposed for the demonstration implementation and evaluation, if applicable**

Metro is committed to contributing \$2 million, or 20 percent of the total project cost, from non-federal funds available at Metro's disposition, including Proposition A,



NOFO # 693JJ319NF00001

Los Angeles County Metropolitan Transportation Authority Part 1

Proposition C, and/or Transportation Development Act, as certified by Metro's Office of Management of Budget and specified in the cover letter provided earlier in this document.