AFFILIATED AGENCIES

Orange County Transit District

Local Transportation Authority

Service Authority for Freeway Emergencies

Consolidated Transportation Service Agency

Congestion Management Agency

Service Authority for Abandoned Vehicles

December 11, 2023

SUBJECT: Request for Proposals (RFP) 3-2944, "Harbor Boulevard Pilot Innovative Transit Signal Priority Study"

Gentlemen/Ladies:

This letter and its Attachments comprise **Addendum No. 3** to the above captioned Request for Proposals issued by the Orange County Transportation Authority ("Authority").

1. Offerors are advised that questions have been received by the Authority. Those questions and Authority's written responses are presented as Attachment A to this Addendum No. 3.

Offerors are reminded to acknowledge receipt of this **Addendum No. 3** in their Letter of Transmittal, which is to accompany the proposal. Offerors are advised that all changes addressed in this **Addendum No. 3** shall be incorporated into the final Agreement.

Questions regarding this **Addendum No. 3** should be directed to the undersigned at 714-560-5064.

Sincerely,

Megan Bornman
Senior Contract Administrator
Contracts Administration and Materials Management

Attachments:

- Attachment A: Question Received & Authority's Responses
- Attachment B: OCTA SMART Narrative

Questions Received (Q) and Authority Answers (A)

Q1. Can the two original project grant proposals funding the project please be made available for download as part of the RFP process.

A1. Attachment B to this Addendum No. 3, is the narrative that was used for the Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program FY2022 and for the Regional Early Action Planning (REAP) 2.0 Grant applications. Offerors should understand that proposal evaluation will be based on the Offeror's responses to the requirements detailed in the RFP not the application.

Q2. Can OCTA clarify which forms should be submitted by the prime only and which forms should also be included on behalf of any subconsultants?

A2. The prime should complete all forms. The proposed subconsultants are only required to complete the 'Campaign Contribution Disclosure' form.

Q3. Are the 2-page resumes also required to be double-spaced?

A3. The resumes are not required to be double-spaced.

Q4. In Section 2.2 Project Benefit Analysis, the first sentence states "This sub-task will build off the Evaluation and Data Management Plan and generate existing metrics to measure Project effectiveness." Is this a plan that will be provided by OCTA?

A4. OCTA will be preparing the plans per the US Department of Transportation guidelines (https://www.transportation.gov/grants/smart/grants-management) and project narrative included in the response to Q1. These plans will be shared with the selected consultant at the start of the project and are expected to be updated as part of Sub-Task 1.4 based on the consultant proposal and Sub-Task 2.1.

Q5. Can cover pages (front and back), tab separators, and Table of Contents be excluded from the page count?

A5. The above-mentioned item are excluded from the page count of the proposal.

Q6. Please confirm that the 12-point font and double-spaced requirement only apply to the body text and excludes graphics, figures, charts, call-out boxes, and tables.

A6. The 12-point font requirement applies to the body of the text in a proposal, and excludes appendices, cover letters, resumes, or forms. Font used for graphics, figures, charts, call-out boxes, and tables are excluded from the 12-font requirement but must be clearly legible.

Q7. Because resumes are not included in the 50-page limit, can they be placed in an Appendix rather than within Section B. Proposed Staffing?

A7. Yes, resumes can be placed in an appendix.

Q8. Does an 11x17 sheet count as 1 or 2 pages?

A8. An 11x17 sheets counts as one page.

Q9. Would OCTA consider extending the proposal due date to Jan 5 to allow for a more thorough proposal and given the holidays? We would propose consideration of keeping the interview date of 1/18 in order to not impact the overall schedule that has been established.

A9. The due date for proposals will not be extended and remains 2:00 p.m. on December 20, 2023.

Overview/Project Description

Project Overview. The Orange County Transportation Authority (OCTA) seeks to deploy a cloud-based Transit Signal Priority (TSP) system along its Harbor Boulevard *Bravo!* Rapid Bus Route. This project intends to integrate existing signal systems, new multimodal intelligent transportation system (ITS) devices, and proactive signal operations with the TSP system to improve on-time arrival of the rapid bus route across five jurisdictions, 24 intersecting historically disadvantaged communities (DACs), and 49 DACs within one mile of the corridor. The project will improve safety of all travelers in the corridor while improving the reliability of the transit system and decreasing the travel time for travelers to reach their destinations.

Background. Harbor Boulevard is a multi-modal corridor traversing five cities in central Orange County, each with numerous historically disadvantaged communities. The 12-mile Harbor Boulevard *Bravo!* 543 and 43 bus routes have a combined average of more than 10,000 daily boardings. Eight percent of all OCTA bus ridership takes place on this corridor which has 50,000 daily vehicles that also commute along this route. Harbor Boulevard connects to key destinations including medical facilities, California State University, Fullerton, Santa Ana College, Disneyland, memorial park, places of worship, and shopping.

If public transit is not improved, bus service reliability and predictability will continue to worsen preventing commuters from reaching their jobs, medical appointments, schools, and homes in a safe and timely manner particularly given the additional vehicles expected in the coming years due to the projected population and job growth. Additionally, 50 bicyclists and 75 pedestrians were struck by motorists along Harbor Boulevard in the project area in the past five years California Statewide Integrated Traffic Records System.

The Harbor Boulevard Corridor was identified as needing high-quality transit in OCTA's 2018 Long Range Transportation Plan and is consistent with the Southern California Association of Governments' (SCAG) regional long-range transportation plan. This corridor was also identified as a high priority corridor in Orange County's 2018 Transit Master Plan, a 20-year plan for enhancing and expanding public transit service for the third most populous county in California.

Though an in-depth analysis of TSP with older technologies was previously conducted, it was not deployed due to the required large capital improvement. In contrast, the proposed project requires less equipment and implements innovative solutions, while leveraging recent improvements local agencies have implemented using local funds. Therefore, a solid foundation is now in place to ensure successful TSP deployment with support from all five local agencies resulting in a more unified and streamlined approach to delivering this cross-jurisdiction improvement.

Project Description. OCTA is proposing a three-phase approach to completing the Stage One SMART Grant. These phases include: (1) conduct project planning and develop high-level system design and technology evaluations; (2) deploy and evaluate the impact of proposed TSP and enhanced technologies on a subset of the Harbor Boulevard corridor; and (3) develop a concept design for the remainder of the corridor for a Stage Two SMART Grant.

Phase One: A holistic transportation system improvement approach will be utilized for the project planning, design, and evaluation in conjunction with the TSP upgrade to ensure that all modes of travel can maintain or improve operations and safety. As transit riders are either pedestrians or bicyclists prior to and after the ridership, enhancing the safety and access to transit will additionally impact the experience of their travel via transit.

A combination of detection, ITS, and signal synchronization upgrades will be procured in phase one for the hardware to be deployed and tested in phase two of the project. This will create the opportunity to develop proactive safety and operational-based performance metrics, such as pedestrian delay, near miss, bicycle tracking, pedestrian and bike counts, and travel time indices and intersection performance monitoring. Non-intrusive detection, including radar, traditional video, Light Detection and Ranging (LiDAR), and fisheye single camera detection, will be deployed and tested with a focus on improving safety for both vehicles and vulnerable road users. These detection solutions can have a multitude of different analytics solutions, including red light running, near miss, vehicle speed and count, pedestrian and bicycle detection/vector, and delay estimations, and automated incident detection.

The project will utilize a cloud-based TSP solution that has been proven to reduce the amount of hardware needed to be installed and maintained. This is a future proof solution that can be upgraded and expanded as technology in the space evolves without requiring added infrastructure.

The TSP solution would operate on the buses' communication switch and connect directly to the onboard automatic vehicle location (AVL) system. OCTA currently utilizes Conduent's OrbCAD system with a six second location poll rate on all buses and at the central office. The selected TSP solution would pull the buses' location from the onboard switch and AVL system, connect these data with the published *Bravo!* 543 and 43 bus schedules in the cloud environment and determine when a TSP call is needed based on set guidelines for vehicles behind schedule and maintaining 20-minute headways. Once a TSP call has been determined to be needed, a request is made directly to the signal controller via the existing fiber or cellular communication network.

Phase Two: The project will perform a proof-of-concept deployment and analysis for a section within the City of Fullerton at nine of the 58 signalized intersections along the corridor. This is an opportunity to ensure appropriate integration of the cloud-based TSP solution and other proposed technology solutions in a smaller and more simplified environment. This prototype area will serve as a live lab to educate and provide outreach to project stakeholders and community leaders. It will also allow OCTA and participating agencies to specify innovative ITS solutions that may have the potential to assist safe travelling for all modes as it expands to the full route.

The existing travel and safety conditions will be fully baselined and evaluated using high-resolution vehicle probe, high-resolution origin-destination, and stakeholder datasets to provide a comprehensive picture of the corridor and surrounding area and to compare it against other OCTA transit corridors.

Phase Three: From the information gathered in the first two phases, the third project phase will develop a concept design for an expansion of the selected solutions such as TSP and ITS equipment along the remainder of the corridor for a Stage Two SMART grant submission.

Desired Outcome and Expansion. The combination of current infrastructure, a proven cloud-based TSP solution, and enhanced multimodal detection present a low-risk, high-value opportunity to enhance the user experience accessing and using transit services and potentially increase ridership. The project presents the opportunity to address five of six of United States Department of Transportation's strategic goals (safety, economic strength and global competitiveness, equity, climate and sustainability, and transformation) and all of the SMART program's goals (safety and reliability, resiliency, equity and access, climate, partnerships, and integration).

Project Location. The *Bravo!* 543 and 43 bus routes operate on Harbor Boulevard in Orange County. The two overlapping routes share a total of 29 stops and have an average daily ridership of 10,000 passengers. The project is in an area that is considered a large sized community with a total population of approximately 440,000 residents within one mile of the project corridor. The route serves the cities of Fullerton, Anaheim, Garden Grove, Santa Ana, and Fountain Valley and is used to provide access to higher education facilities, medical facilities, employment centers, transportation centers, and retail and amusement destinations. The adjacent development along the 12-mile route is diverse – the northern section of the corridor is largely commercial and residential while the southern section is home to several businesses and tourist destinations, including Disneyland (the county's largest employer). Of the 24 census tracts directly intersecting with the project, 75 percent of the route is within a census tract classified as Historically Disadvantaged Communities. Within a one-mile radius of the project corridor, 66 percent of the census tracts (49 tracts) are classified as a DAC. This area has a higher concentration of DACs compared to the larger county, in which 35 percent of the census tracts (a total of 206) are classified as DACs.

Community Impact. The high concentration of Historically Disadvantaged Communities in the project area indicates that there is a significant population using transit, walking, and/or bicycling to access jobs, goods, and services. Within a one-mile radius of the project corridor, approximately two percent of households do not have a personal vehicle and approximately 15 percent of households have access to only one vehicle. The project will provide benefits for the surrounding disadvantaged communities, who disproportionately experience the negative impacts of transportation, environmental, and unsafe conditions. Specifically, the technologies will (1) improve transportation access by reducing travel times by 20 percent, (2) reduce greenhouse gas (GHG) emissions and improve air quality by minimizing bus idling and stopping, and (3) increase the safety of vulnerable road users through detection technology. These benefits will be measured using methods discussed within the "Feasibility of Workplan" section of this application.

If the pilot is successful, these technologies could also be deployed on other OCTA routes throughout the county, thus extending these benefits to several additional Historically Disadvantaged Communities that experience similar disadvantages.

Technical Merit Overview.

Identification and Understanding of the Problem to Be Solved. The overlapping 12-mile Harbor Boulevard *Bravo!* 543 and 43 route is the highest used transit route in Orange County, averaging more than 10,000 daily boardings and eight percent of all OCTA riders. The corridor has 50,000 daily vehicles commuting along this route with one of the largest California State Universities located near the route (over 41,000 students: 44 percent Hispanic, 21 percent Asian), Santa Ana College (over 36,000 students: 55 percent Hispanic, eight percent Asian, and 1 percent Black) several large medical centers, Downtown Anaheim with several key destinations and employers including Disneyland, the largest employer in the county. With the high volume of vehicles, the tracked buses on this route were late 19 percent of the time, resulting in bus service that is somewhat unpredictable and unreliable. Additionally, with projected regional population and employment growth, congestion is estimated to increase delay by 66 percent if no improvements are made, equivalent to an increase in travel time on the 12-mile project corridor from 45 minutes up to 75 minutes.

The Harbor Boulevard project area has experienced 50 bicyclists and 75 pedestrians being struck by a vehicle in the past five years (California Statewide Integrated Traffic Records System). With

improved transit services, ridership is likely to increase, and it will be even more critical to improve pedestrian and bicycle safety and access to these transit services.

Appropriateness of Proposed Solution. Initial investigations were conducted which identified several cloud-based TSP technologies and pedestrian/bicycle detection equipment that have proven and documented results immediately after installation. Extensive research indicates that TSP improvements result in over 18 percent improvement in bus travel time with an increase in travel time reliability. Improved reliability and predictability have the potential for mode-shift reducing the number of vehicles on the corridor and increasing the number of transit users.

OCTA's proposed TSP solution is designed to be scalable, as the platform can collect information from all buses, but only utilizes the data for the specified corridor. If this solution is successful, the technology can be expanded to new corridors or even the whole county seamlessly. Also, the platform can be expanded to include Emergency Vehicle Preemption (EVP), by working with the local fire departments to place EVP calls at signals throughout the desired area.

Several technology providers were engaged for potential participation in the project; and network, fleet, and signaling capabilities are expected to be compatible thus minimizing risks of final delivery. The TSP platform reviewed for consideration under this project will utilize machine learning technology that will constantly analyze the system and make improvements. After an initial period of running in the field, the platform will begin to automatically adjust and fine tune TSP operations by utilizing real world conditions observed in the prototype area, such as idling times and fluctuations in traffic patterns.

The first pedestrian detection technology to be evaluated will be two forms of LiDAR – traditional rotating LiDAR and solid-state LiDAR. Rotating LiDAR is the most common system currently in use and relies on a spinning LiDAR that gathers data points and builds the environment around it. However, the growing opinion indicates solid-state LiDAR will be the future due to the lower cost and lack of moving parts. Solid-state works similarly to a phased array in radios giving the same imaging and data as the rotating LiDAR but with a smaller footprint and ease of setup. The project will coordinate with LiDAR providers to build key performance indicators, such as pedestrian delay, near miss, bike tracking, pedestrian and bike counts, and possibly incident detection.

Infrared detection cameras will also be installed and tested at selected locations with results compared to existing pedestrian push buttons and LiDAR deployed along the prototype area. Infrared cameras rely upon heat detecting sensors, which allows for 24/7 detection because weather and lighting conditions do not interfere with detection of pedestrians, bicyclists, and vehicles. This camera system, located along crosswalks and pedestrian pads at select intersections, will automatically place a call, integrating with the signal system to indicate when there are pedestrians present, particularly benefiting those who do not or cannot push a button to request for the light to cross. This technology has been in use for decades and continues to be improved.

To reduce the impacts that TSP transitioning can have on vehicle operations in the prototype area, vehicle detection and controller firmware will be upgraded to the most advanced technology available. Non-intrusive detection that is Internet Protocol (IP) accessible would be sought to reduce operational impacts and for easy system reconfiguration if changes arise to geometry or traveling patterns. Microwave radar setback detection can detect vehicles with 98 percent accuracy, and it can adjust the signal cycle based on dilemma zone issues. This allows for a reduction in green time or a longer yellow or red phase to allow for vehicles to safely traverse the intersection.

Orange County's weather allows for video detection to work in the optimum setting, thus traditional video detection through a single-point fisheye camera will be deployed in the prototype as well. The traditional video detection system relies on one camera per approach to capture detection zones. A single point fisheye camera, however, utilizes multiple cameras inside one unit to provide a 360-degree viewing field. The unit provides high precision detection at the intersection, and analytics can be remotely configured to detect bicycles as well as vehicles.

The detection systems selected for testing utilize common installation means with minimal disruption to traffic of which OCTA, City, and local contractor staff are knowledgeable. This will allow for quick deployment and integration once equipment is received.

Once all detection and technologies are installed, the project will implement new signal timing plans. OCTA will lead the effort to complete cross-jurisdictional signal synchronization along the corridor to accommodate TSP timing parameters and to update signal timing plans to match evolving traffic demands. Over the past decade, Orange County agencies have invested in National Transportation Communications for ITS Protocol compliant traffic signal firmware, which will allow for easier data sharing and automation between jurisdictions. This will lead to fewer stops and delays for all modes of travel and can reduce emissions and vehicle maintenance, which in turn result in the traveling public experiencing a seamless commute along the corridor.

During Stage One, the groundwork will be completed for a Traffic Responsive signal timing environment that will utilize the advanced detection systems to count vehicles, pedestrians, and bikes and choose the best timing plan automatically. This will allow for the signal system to respond to fluctuations in traffic caused by events.

Expected Benefits. The project benefits will greatly support and align with U.S. DOT's strategic goals. The scope of the project is to better **integrate** transit vehicle operations with roadside ITS that better identifies bicyclists and pedestrians. The proposed technology has been linked to increasing **safety** for vulnerable road users. Research into advanced detection has indicated crashes can be reduced by up to 54 percent. Additionally, the proposed TSP solution can be expanded for EVP, which has been shown to greatly reduce response time (up to 20 percent reduction in travel time), as well as reducing emergency vehicle crashes at signals by 75 percent, therefore improving safety for first responders, motorists, and citizens needing emergency assistance.

Investments in more reliable transit operations can bolster **economic strength and global competitiveness** by offering a five to one benefit to cost ratio ((American Public Transportation Association (APTA)). Every one-million dollars invested in transit can yield nearly 50 jobs (APTA), which leads to more **equitable** communities having **access** to a healthier economy and community. This project also improves equity by providing added safety, a faster means of travel, and cleaner air for the 49 disadvantaged communities located within one mile of the corridor. The Environmental Protection Agency's (EPA) EJScreen tool ranks the project area compared to all other U.S. cities (in percentiles): 92nd for traffic proximity and volume, 85th for people of color, 90th for population with less than high school education, and 89th for limited English.

The California Air Resource Board (CARB) Benefit Calculator Tool shows a potential for GHG emissions of 1,208 metric tons of CO_2 and vehicle miles traveled (VMT) by 3.3 million miles over 10 years if the project is fully implemented in Stage 2. These results will positively impact **climate change and resiliency**. The project area compared to other U.S. cities ranks as follows (in percentile): 97th for hazardous waste proximity, 96th for particulate matter (PM), 80th to 90th for: diesel PM, air toxics cancer risk, and air toxics respiratory hazard (EPA's EJ Screen). Further,

similar projects have resulted in faster service and improved air quality. A similar TSP cloud-based implementation in East Palo Alto resulted in delay time reductions of 45 percent in the northbound and 19 percent traveling southbound. These solutions have also resulted in 12 percent emission reductions and 14 percent fuel savings for their partner transit agencies.

As discussed in greater detail in the "Feasibility of Workplan" section, **measurements and validation** of specific project impacts to the community will be determined using high-resolution third-party data and transit vehicle data. The data used for project validation will not collect personally identifiable information, thereby **protecting the privacy** of all facility users. The proposed data to be procured is expected to provide open agency, perpetual use data licenses, which will ensure appropriate **data sharing** and transparency with all **partner agencies**, including 34 cities, the County of Orange, California Department of Transportation (Caltrans), and private sector team members. The proposed solutions are considered **appropriately scaled** given that the project area is a dense, large-sized community with significant ridership to support, test, and measure the effectiveness of these technologies.

Project Readiness Overview

Feasibility of Workplan. Upon notice to proceed, a project kickoff meeting will be held with all partners to clearly define roles and responsibilities as well as review project schedule. Permitting requirements will be verified, including signal and environmental permits (expecting a Categorical Exemption), and formal approval for work authorization from the City of Fullerton for the prototype area technology deployment per the preliminary approval in the Letter of Commitment.

The project kickoff will also commence Phase One of the project, a three-month planning and concept evaluation. During this time, procurement of all technologies, data providers, and detection equipment will take place, as well as bringing consultant and contractor staff on board to assist with installation, integration, and testing.

Phase Two will take place over the next nine months, with a focus on a proof of concept for deploying the cloud-based TSP system within the City of Fullerton and OCTA's fleet as well as testing specific advantages of detection equipment within the corridor's environment. This will serve as an opportunity to further evaluate and test all technologies identified in Phase One.

Data collected during Phase Two will be analyzed daily to determine if changes are required to further enhance operations. Once the system is considered stabilized, performance analyses will be conducted for transit vehicles and impacted roadway to ascertain the impacts of the project. As OCTA already currently collects geospatial and temporal data for each transit vehicle, the data will indicate the impact on fleet travel-time, on-time arrival, idle time, and fuel savings.

To track performance of the corridor and capture baseline data, high resolution speed and origin-destination will be used. With the size and availability of these data, before/after analyses will be completed for project area cost of congestion, route-specific travel time reliability, route-specific congestion rates, and signal specific performance. This can be compared to other transit routes within the county to determine if other routes need similar improvements.

Phase Three, taking place over the final six months, will be used to develop a conceptual design for the remainder of the corridor. This includes identifying locations needing hardware enhancements, detection upgrades, or vulnerable road user improvements. Lessons learned and data analyses gathered during Phases One and Two will serve to develop documents such as guidelines, standard operating procedures (SOPs), and specifications for the technology.

OCTA has the workforce capacity to support the deployment, operation, and maintenance of the proposed technologies and will ensure adequate staff availability for these tasks. In Stage Two, project implementation, workforce development will be advanced with opportunities for growth. The project encourages regional staffing investment focused on providing workforce opportunities for historically underrepresented groups and allowing for a free and fair choice to join a union.

Community Engagement and Partnerships. The proposed project route operates within the cities of Fullerton, Anaheim, Garden Grove, Santa Ana, and Fountain Valley. Over the past ten years, OCTA has worked with and built partnerships with each agency through its Regional Traffic Signal Synchronization Program, which assists and enables local agencies to improve traffic signal operations and infrastructure. Having established these relationships, all cities in the project area and Caltrans provided letters of commitment (see **Appendix III – Letters of Commitment)**, to cooperate and assist as needed with the successful implementation of the project.

OCTA is committed to integrating not only the partner agencies but all transportation agencies within the county. Agencies will be invited to participate in the kickoff meeting to learn about the project scope, performance metrics, and any additional applicable metrics. During Phase Two, outreach will include all 34 incorporated cities, the county, and Caltrans to show the capability of the technology and to grow support for expansion and future investment. Monthly, quarterly, and annual key performance indicator reports will be published to show the success and identify areas of need in the prototype area. During Phase Three, stakeholders will be engaged to capture lessons learned and to provide input in advancing SOPs and specifications.

OCTA will also partner with private sector companies to acquire, implement, design, and validate the new TSP solution. For the cloud-based TSP product acquisition and implementation, OCTA has identified several candidate systems that have been used in jurisdictions of varying sizes. For design and validation, a consulting firm will be selected that is well-versed in traffic signal design and operation, safety analysis, and project management.

An outreach and engagement plan will be completed to increase project awareness and solicit input from those who live, work, and travel to the area. A multilingual process will be used to connect with diverse, disadvantaged, and hard-to-reach residents who may lack internet access or English skills. Materials will be multilingual and translation services will be offered. Community workshops will be held in-person and virtually with opportunities to voice opinions. Locations and times of day will be chosen to ensure the largest number of residents can participate. To further reach disadvantaged community members and people with special needs, Orange County Healthcare Agency, cultural groups, local business owners, community-based organizations (CBOs), social services agencies, and affordable housing advocates will be invited to participate.

Leadership and Qualifications. OCTA is the county transportation planning commission and countywide transit provider responsible for funding and implementing transit and capital projects and services that affect the quality of life for over three million residents across 34 cities. As an agency that has been implementing multi-agency, multi-million dollar ITS projects in Orange County for decades, a combination of internal and consulting technical staffing, ability, and experience are readily available.

OCTA Planning Division staff will lead this project with support from key staff in Transit Operations, Information Systems Technical Services, and Public Outreach. Additional information detailing areas of expertise and projects completed can be found in **Appendix I – Resumes**.