

**Independent Testing,
Verification, & Validation
Request for Information (RFI)**

Shared Autonomous Vehicles
(SAV)



August 2, 2016

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Disclaimer: Read before responding to this RFI

- This RFI is issued for information and planning purposes only and does not constitute a solicitation. A response to this RFI is not an offer and cannot be accepted by the Contra Costa Transportation Authority (CCTA) to form a binding contract.
- Participants are solely responsible for all expenses associated with responding to this RFI. Responses received to this RFI become the property of CCTA and will not be returned to the submitting company/team. Participation in this process is at the sole expense of each team or company.
- Participants should be aware that the responses to this RFI may be subject to the Public Records Act. Companies are herein notified that all material submitted, including responses to RFI, are subject to the provisions of the California Public Records Act (Government Code §§ sections 6250 et seq.) (the "Public Records Act") and any other laws and regulations applicable to the disclosure of documents submitted under this RFI. CCTA's use and disclosure of its records are governed by such laws. Companies should familiarize themselves with the provisions of the Public Records Act requiring disclosure of public information, and exceptions thereto. In no event shall CCTA or any of its agents, representatives, consultants, directors, officers, or employees be liable to a Company or Company team member for the disclosure of any materials or information submitted in response to the RFI.
- CCTA is not requesting pricing information; rather, the intent of the RFI is to gather information, solutions, and expertise available to meet the necessary requirements. Please do not include any proprietary information, or any cost information in your response to this RFI.
- CCTA will not advise a submitting party as to the nature or content of documents entitled to protection from disclosure under state or federal open records laws, as to the interpretation of such laws or as to definition of trade secret.

INDEPENDENT TESTING, VERIFICATION, & VALIDATION REQUEST FOR INFORMATION (RFI)

Date: August 2, 2016
To: Interested Participants
Subject: Independent Testing, Verification, and Validation (ITV&V) of Shared Autonomous Vehicles (SAV) Request for Information (RFI)

Dear Interested Parties:

The Contra Costa Transportation Authority (CCTA) is issuing this Request for Information (RFI) to companies or academia specializing in testing, verification, and validation services of Autonomous Vehicles or similar technologies. The purpose of the RFI is to (1) provide general information about the project and (2) solicit input on the testing, verification, validation, and new innovation. The output of this activity will lead to the procurement and delivery process of fully tested autonomous vehicles.

CCTA is not requesting bids or proposals at this time. Companies that do not participate in the RFI process are in no way precluded from submitting a proposal if a future solicitation is released.

CCTA thanks you in advance for your interest and looks forward to receiving industry feedback on the process.

Sincerely,



Jack Hall, P.E.
ITS CV/AV Program Manager
Contra Costa Transportation Authority (CCTA)

1.0 PLAN OVERVIEW

The Contra Costa Transportation Authority (CCTA) is a leader in transportation innovation in the Bay Area. The Agency has been successful in generating funds for local improvements and has a track record of executing projects and strengthening transportation in Contra Costa County. CCTA was originally formed to manage the funds generated by the half-cent transportation sales tax, which Contra Costa County voters enacted in 1988 and renewed in 2004. In addition to carrying out the Measure C and Measure J Expenditure Plans, the Authority also serves in the role of Contra Costa County's Congestion Management Agency and administers the County's Congestion Management Program. The Authority has evolved to become a dynamic, highly collaborative and results-oriented regional partner and ITS leader with a reputation for delivering projects that keep Contra Costa moving. CCTA is the lead agency for the proposed project and will provide executive leadership and countywide coordination with public and private sector partners.

GoMentum Station in Concord, California is where the CCTA leads and facilitates a collaborative partnership among multiple partners, public agencies, researchers, academics, technology companies, manufacturers, and suppliers. These entities converge in research development, testing validation and commercialization of Connected Vehicle (CV) applications and Autonomous Vehicles (AV) technologies to define the next generation of transportation network infrastructure. The 5,000-acre former navy weapons station, featuring 20 miles of paved roadway, is the largest secure test facility in the world and will become the center of CV/AV research.

A Shared Autonomous Vehicle (SAV) Program is being developed for deployment in Contra Costa County. The vehicles will be tested, verified, and validated by current partners at the GoMentum test bed. However, CCTA is considering an independent testing, verification, and validation process performed by an independent party as another level of assuring the SAVs are fully tested and verified prior to deployment.

2.0 PURPOSE

The Contra Costa Transportation Authority (CCTA) is issuing this Request for Information (RFI) to seek industry input on the development of independent autonomous vehicle testing, verification and validation procedures to be used as part of the Shared Autonomous Vehicles (SAV) Program. The SAV program will be implemented as part of the Contra Costa County deployment of First Mile / Last Mile project (FM/LM). This project is designed to address the transit service gap that exists between a traveler's place of residence and the desired transit hub (first mile) and the traveler's trip from the final station to his/her final destination (last mile). This document includes information related to the RFI process and an overview of the SAV deployment project in Contra Costa County.

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The purpose of this communication is to solicit information and suggestions from experienced sources, academia, contractors, and other qualified entities. This is a request issued solely for information and planning purposes and does not constitute a Request for Proposal (RFP). CCTA reserves the right to use or not use the information collected from responses of interested participants to this RFI.

3.0 SCOPE

CCTA seeks input on the future potential services regarding independent testing, verification, and validation of Autonomous Vehicles. The main purpose of testing and verification is to evaluate functionality, usability, security, safety, and performance of Shared Autonomous Vehicles. Although these vehicles are tested by the manufacturer prior to sale, the CCTA intends to perform independent tests to ensure transparency and eliminate potential conflicts of interest with the manufacturer's own efforts.

4.0 KEY ACTION DATES

Listed below are the Key Action Dates related to this RFI. If CCTA finds it necessary to change any of these dates, an Addendum to this RFI will be released.

Table 1 – Key Action Dates

Key Action	Date	Time
Release of RFI	08/03/2016	4:00 p.m. PST
Last Day to Submit Questions on the RFI	08/10/2016	2:00 p.m. PST
CCTA response to Questions	08/15/2016	2:00 p.m. PST
Last Day to Submit Responses to RFI	08/29/2016	4:00 p.m. PST

5.0 CONTACT OFFICIAL

All correspondence and questions related to this RFI shall be via email and directed to:

Contra Costa Transportation Authority (CCTA)
Jack Hall, P.E. ITS CV/AV Program Manager
email: jhall@ccta.net

The contact person designated above is the sole contact for this RFI. Organizations responding to this RFI that require clarification of any matter must contact only this individual. All questions

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and clarifications must be submitted in writing. No other representative of the CCTA is authorized to communicate with Participants with respect to this RFI.

Please include "Response to ITV&V of SAV RFI" in the subject line of emails.

6.0 RFI RESPONSE AND CONTENT FORMAT

Responses are due by **Monday, August 29, 2016 at 4:00 p.m. PST** and up to **six printed copies** and **one electronic copy** shall be delivered to **Jack Hall at 2999 Oak Rd. Suite 100 - CCTA, Walnut Creek, CA 94597**; shall be clearly marked as "**Response to ITV&V of SAV RFI**".

Participants need to provide a short response of no more than **15 single-sided**, single spaced pages with font no smaller than 10-point, and must include the followings:

1. A cover page not exceeding **one page** that identifies:
 - a. Reference to the RFI by specifying "Response to ITV&V of SAV RFI";
 - b. Company name;
 - c. Company address;
2. A cover letter not exceeding **two pages** that describes the company or team providing the response to RFI; a short description with each service as to how it responds to the RFI questions contained herein, and include the description of the services proposed.
3. Up to **three pages** including a brief description of company or team providing responses to the RFI with description of team's proven approach to successfully completing a project of this type and scale. Include a short bio of team members that have experience, knowledge, and expertise in performing similar services. Include the years of experience and home office location of the staff. Resumes can be included in appendices and will not be counted versus total number of pages.
4. Up to **one page** describing strengths of your team compared to other teams or companies providing similar services.
5. Up to **three pages** describing how your proposed solution and services might accommodate the following:
 - a. Research and Development experience related to Autonomous Vehicles;
 - b. Testing, Verification, and Validation of Autonomous Vehicles;

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- c. Design, Development, and Systems Integration Services related to Autonomous Vehicles;
 - d. Safety of workers performing test and verification of Autonomous Vehicles;
6. Up to **five pages** discussing responses to the questions listed in **section 7** of this RFI. Please respond to all questions listed in section 7 to the best of your ability.
7. Appendices: any additional information not specifically requested, but which the participants deems important and relevant may also be submitted. Considerations for this additional information:
 - a. Resumes of team members with experience, knowledge, and expertise of providing similar work or projects with similar scale.
 - b. Provide any additional information not requested above, but which you deem important and relevant to this RFI.
 - c. Lessons learned from other similar projects.
 - d. Description of team/company projects and past or current services in similar scale that is being provided.
 - e. Test plan, verification plan, with testing procedures and verification cases of similar project with similar scale.

Appendices, tabs or separators will not be counted toward the page limit. Items included in appendices will not be considered as part of response to the RFI unless clearly referenced in the main content.

7.0 BACKGROUND AND CURRENT ENVIRONMENT

This document is a solicitation for providing information related to the SAV testing, verification, validation effort only. The CCTA cannot guarantee that any future business will result from the information provided, nor shall it pay for the information provided.

The Federal Highway Administration (FHWA) Systems Engineering Guidebook describes the Testing, Verification, and Validation process for fully testing of systems. The SAV program will closely follow these guidelines.

Significant testing, verification, and validation of vehicles is currently being performed by the vehicle manufacturers or their partners. The CCTA is seeking information about additional independent testing, verification, and validation efforts that can be performed by independent parties.

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The National Highway Traffic Safety Administration (NHTSA) has defined five levels of Autonomous Vehicles (0 to 4) where level 4 is a full self-driving automation. The SAVs that are being considered for deployment and are currently under development and testing at GoMentum Station are level 4. These vehicles do not have steering wheel, gas pedals, or brake pedals.

Participants should use up to five pages of their response to answer the following questions:

1. What is your team's perspective and track record of testing, verification, validation of Autonomous Vehicles? Have you worked with other manufacturers in the past in testing their autonomous vehicles or have you performed independent testing, verification, and validation? Please include project contact references for the projects performed with similar scales in your response.
2. How do you consider your company or team independent from the automobile manufacturing industry? Will your team be capable of testing, verifying and validating shared autonomous vehicles independently without reliance on other parties including the vehicle manufacturer? Respondent's should discuss a methodology for this testing and the potential need for wider range of testing procedures such as code review, unit testing, factory test results review, etc. The discussion should include the potential need for Non-Disclosure Agreements (NDA) for collaboration and communication with vehicle manufacturers to allow access to systems architecture, codes, factory test results, etc.
3. Using the five levels of autonomous driving as defined by NHTSA, please describe your teams experience with each type and describe your teams' proven approach toward testing, verification, and validation of autonomous vehicles. Please describe if you have used FHWA's recommended Systems Engineering approach for testing, verification and validation or if you have used other approaches. Please describe the methodology and approach used as well as describing the reason for that approach being used.
4. Describe your team's experience with testing and verification of Autonomous Vehicles for assuring safety, functionality, usability, security, and performance of Shared Autonomous Vehicles. Please include project contact references. Describe your proposed recommendation for recording test results such as system logs, video recordings, etc.
5. Describe your team's recommended safety procedures for project team members that will be verifying Autonomous Vehicles capabilities in the test-bed environment. What safety procedures will be considered for vehicle passengers when the vehicles are operating as fully autonomous vehicles under test and development? What safety procedures will be recommended to be considered for pedestrians or workers on the road or in the side of the road observing the tests?

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6. What do you believe to be the most important safety requirements that the SAVs must successfully pass and how do you intend to test, validate and verify results?

8.0 COSTS

Participants should not include cost or pricing elements in their response. The inclusion of cost or pricing may cause the RFI to be considered non-responsive.