Request for Letters of Intent

Basic Infrastructure Message Development and Standards
Support for Connected Vehicles Applications

April 6, 2016

Issued by

University of Virginia Center for Transportation Studies
Charlottesville, Virginia

On Behalf of

Connected Vehicle Pooled Fund Study
I. GENERAL INFORMATION

Request for Letters of Intent (RFLI) Name: Basic Infrastructure Message Development and Standards Support for Connected Vehicles Applications

This Request for Letters of Intent (RFLI) has been posted on the Connected Vehicle Pooled Fund Study (CV PFS) website (http://www.cts.virginia.edu/cvpfs/) for your information. Addenda and attachments will be posted if issued. It is the responsibility of interested parties to ensure that the latest version of the entire RFLI and related links are reviewed prior to submission of a letter of intent. We encourage you to check the website frequently for any changes prior to the due date.

For ease of reference, each firm or individual receiving this RFLI is referred to as an “interested party” and the firm or individual selected as a potential partner of the University of Virginia Center for Transportation Studies (UVA CTS) on behalf of the CV PFS is referred to as the “preferred subcontractor”. This RFLI states the instructions for submitting letters of intent, and the procedure and criteria by which a preferred subcontractor may be selected.

RFLI Schedule:

- **Issue Date**: Wednesday, April 6, 2016

- **RFLI Questions**: Any questions or necessary additional information concerning this RFLI must be emailed to the UVA CTS listed below no later than 12:00 p.m. EDT on Friday, April 22, 2016 in order to guarantee a timely response prior to the letter of intent due date.

- **Letters of Intent Due Date**: 3:00 p.m. EDT on Friday, May 6, 2016. Letters of Intent must be sent to the UVA CTS via email using the contact information in the box below. The UVA CTS reserves the right to reject letters of intent received after the stated due date and time.

- **Expected Subcontract Start Date**: July 2016
  - **Expected Term**: For twelve months
  - **Expected Level of Effort**: $400,000

REFER ALL QUESTIONS TO:
University of Virginia Center for Transportation Studies
Attention: Hyungjun Park
Phone: 434-924-1651
Email: hpark@email.virginia.edu
Procedure:

It is important to note that preparation and submission of a letter of intent (for detailed contents, see Section IV. Contents of the Letter of Intent), in response to this RFLI, is completely voluntary, without any bearing on contractual obligations. The purpose of this RFLI is to identify a potential partner that may work, as a subcontractor, with the CV PFS and the UVA CTS on the project outlined in this RFLI. Once all the letters of intent are received, the below procedure will be followed:

1. The CV PFS team members will evaluate the letters of intent (including a signed cover letter, a proposal, and a budget) submitted in response to the RFLI to identify an interested party that best meets CV PFS’s needs as a preferred subcontractor;
2. Once a preferred subcontractor is identified, the CV PFS and the selected preferred subcontractor will conduct negotiations to come to an agreement on the scope and budget of a subcontract; and
3. Finally, a formal subcontract will be established through the UVA Office of Sponsored Programs (OSP) and the preferred subcontractor officially becomes the subcontractor.

II. BACKGROUND INFORMATION

CONNECTED VEHICLE POOLED FUND STUDY

The project detailed in this RFLI is intended to investigate “Basic Infrastructure Message Development and Standards Support for Connected Vehicles Applications” for the Connected Vehicle Pooled Fund Study (CV PFS) entitled “Program to Support the Development and Deployment of Connected Vehicle Applications.” This CV PFS was created by a group of state and local transportation agencies and the Federal Highway Administration (FHWA), with the Virginia Department of Transportation (VDOT) serving as the lead agency. The University of Virginia Center for Transportation Studies (UVA CTS) is supporting VDOT on the pooled fund study, serving as the technical and administrative lead for the effort. For more information about the pooled fund study, please visit http://www.cts.virginia.edu/cvpfs/.

BACKGROUND

In a connected vehicle environment, vehicles which are equipped with Dedicated Short Range Communication (DSRC) devices broadcast Basic Safety Messages (BSMs), and a standard such as SAE J2735 has been fairly well defined for what information is in the BSM. On the other hand, from the infrastructure side, which infrastructure information will be or needs to be broadcasted is relatively unknown and has not been well investigated yet. While some of the infrastructure related information, i.e. a Signal Phase and Timing (SPaT) message, and a MAP
message (including intersection ID, reference point, orientation, lane width, type, etc.), are already included in the current standards, there are other pieces of infrastructure information that may benefit connected vehicles applications; such as speed limit (particularly where that might be variable), standard signage in the area, presence of school zones, work zones and lane closures, messages displayed on variable messages signs or highway advisory radios, etc.

With this background, it was recently suggested that a corollary message to the BSM from the infrastructure, a Basic Infrastructure Message (BIM), needs to be investigated. Having a standard (or near standard) BIM would help the OEMs and third party application providers to understand that there will be some infrastructure for them to rely on, and will give them some basis for the kind of message they can expect from the infrastructure. At the same time, this will also help the public transportation agencies to know what kind of information to broadcast from their Road Side Equipment (RSE).

Once a standard (or near standard) BIM is developed, the next step would be to work with the appropriate standards development organization and committee to get the BIM standard message under consideration as a standard. Likewise, there is an urgent need for the public agencies (actual operators and maintainers of the infrastructure) to be able to influence the decisions related to the standards for vehicular data, such as BSM, as well. For a variety of reasons (budget, expertise, travel constraints, time availability, etc.), the operating agency personnel have not engaged in these standards development exercises, but have an important interest in their outcomes. Also, many of the states are not even fully aware of what standards exist or what the status of them is. With that being said, it is important to establish a means with which the CV PFS team can track standards related activities and influence the development of these standards.

### III. SCOPE OF SERVICES

The UVA CTS seeks a qualified partner to investigate “Basic Infrastructure Message Development and Standards Support for Connected Vehicles Applications.”

### PROJECT GOALS

The goals of this project are:

- To develop a Basic Infrastructure Message (BIM); and
- To establish a means to collaborate with the relevant standards development organizations.
**TASKS**

A list of tasks necessary to accomplish the goals is presented below.

1. **Task 1. Project Management**

The subcontractor is responsible for subcontract management, monitoring, and control/reporting of the project progress, including the following subtasks:

1.1. Conduct a project kick-off meeting within two weeks of the project start date. This meeting will be conducted as a webinar or an in-person meeting. The purpose of the meeting will be to review the project plan including a draft schedule, and the work plan and to identify any issues or concerns.

1.2. Submit a detailed project schedule that lists tasks, meetings, and major milestones. The project schedule shall be submitted electronically in Microsoft Project Plan (*.mpp) format.

1.3. A monthly progress report shall be compiled and submitted electronically to the UVA CTS by the 15th of the month following the monthly reporting period. In cases where the 15th of the month falls on a weekend, the report will submitted the following Monday. The monthly progress report will consist of an executive summary, monthly budget information grouped by major task item, a current listing of scheduled milestones and deliverables, a listing of accomplishments for the current reporting period, and a listing of planned accomplishments for the next reporting period.

1.4. Monthly progress conference calls shall be held throughout the project period. During a monthly call, the PI of the subcontractor shall provide a project summary including project progress, schedule, scope issues, and budget. Meeting minutes, including action items, shall be submitted within one week of the teleconference.

1.5. A project closeout meeting shall be held during the last week of the project. During this meeting, the PI shall present a summary of the work performed under each task, an overview and status of each deliverable, and overview of budgetary expenditures during the project.

<table>
<thead>
<tr>
<th>Task 1 Deliverable</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Prepare Briefing Materials</td>
<td>1 Week from Subcontract Start</td>
</tr>
<tr>
<td>Draft Project Schedule</td>
<td>1 Week from Subcontract Start</td>
</tr>
<tr>
<td>Conduct Project Kick-Off Meeting</td>
<td>Within 2 weeks from Subcontract Start</td>
</tr>
<tr>
<td>Final Project Schedule</td>
<td>Within 1 week after Kick-Off Meeting</td>
</tr>
<tr>
<td>Monthly Progress Report</td>
<td>By the 15th of the following month</td>
</tr>
<tr>
<td>Monthly Conference Calls and Meeting Minutes</td>
<td>DATE TBD</td>
</tr>
<tr>
<td>Closeout Meeting</td>
<td>Last week of Subcontract</td>
</tr>
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2. **Task 2. Infrastructure Information Elements Review**

The goal of this task is to develop a comprehensive list of infrastructure information elements that are available and desirable to be broadcasted under a connected vehicle environment. More detailed subtasks are:
2.1. Review the infrastructure information elements from the infrastructure owner/operator’s point of view, including, but not limited to, connected vehicle related infrastructure, traditional Intelligent Transportation Systems (ITS) infrastructure, general transportation infrastructure (such as traffic signs, traffic signals, etc.), and other dynamic traffic information related elements (such as road surface condition, variable speed limit, etc.)

2.2. Identify the kind of basic infrastructure information that might be useful to motorist, third party application providers, OEMs, and the infrastructure owners/operators under a connected vehicle environment
   2.2.1. Work with stakeholders (such as CAMP) to reach consensus about the usefulness of infrastructure information elements

2.3. Finally, develop a comprehensive list of static and dynamic infrastructure information elements that need to be considered for broadcasting in a connected vehicle environment

3. Task 3. Standards and Related Activities Review

The goal of this task is to develop an overview white paper on connected vehicles standards in general and to develop a list of infrastructure related items included in the current standards.

3.1. Develop a white paper summarizing a list of existing connected vehicles standards with a description, responsible standards development organizations, current status, etc.
   3.1.1. Representative connected vehicles standards include, but not limited to, IEEE 802.11p, IEEE 1609, and SAE J2735/2945, also referred to as Legacy DSRC Standards.
   3.1.2. The subcontractor shall review any available documents from USDOT that synthesize standards needs related to the suite of USDOT connected vehicle applications considered under the USDOT DMA and AERIS programs, and under the Connected Vehicle Reference Implementation Architecture.
   3.1.3. In addition, a brief review summary of the “traditional” Intelligent Transportation Systems infrastructure standards shall be provided, including, but not limited to, the National Transportation Communications for ITS Protocol (NTCIP), Traffic Management Data Dictionary (TMDD) and Message Sets, Commercial Vehicle Information Systems and Networks (CVISN), Incident Management, Transit Communications Interface Profiles (TCIP), and Advanced Traveler Information Systems (ATIS).

3.2. Develop a comprehensive list of infrastructure related elements currently included in the existing standards
   3.2.1. Review current standards focusing on the infrastructure pieces including, but not limited to, SAE J2735 (SPAT, MAP, SRM/SSM, RSA, etc.) and SAE J2945
   3.2.2. Finally, develop a comprehensive list of infrastructure information elements included in the current standards

4. Task 4. Basic Infrastructure Message Development

In this task, the subcontractor shall develop a standard (or near standard) Basic Infrastructure Message (BIM) including the recommended structure and its’ contents. For this, the following subtasks are recommended:
4.1. Compare the list of infrastructure information elements available and desirable to broadcast (from Task 1) and the list of infrastructure related data elements currently included in the existing standards (from Task 2)
4.2. Review the CAMP BIM to see what information (containers) are missing
4.3. Determine what portions of the infrastructure information should be standardized
4.4. Create a list of information elements and categorize those into essential/extended, critical/optional, dynamic/static, DSRC channel assignment groups
4.5. Finally, develop a Basic Infrastructure Message

5. Task 5. Basic Infrastructure Message Standardization

Once a Basic Infrastructure Message is developed, the next step is to work with the appropriate standards development organization for actual standardization.

5.1. Develop final standards material of the BIM for consideration by the relevant standards development organizations
5.2. Prepare draft correspondence including action and transmittal emails/letters
5.3. Work with the appropriate standards development organization to get the BIM standard message under consideration as a standard


There is a strong need for the CV PFS team to be able to track down the current connected vehicle standards and its’ related activities, and to be able to influence the decisions related to any standards based on the needs of the CV PFS, actual infrastructure owners and operators. For this, the subcontractor shall provide an expert (representative) with the technical ability and aptitude to represent the CV PFS team as an active participant in appropriate standards development organizations. Specific roles of this representative are:

6.1. Communicate with the CV PFS team
   6.1.1. Participate in 1) two CV PFS face-to-face meetings per year, 2) CV PFS monthly calls usually scheduled on the last Friday of each month, and 3) other CV PFS projects meetings as needed
   6.1.2. Identify and summarize the key issues and needs (such as high priority data elements, update intervals, geographic needs for the elements, etc.) of the CV PFS group, that need to be reflected in the connected vehicle standards development, based on the discussions at the calls/meetings and lessons learned from the CV PFS projects
   6.1.3. Provide technical awareness to the CV PFS group
      6.1.3.1. Track all activities related to connected vehicle standards
      6.1.3.2. Prepare monthly status update reports on connected vehicle standards
      6.1.3.3. Present the status report at monthly calls and/or face-to-face meetings
      6.1.3.4. Provide webinars to CV PFS for educational purposes as needed
6.2. Represent the CV PFS group in standard development organizations
6.2.1. Participate in standard development organization meetings and related meetings such as workshops as a representative of CV PFS
6.2.2. Attempt to meet CV PFS needs by influencing the standards development in a proactive way to get standards elements that CV PFS needs
   6.2.2.1. Develop draft standards material for consideration by the relevant standards development organizations as needed
   6.2.2.2. Prepare draft correspondence including action and transmittal emails/letters as needed
6.2.3. Prepare standards-related meeting and trip reports by summarizing the status and significant findings
6.3. Prepare white papers on specific topics of interest as directed by the CV PFS
   6.3.1. Develop white papers on specific issues related to the development of standards as directed by the CV PFS

IV. CONTENTS OF THE LETTER OF INTENT

Letters of Intent are to provide a concise description of the research plan and capabilities of the interested party to satisfy the requirements of the RFLI. Emphasis will be on completeness and clarity of content. The letter of intent should include a signed cover letter, a proposal, and a proposed budget. The interested party shall submit the following in the letter of intent:

1. A signed cover letter (2 pages or less)
2. A proposal (20 pages or less, not including a title page and qualifications of participants)
   a. A detailed description and the full plan, to include a timeline, to accomplish the project proposed.
   b. A brief history of the interested party and its experience, qualifications and success in providing the type of service requested.
3. The interested party’s proposed price / fee for providing the Services (no page limit)

V. BASIS OF SELECTION OF PREFERRED SUBCONTRACTOR

Letters of intent accompanied with proposals will be evaluated based upon the overall merits/value including, but not limited to, price. All letters received will be carefully evaluated by the CV PFS based on the following criteria:

1. The interested party’s technical plan to provide the CV PFS with the products as described in the Scope of Services section;
2. The interested party’s experience in providing Services similar to those described in this RFLI; and
3. The interested party’s price/fee for providing the Services.