



U.S. Department of Transportation

Federal Highway Administration

Notice of Funding Opportunity

Number 693JJ324NF00003

“Saving Lives with Connectivity: Accelerating Vehicle to Everything (V2X) Deployment”

Issue Date: 10/26/2023

Application Due Date: 1/17/2024

TABLE OF CONTENTS

| TITLE | PAGE |
|---|------|
| SUMMARY INFORMATION | 3 |
| FUNDING OPPORTUNITY INFORMATIONAL WEBINAR | 4 |
| SECTION A - PROGRAM DESCRIPTION | 5 |
| SECTION B - FEDERAL AWARD INFORMATION | 47 |
| SECTION C - ELIGIBILITY INFORMATION | 48 |
| SECTION D - APPLICATION AND SUBMISSION INFORMATION | 49 |
| SECTION E - APPLICATION REVIEW INFORMATION | 58 |
| SECTION F - FEDERAL AWARD ADMINISTRATION INFORMATION | 66 |
| SECTION G - FEDERAL AWARDING AGENCY CONTACTS | 77 |
| SECTION H - OTHER INFORMATION | 78 |
| ATTACHMENT - SAMPLE SYSTEMS ENGINEERING DOCUMENTATION | 79 |

The Federal Highway Administration (FHWA) is using www.Grants.gov for issuance of this Notice of Funding Opportunity (NOFO). Applicants must register at Grants.gov under the NOFO number to receive notifications of updates/amendments to this NOFO. It is the applicant's responsibility to monitor the Grants.gov site for any updates/amendments to this NOFO.

This notice contains collection-of-information requirements subject to the Paperwork Reduction Act. The use of Standard Forms (SF) 424, 424A, 424B, 424C, 424 D, and SF-LLL has been approved by the Office of Management and Budget (OMB) under 2105-0520. Notwithstanding any other provision of law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the Paperwork Reduction Act, unless that collection displays a currently valid OMB control number.

Summary Information

| | |
|-------------------------------------|---|
| Funding Opportunity Summary: | Up to \$40 million for Fiscal Years 2024, in Federal funding for eligible entities to deploy, operate, document, and showcase integrated, advanced roadway deployments featuring applications enabled by interoperable wireless connectivity (among vehicles, mobile devices, and smart infrastructure) that substantially and quantitatively improve system safety, enhance traveler mobility, improve efficiency of goods movement, mitigate environmental impacts, and address disparities in transportation equity. |
| Federal Agency Name: | U.S. Department of Transportation (DOT) Federal Highway Administration (FHWA) 1200 New Jersey Avenue, SE Mail Drop: E86-205 Washington, DC 20590 Attn: John Harding |
| Funding Opportunity Title: | Saving Lives with Connectivity: Accelerating Vehicle to Everything (V2X) Deployment |
| Announcement Type: | This is the only notice for the Saving Lives with Connectivity: Accelerating V2X Deployment |
| Funding Opportunity Number: | 693JJ324NF00003 |
| Type of Award: | Cooperative Agreements |
| Assistance Listing Number: | 20.200 Highway Research & Development |
| Application Due Date: | Submission Deadline: Applications Due by 1/17/2024 at 11:59 PM Eastern Time through www.Grants.gov |
| Questions: | Submit Questions to: rob.miller@dot.gov |

Funding Opportunity Informational Webinar

The FHWA will host an Informational Session regarding this funding opportunity focused on the Saving Lives with Connectivity: Accelerating Vehicle to Everything (V2X) Deployment program. This session will be conducted as a virtual forum and will focus on specific topics to help potential applicants gather additional information and ask specific questions.

Participation in this session is not mandatory to submit an application under this NOFO. However, we encourage potential applicants to take advantage of this opportunity to gather information regarding this specific funding opportunity.

INFORMATIONAL SESSION: Saving Lives with Connectivity: Accelerating V2X Deployment Program

SESSION: Virtual Webcast: Background and Application Information for the Saving Lives with Connectivity: Accelerating V2X Deployment Program

DATE: November 15, 2023

TIME: 1:00 pm Eastern Time

INFORMATION AND REGISTRATION:

https://usdot.zoomgov.com/webinar/register/WN_xEoZhP2DTRyyZ9flZBuEGA

Each section of this notice contains information and instructions relevant to the application process. The applicant should read this notice in its entirety so that they have the information they need to submit eligible and competitive applications.

FOR FURTHER INFORMATION CONTACT:

For further information concerning this notice, please contact

Rob Miller

Email: Rob.Miller@dot.gov

Phone: 202-366-9167

Alternate:

Robin Hobbs

Email: Robin.Hobbs@dot.gov

Phone: 202-366-4004.

A Telephone Device for the Deaf (TDD) is available for individuals who are deaf or hard of hearing at 202-366-3993.

In addition, FHWA will post answers to questions and requests for clarifications on Grants.gov. To ensure applicants receive accurate information about eligibility or the program, the applicant is encouraged to contact FHWA directly, rather than through intermediaries or third parties, with questions.

SECTION A - PROGRAM DESCRIPTION

1. STATEMENT OF PURPOSE

According to the latest projections from the National Highway Traffic Safety Administration (NHTSA) for 2022, an estimated 42,795 people died in motor vehicle crashes. The U.S. Department of Transportation's (DOT) mission is to facilitate a rapid reduction in (and eventual elimination of) crashes on our nation's roadways. Both the Secretary of Transportation and the Federal Highway Administration (FHWA) Administrator have emphasized that safety underpins all Federal activity in transportation. Zero is the only acceptable number of traffic fatalities. Our nation has the technology and the resources to make our roadways substantially safer. A combination of innovation and collective action can accelerate the process of making this a goal a reality.

The National Roadway Safety Strategy (NRSS)¹ describes the major near-term actions DOT will take to make a meaningful difference in safety improvements. One of these actions on the NRSS Tracking Dashboard² is to advance the use and deployment of technologies that furthers roadway safety, by specifically calling out both Intelligent Transportation Systems (ITS) and interoperable vehicle to everything (V2X) wireless communications. The ITS and V2X safety applications augment and complement a wider portfolio of potential safety-related actions, including DOT-identified proven safety countermeasures³.

The DOT seeks to deliver a world-class transportation system that advances safe, efficient, equitable, and sustainable mobility choices for all while strengthening our nation's economy. Wireless connectivity (among vehicles, mobile devices, and smart infrastructure) is a fundamental element of any modern, world-class transportation system. Wireless connectivity must also be interoperable, ensuring that safety applications and other services dependent on seamless communications can be trusted to operate reliably and effectively across all of the nation's surface transportation system.

To accelerate the adoption and deployment of interoperable connectivity nationwide, DOT seeks eligible entities to deploy, operate, document, and showcase integrated, advanced roadway deployments featuring applications enabled by interoperable connectivity that substantially and quantitatively:

¹ <https://www.transportation.gov/sites/dot.gov/files/2022-02/USDOT-National-Roadway-Safety-Strategy.pdf>

²

https://explore.dot.gov/views/NRSSDashboard/Dashboard?%3Aembed=y&%3AisGuestRedirectFromVizportal=y%3AshowAppBanner&%3Adisplay_count=n&%3AshowVizHome=n&%3Aorigin=viz_share_link&%3Atoolbar=no&%3A%3Aembed=yes#7

³ <https://highways.dot.gov/safety/proven-safety-countermeasures>

- improve system safety (particularly the safety of vulnerable road users as defined in the FHWA Vulnerable Road User Safety Assessment Guidance⁴);
- enhance traveler mobility;
- improve the efficiency of goods movement;
- mitigate environmental impacts;
- address disparities in transportation equity; and,
- demonstrate a significant return on (public and private) investment.

The FHWA and the Intelligent Transportation Systems Joint Program Office (ITS JPO), in coordination with the Assistant Secretary for Research and Technology, have authored a draft *National Accelerating V2X Deployment Plan*, pending release, (hereafter, “the draft Plan”) that lays out short, medium, and long-term goals and targets to achieve interoperable connectivity at a national scale. One objective of this draft Plan is to develop, evaluate and document a suitable reference implementation for interoperable connectivity. This reference implementation can serve as a practical template spurring broader, at-scale national deployment. One element of the draft Plan is a DOT-sponsored effort (the subject of this solicitation), the Saving Lives with Connectivity: Accelerating V2X Deployment Initiative (hereafter, “the Initiative”), to support the creation of this reference implementation. The Initiative seeks the development, evaluation, and documentation of *multiple* operational systems that both achieve the goals related to safety, mobility, efficiency, environmental impacts, equity, and return-on-investment (ROI) noted above and can demonstrate *both* intra- and inter-site interoperability. Functional interfaces developed, technical insights gained, and lessons learned recorded from these Initiative deployments will be identified and documented to augment Federal efforts to create a practical and effective reference implementation. Awardees are sought who are motivated to innovate, to demonstrate interoperability, to measure benefits, and to share insights with the broader transportation community – and act as key enablers of the vision of interoperable connectivity. Initiative deployments support both the reference implementation and other guidance documents within a national deployment plan (to be released later in 2023). Awardees must be not only *motivated*, but also *capable* of delivering at the accelerated technical pace matching the goals and timeline described in the draft Plan.

2. LEGISLATIVE AUTHORITY

Specific statutory authority for conducting this effort is found under section 516(a) of Title 23, United States Code (U.S.C.), which authorizes the Secretary of Transportation to “carry out a comprehensive program of intelligent transportation system research and development, and operational tests of intelligent vehicles, intelligent infrastructure systems, and other similar activities that are necessary to carry out this chapter.”

Funding is authorized under section 11101(c)(1)(D) of the Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021).

⁴ <https://highways.dot.gov/safety/hsip/vru-safety-assessment-guidance>

The authority to award a cooperative agreement for this effort is found under section 502(b)(3) of Title 23, U.S.C., Surface Transportation Research, which states the following:

(3) COOPERATION, GRANTS, AND CONTRACTS. —The Secretary may carry out research, development, and technology transfer activities related to transportation—

- (A) Independently,
- (B) In cooperation with other Federal departments, agencies, and instrumentalities and Federal laboratories, or
- (C) By making grants to, or entering into contracts and cooperative agreements with one or more of the following: the National Academy of Sciences, the American Association of State Highway and Transportation Officials, any Federal laboratory, Federal Agency, State agency, authority, association, institution, for-profit or nonprofit corporation, organization, foreign country, or any other person.

Cost Share: Per section 516(c) of Title 23, U.S.C., “The Federal share payable on account of any project or activity carried out under subsection (a) shall not exceed 80 percent.”

3. BACKGROUND

Wireless communications among vehicles, roadside infrastructure, and mobile devices enable a wide range of applications designed to improve safety, provide equitable transportation, enhance mobility, reduce negative environmental impacts, and bolster system efficiency. Crucial to this vision is the notion of *interoperable connectivity* – that is, that a diverse range of mobile, in-vehicle, and roadside devices can communicate ubiquitously, efficiently, and securely in a privacy-protected manner using multiple wireless communications technologies, wireless messages, open data formats, and standards.

A wide range of safety-related and other applications leveraging wireless connectivity have been developed and deployed across the nation. One resource describing a variety of these applications can be found on the DOT Intelligent Transportation Systems Joint Program Office website⁵. These applications are divided in categories: Vehicle-to-Infrastructure (V2I) Safety, Vehicle-to-Vehicle (V2V) Safety, Agency Data, Environment, Road Weather, Mobility, and Smart Roadside. Additional resources can also be found in the Intelligent Transportation Systems Joint Program Office (ITS JPO) Smart Community Resource Center⁶. These ITS JPO resources provide examples of developed and deployed applications leveraging wireless communications. However, they are intended neither as an exhaustive nor restrictive list. Additional applications are in development across the nation – in academia, in the public sector, and in the private sector. The Initiative is open to all potentially high-value applications that can make a significant and measurable impact on immediate needs related to safety, mobility, efficiency, environmental impact, equity, and financial sustainability (see Section A.1). In particular, the effort seeks innovative combinations of applications that can demonstrate

⁵ https://www.its.dot.gov/pilots/cv_pilot_apps.htm

⁶ <https://www.its.dot.gov/scrc/#/ic>

immediate impact and value delivered while simultaneously helping to chart a practical path towards national interoperable connectivity.

The path towards nationwide interoperability has not been straightforward. Until 2020, one leading plan to realize interoperable V2X connectivity had been built around an assumption of the availability of dedicated wireless spectrum in the 5.9 GHz band in combination with Dedicated Short-Range Communications (DSRC) communication standards. Although significant progress was made in the development of these standards together with field testing in multiple pilot deployments, the rate of progress towards mass market DSRC deployment was slower than expected by decision-makers at the Federal Communications Commission (FCC). Noting the state of 5.9 GHz band utilization in 2020, the FCC issued a formal order significantly reducing the bandwidth set aside for ITS applications. Most (45 megahertz (MHz)) of the previously ITS-dedicated (75MHz) 5.9 gigahertz (GHz) band was reallocated to non-ITS consumer applications (e.g., Wi-Fi). A portion (30MHz) of the 5.9 GHz band remains dedicated to ITS licensed applications, the other 45MHz is now identified as unlicensed spectrum. As a result, the broader ITS community is at a crucial crossroads in 2023 with respect to the future of interoperable connectivity. Additional information and updates can be found on the DOT Safety Band resources website⁷ and in the V2X Summit⁸ proceedings.

Multiple technological, economic, and policy strategies may be considered charting a path towards interoperable connectivity. Some strategies may focus exclusively on the remaining ITS licensed spectrum utilizing C-V2X (Cellular V2X) standards per the current FCC band plan. Additional strategies may utilize other forms of wireless communications, including but not limited to current and emerging fifth generation (5G) cellular and 5G new radio technologies. All of these wireless communications strategies feature significant uncertainties, challenges, and risks. As discussed in Section A.1, this funding opportunity is intended to assess these risks, overcome challenges, and mitigate key uncertainties detrimental to the overarching goal of interoperable connectivity.

3.1. DEPLOYMENT SITE FEATURES AND ATTRIBUTES

The Initiative seeks innovative technical approaches featuring:

- *conformant and effective utilization of the 5.9 GHz ITS licensed spectrum, potentially augmented with other forms of wireless communications, enabling both*
- *measurable system impact and a path forward towards nationwide interoperability.*

Deployment sites are sought with the following attributes:

- *Immediate and measurable impact to address critical needs within the transportation system, particularly safety-related needs.* The proposed deployment must address one or more real problem(s) within an operational surface transportation system within the time frame of this Initiative (30 months, see Section A.3.2) Technology demonstrations without direct impact on current safety, mobility, efficiency, or equity operational needs

⁷ <https://www.transportation.gov/content/safety-band>

⁸ <https://www.transportation.gov/V2XCommSummit>

are not sought under this Initiative.

NOTE: Field tests on closed or otherwise controlled environments separate from operational transportation systems will not be considered for award.

- *Conformant, effective utilization of the 5.9 GHz ITS licensed spectrum.* Utilization of the ITS licensed 5.9 GHz spectrum must conform to all relevant FCC regulation, including obtaining all required waivers and the use of C-V2X standards. Effective utilization implies that the pertinent attributes of the reserved spectrum (e.g., latency, range, and lack of interference) are properly and appropriately allocated to applications dependent on these attributes and results in measurable and quantifiable system impacts.

NOTE: Deployments that do not utilize the 5.9 GHz ITS licensed spectrum will not be considered for award.

Bandwidth constraints may compel deployers to consider other forms of communications to augment the 5.9 GHz ITS licensed spectrum to enable a complete deployment concept. Innovative utilization of other forms of communications along with approaches utilizing the 5.9 GHz ITS licensed spectrum may be included as an element of the proposed deployment.

NOTE: Deployments may augment utilization of the 5.9 GHz ITS licensed spectrum with other forms of communications, but are not required to do so.

- *Demonstrable standards-enabled interoperability.* Capability and depth of technical team to engage in the collective planning and execution of interoperability demonstrations both individually and in conjunction with other Initiative awardees. Interoperability demonstrations must provide over-the-road evidence of successful and secure communications as well as the effective operation of ITS applications among diverse roadside equipment, in-vehicle, and mobile devices. Demonstrations of interoperable connectivity are sought both among equipment and processes *within* a deployment site as a first step, and utilizing technologies from *across all* awardee sites in a second step.
- *Successfully implement and support interoperable security credential management.* Deployment sites must include an Institute of Electrical and Electronics Engineers (IEEE) 1609.2.1 compliant security credential management system (SCMS)⁹. In particular, SCMS solutions capable of supporting a path to national interoperability are strongly preferred. All interoperability demonstrations must include end-to-end security credential management, both within the proposed deployment and in interoperability demonstrations with other Initiative awardees.

3.2. INITIATIVE STRUCTURE AND PHASING

⁹ <https://www.its.dot.gov/resources/scms.htm>

The draft Plan recognizes the urgency required to set the nation on path to interoperable connectivity. The draft Plan also recognizes the substantial technical and non-technical risks associated with overcoming the inherent challenges to interoperable connectivity. These two factors, the urgency to move forward rapidly and the need to manage risk, are reflected in the two-phase Initiative design.

Phases of the Deployment Effort. Each deployment project is expected to be developed in two distinct DOT-funded phases as illustrated in the figure below. The figure highlights selected key deliverables and activities throughout the Initiative. Further, Initiative awardees are expected to sustain operations for a minimum period of five years after Phase 2 is completed with no supplementary funding from DOT.

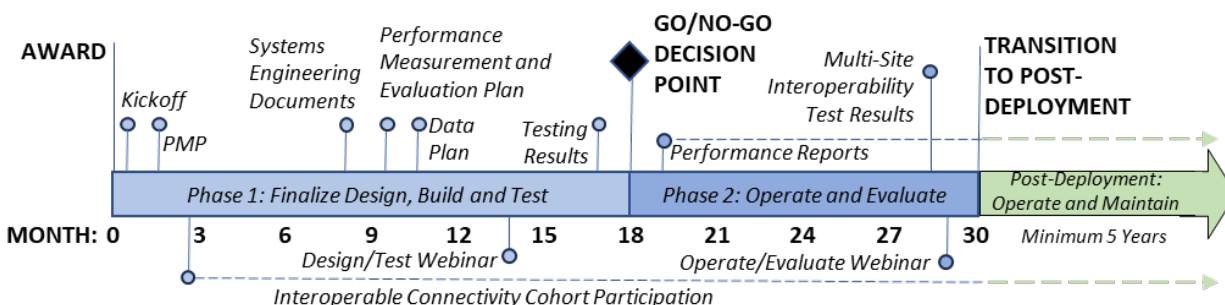


Figure 1. Phases of the Initiative.

Phase 1: Finalize Design, Build, and Test. In this phase, awardees will conduct systems engineering activity leading to the installation and testing of the deployed system. Note that for sites with already operational systems, undergoing enhancement and extension of current systems requires updates to existing Concepts of Operations (ConOps), Systems Requirements, Systems Architecture, System Design, and other documentation. Sites deploying all-new systems, or who do not have systems engineering artifacts and other planning documentation in hand at award, will be required to create them. Sample systems engineering documents may be found on <https://www.its.dot.gov/pilots/events.htm>. Incremental (agile) systems engineering approaches may be offered, in conjunction with (e.g., a hybrid approach) or in lieu of traditional waterfall methods.

NOTE: The maximum proposed duration of Phase 1 is 18 months.

Within Phase 1, each site must demonstrate interoperability among wirelessly connected devices and the surrounding transportation systems throughout their proposed deployment area (among other requirements) as a part of comprehensive system testing. In addition, sites may also be asked to demonstrate interoperable elements of their deployments at DOT's request in one or more relevant venues, e.g., Plugfest¹⁰ events. Sites will be responsible for transporting the relevant equipment to these venues.

¹⁰ https://omniair.org/florida_plugfest/

The DOT is cognizant that the vision of *interoperable connectivity* (See Section A.3) is aspirational and imprecise in nature, while testing and demonstration of interoperability must be concretely and precisely defined. For this Initiative, DOT expects awardees to focus (first) on the key interoperability building blocks in a deployed system, namely the transmission and reception of fundamental standards-conformant messages (e.g., Basic Safety Messages, Signal Phase and Timing and Map messages, and messages related to security credential management). In Phase 1, DOT expects that equipment from multiple vendors will demonstrate this fundamental level of interoperability. Note that all interoperability testing must be conducted with relevant security management processes “live” and connected with an operational SCMS.

Further, DOT seeks to encourage the utilization of IEEE 1602.2.1 certified technology within the deployments. However, DOT recognizes that both the technology and the relevant certification processes are maturing. Therefore, at a minimum, all IEEE 1602.2.1 relevant devices must be submitted for certification prior to the initiation of Phase 2.

Phase 2 Go/No-Go Decision Point. Prior to moving to Phase 2, the deployed system must be suitably tested. The DOT, in conjunction with the grant Recipient, will assess when testing is complete that the system demonstrates it performs both *safely* and as *designed*. Funding for Phase 2 will not be obligated by DOT and authorization to incur costs for Phase 2 is subject to conditions described in Section A.6 of this NOFO. If such a determination cannot be made, funding for Phase 2 will not be obligated by DOT.

Phase 2: Operate and Evaluate. In this phase, the operational system must be maintained in an operational state for the purposes of determining both operational impacts, costs, and technical insights. The collection of data related to the impact of the deployment cannot be less than 12 months and no more than 24 months. The sites will be responsible for a minimum 12 months of data and impact evaluation even if the completion of Phase 1 is delayed.

Throughout Phase 1 and Phase 2, each site will participate in the planning and execution of a joint interoperability demonstration involving devices from all awarded sites. This interoperability demonstration may be assumed to take place between Month 22 and Month 28 (see Figure 1). Note that the DOT will lead the development of the Phase 2 interoperability demonstration plan (with site feedback). This includes the identification and procurement of a third-party closed testing facility, if required. Sites (and their relevant technology vendors) will be responsible for preparing and transporting relevant equipment to the DOT-identified testing site per the Phase 2 interoperability demonstration plan. Sites may also be asked (collectively) to demonstrate interoperable elements of their deployments at DOT request, both in technical venues (e.g., Plugfest, as described above) or as a part of outreach activity. Sites will be responsible for transporting the relevant equipment to these venues.

NOTE: The minimum duration of Phase 2 (either proposed or in execution) is 12 months.

Post-Deployment: Operate and Maintain. The Initiative is a *deployment* initiative, not a field operational test or technology demonstration. Sites are expected to maintain, operate, and continue to evaluate the effectiveness of successful, conformant elements of the deployment for a minimum of 5 years after the end of Phase 2. Post-deployment planning should assume no

additional Federal funding from the Initiative, that is, all operational costs must be borne by site-identified sources after the conclusion of Phase 2. Post-deployment operations planning should address potential contingencies relative to both technical, financial (e.g., availability of other Federal and State aid), and policy (e.g., possible FCC actions) implications.

NOTE: The minimum duration for post-deployment operations and maintenance planning is 5 years.

4. GOALS

4.1. DEPARTMENTAL GOALS

The DOT seeks to fund projects under this NOFO that, in combination with the merit selection criteria, advance one or more of the following Departmental goals, where applicable.

Safety

The Department is committed to advancing safe, efficient transportation, including under this Initiative.

The NRSS, issued January 27, 2022, commits the Department to respond to the current crisis in roadway fatalities by “taking substantial, comprehensive action to significantly reduce serious and fatal injuries on the Nation’s roadways,” in pursuit of the goal of achieving zero roadway deaths through a Safe System Approach.¹¹ The outcomes that are anticipated from the projects funded by the Initiative should align with the NRSS.

Equity

The Department seeks to award projects under the Initiative that will create proportional impacts to all populations in a project area, remove transportation related disparities to all populations in a project area, and increase equitable access to project benefits, consistent with Executive Order (E.O.) 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government (86 FR 7009).

Climate Change and Sustainability

The Department seeks to fund projects under the Initiative that reduce greenhouse gas emissions in the transportation sector, incorporate evidence-based climate resilience measures and features, reduce the lifecycle greenhouse gas emissions from the project materials, and avoid adverse environmental impacts to air or water quality, wetlands, and endangered species, and address the disproportionate negative environmental impacts of transportation on disadvantaged communities, consistent with E.O. 14008, Tackling the Climate Crisis at Home and Abroad (86 FR 7619).¹²

¹¹ <https://www.transportation.gov/NRSS>

¹² See U.S. Department of Transportation Strategic Framework FY 2022–2026 (Dec. 2021) at <https://www.transportation.gov/administrations/office-policy/fy2022-2026-strategic-framework>

Workforce Development, Job Quality, and Wealth Creation

The Department intends to use the Initiative to support the creation of good-paying jobs with the free and fair choice to join a union and the incorporation of strong labor standards and training and placement programs, especially registered apprenticeships, in project planning stages, consistent with E.O. 14025, Worker Organizing and Empowerment (86 FR 22829), and E.O. 14052, Implementation of the Infrastructure Investment and Jobs Act (86 FR 64335). The Department also intends to use the Initiative to support wealth creation, consistent with the [Department's Equity Action Plan](#) through the inclusion of Local inclusive economic development and entrepreneurship such as the utilization of Disadvantaged Business Enterprises, Minority-owned Businesses, Women-owned Businesses, or 8(a) firms.

4.2. INITIATIVE GOALS

The DOT's vision for the Initiative is to accelerate the adoption and deployment of interoperable connectivity nationwide to:

- improve system safety (particularly the safety of vulnerable road users);
- enhance traveler mobility;
- improve the efficiency of goods movement;
- address disparities in transportation equity;
- reduce environmental impacts (e.g., greenhouse gas emissions and pollution); and,
- demonstrate a significant return on (public and private) investment.

Goals of the Initiative:

- Deploy, operate, and showcase integrated, advanced deployments featuring applications enabled by interoperable connectivity that *substantially* and *quantitatively* improve safety, mobility, efficiency, environmental impacts, equity, and ROI.
- Inform and educate the ITS community and the general public regarding these impacts.
- Support the development, evaluation, and documentation of a suitable reference implementation for secure interoperable connectivity that will serve as a practical template spurring broader, at-scale national deployment of interoperable connectivity.

5. STATEMENT OF WORK

The following sections delineate the tasks and deliverables required in Phases 1 and 2 for Initiative awardees deployments.

If a Phase 1 deliverable, or version update, has not been expressly approved in writing by DOT, the Recipient shall not perform the relevant Phase 2 activities until such time as the Phase 1 deliverable, or version update, is expressly approved in writing by the DOT. Costs incurred to perform Phase 2 tasks, without receipt of written approval of the relevant Phase 1 deliverables or updates from the Agreement Officer's Representative (AOR) shall be deemed unallowable.

PHASE 1: FINALIZE DESIGN, BUILD, AND TEST TASKS

- 1-1. Program Management
- 1-2. System Planning and Design
 - 1-2.1. Systems Engineering Documentation Development and/or Refinement

- 1-2.2. Data Planning
- 1-2.3. Acquisition and Installation Planning
- 1-2.4. Operations and Maintenance Planning
- 1-2.5. Performance Measurement and Evaluation Planning and Baseline Reporting
- 1-3. System Build
 - 1-3.1. System Acquisition and Installation
 - 1-3.2. Software Development and Integration
- 1-4. System Test and Operational Readiness Demonstration
 - 1-4.1. System Test and Operational Readiness Demonstration Planning
 - 1-4.2. System Configuration and Unit/Subsystem/System Testing
 - 1-4.3. Operational Readiness Demonstration
- 1-5. Stakeholder Outreach and Communications
 - 1-5.1. Outreach Plan
 - 1-5.2. Cohort Participation
 - 1-5.3. Design/Build/Test Lessons Learned and Webinars
 - 1-5.4. Design/Build/Test Reference Implementation Guide

PHASE 2: OPERATE AND EVALUATE TASKS

- 2-1. Program Management
- 2-2. System Operations and Maintenance
- 2-3. Inter Site Interoperability Demonstrations
- 2-4. System Performance Measurement and Evaluation
- 2-5. Stakeholder Outreach and Communications
 - 2-5.1. Cohort Participation
 - 2-5.2. Operate/Evaluate Lessons Learned and Webinars
 - 2-5.3. Operate/Evaluate Reference Implementation Guide
- 2-6. Post-Deployment Transition Planning

NOTE 1: All final reports under this agreement will be made publicly available. All publications resulting from this agreement shall follow the ITS JPO publication guidelines,¹³ including being 508-compliant, and comply with the current DOT Public Access Plan on date of award (currently Version 1.1¹⁴). In addition, data from these efforts are expected to be made widely available where appropriate, also in accordance with the DOT Public Access Plan.

NOTE 2: The AOR will supply supporting materials and technical assistance to Recipients during Phases 1 and 2. Technical assistance includes templates for select deliverables in Phases 1 and 2.

PHASE 1: FINALIZE DESIGN, BUILD, AND TEST

1-1. Program Management

¹³ <https://www.its.dot.gov/communications/pubsguidance.htm>

¹⁴ <https://www.transportation.gov/mission/open/official-dot-public-access-plan-v11>

Phase 1 Kickoff Meeting. Within four weeks after the effective date of the award, representatives from the Recipient's deployment team shall attend a kickoff meeting with the DOT and its representatives to ensure that all parties have a common understanding of the award requirements and expectations. The kickoff meeting is planned as an in-person meeting in Washington, DC or at the site, subject to AOR approval. A (completely) virtual meeting may replace the in-person kickoff, subject to AOR approval.

Kickoff Meeting Attendance. The Recipient shall bring its key personnel identified in SECTION F.2.F, or their designees, plus one additional representative as necessary, to this meeting. The AOR will coordinate with the Recipient on the location, the agenda, and the list of other attendees. The AOR will arrange for the meeting location, if held at DOT.

Kickoff Meeting Travel Costs. Travel costs to attend the kickoff meeting shall be limited to a maximum of four individuals from the Recipient team unless otherwise approved by the Agreement Officer (AO). Specifically, the DOT requests attendance at the kickoff meeting by the four key personnel identified herein, or their designees, plus one grant/business manager or administrator. A virtual web conference will be made available for remote participation by additional Recipient team members.

Project Management Plan. A successful deployment concept will require a disciplined approach to managing the execution of the work and making sure the team responsible for the deployment delivers the highest quality products on time and within budget. Consistent processes and procedures should be used to ensure quality, timeliness, and cost control. The Recipient must conduct effective program management activities to include:

- **Scope Management.** This includes ensuring that all required activities are performed and that only required activities are performed. The Recipient should have mechanisms in place for verifying and controlling the overall scope of the deployment.
- **Schedule Management.** This includes managing the timely execution of work activities. A Project Schedule should list all activities required to bring the necessary work to a successful completion. Successful schedule management should identify how the team will monitor the project schedule and manage changes after a baseline schedule has been approved. Schedule management includes identifying, analyzing, documenting, prioritizing, approving or rejecting, and publishing all schedule-related changes.
- **Communications Management.** This includes the systematic planning, implementing, monitoring, and revision of all the channels of communication with project partners and with other stakeholders. For the purposes of the Initiative, a partner refers to an organization or individual on the deployment team. A stakeholder refers to an organization or individual potentially impacted by the deployment itself, regardless of whether they are team members (partners) or not. Communications management ensures effective internal team communications and governance methods, as well as communications with the DOT's AOR. All communications must meet stakeholder language and accessibility needs.

- **Cost Management.** This includes the process of planning and controlling the budget for the deployment. Effective cost management should ensure that any issues with funding are surfaced quickly before cost overruns can occur.
- **Quality Management.** This includes effectively managing the quality of the products produced, from planning to delivery. Quality management includes procedures to be followed to implement a quality program and provide DOT with visibility into product quality (e.g., process and product evaluations, record keeping, nonconformance tracking, and reporting channels). Quality management addresses both Quality Control (QC) and Quality Assurance (QA) processes. The QC is defined as the monitoring and controlling actions required during a project to ensure that a product – or performed service – adheres to a defined set of quality criteria. The QA ensures that the appropriate quality planning and QC mechanisms are defined and utilized to prevent mistakes or defects.
- **Procurement Management.** This includes the process for managing procurements for the deployment project. Procurement management also includes contract management. Procurement management plan should discuss at a minimum: the approach for acquisition of services, devices, and products; how vendors will be selected and managed; the types of contracts that will be used; the types of metrics for evaluating vendors' performance; the procurement timelines; planning for procurement contingencies; and roles and responsibilities. Procurement risks should be surfaced as soon as these are identified.
- **Configuration Management.** This includes managing how items to be placed under configuration control are identified, when they are identified, and when they are placed into a configuration control process or system. Configuration management may include establishing a Configuration Control Board (CCB) and include procedures for handling proposed changes to items under configuration control, and the role of DOT in configuration control.
- **Risk Management.** This includes identifying, prioritizing, and managing program risks in a timely and efficient manner. Risks that may impact the schedule, scope, or costs of activities performed under the program should be identified, documented, and tracked. Plans for mitigating risks should be identified and implemented.

The Recipient will prepare a Project Management Plan (PMP) that describes the activities required to perform the work, applying current Project Management Body of Knowledge guidance.¹⁵ The PMP will explain the roles and responsibilities of all key individuals within the program/project team. At a minimum, the PMP will contain a Scope Management Plan, a Schedule Management Plan, a Communications Management Plan, a Cost Management Plan, a Quality Management Plan, Configuration Management Plan, and a Risk Management Plan.

¹⁵ Project Management Institute (2017), A Guide to the Project Management Body of Knowledge, 6th Ed. or later

The Recipient will deliver a draft PMP to DOT. After receiving DOT comments and resolving them, the Recipient will provide a revised version of the PMP and its related documents. During the course of the deployment, the Recipient may propose modifications to the PMP. Any such modifications shall go through the cycle of draft submission, DOT review and comment, comment resolution, and submission of a revised version. Routine Monthly Project Schedule updates, required as part of the Monthly Progress Reports per NOFO Section F.3, are not considered to be modifications to the PMP.

The PMP will be accompanied by a detailed deployment Project Schedule, considered to be a logical component of the PMP, although it will be submitted as a separate electronic file. The Project Schedule will list all activities required to bring the necessary work to a successful completion and will contain – at a minimum – three levels of the Work Breakdown Structure (WBS). The Project Schedule should be submitted in Microsoft Project (2007 or later) format.

The Project Schedule will be updated monthly (see NOFO Section F.3). The Project Schedule will describe the following:

- Name of the work activity;
- Expected start and end dates;
- Name of the individual with the primary responsibility for accomplishing the work;
- Dependencies with other work activities in the Project Schedule;
- All deliverables, procurements, or milestones resulting from the work activity; and
- Percent Work Completed.

Monthly Progress Reporting. The Recipient shall provide monthly reporting in accordance with instructions provided in Section F.3 Monthly Reporting (e.g., activity narrative, updated monthly project and task schedules, updated risk register, updated Lessons Learned Logbook (see Task 1-5.3)), utilizing DOT templates that will be provided at the kickoff. Note that monthly reporting is composed of two documents, Part I: Technical Progress and Status Summary, and Part II: Detailed Financial Summary (see Section F.3).

Bi-Weekly Site-Specific Coordination Teleconferences. The DOT requires the Recipient to organize and participate in a site-specific bi-weekly deployment coordination teleconference with the site AOR and Federal team members to review work in progress, identify issues and risks, and coordinate technical assistance. At a minimum, the site key personnel and other relevant team members as appropriate for topic discussions should participate in these meetings.

Monthly All-Sites Coordination Teleconferences. To assist in coordination across sites and encourage collaboration among deployment sites, the Recipient will have a minimum of one representative participate in a monthly all-site coordination teleconference to be conducted with all Phase 1 Recipients.

Roundtable Teleconferences. The Recipient will have a minimum of one representative participate in bi-weekly roundtable meetings involving site representatives and Federal staff organized around specific topics. These roundtables will be a venue for sites to have collaborative discussions on specific challenges, insights, and solutions. The topics of discussion within the roundtable may be general in nature and may surface the need to convene additional

technical and non-technical issues as required. Multiple roundtables may be conducted in parallel, depending on the needs of and topics surfaced by the sites. For example, there may be a roundtable focused on Outreach and Communications, a second roundtable focused on Performance Measurement, a third roundtable focused on Systems Engineering, and so on. Regardless of how they may be constructed or realized, a key focus of the roundtable meetings will be on planning for inter-site interoperability demonstrations (to be conducted in Phase 2), and technical exchange. The inter-site interoperability demonstrations planning may be part of the Systems Engineering roundtable or may be organized as a separate roundtable. Additional follow-on meetings on specific technical issues may be held with the Federal technical team. A **DOT Technical Assistance Team**, composed of Federal and contractor staff, will be available to provide technical assistance and troubleshoot issues, working with the Recipient. Some issues may be referred to relevant Cohort or Stakeholder Outreach activities targeting the general ITS community (see Task 1-5, Task 2-5).

Standards Development Organization (SDO) Working Group/Committee Meetings. As directed by the AOR, the Recipient will make available an appropriate subject matter expert (SME) from their team to participate in SDO working group and/or technical committee meetings and provide/edit content of applicable standards. The SME is expected to participate in technical discussions and provide program needs, use cases, and requirements to the appropriate SDOs. The Recipient will also be responsible for reviewing/editing standards documentation relevant to interoperable connectivity as it is developed and balloted within the SDO process.

Phase 1, Task 1-1 Required Deliverables

- Phase 1 Kickoff Meeting
- Project Management Plan (Draft/Final/Revised)
- Monthly Progress Report Part I: Technical Progress and Status Summary
- Monthly Progress Report Part II: Detailed Financial Summary
- Participation in Bi-weekly Site-Specific Coordination Teleconferences
- Participation in Monthly All-Sites Coordination Teleconferences
- Participation in Bi-weekly Roundtable Teleconferences
- Participation in SDO Working Group/Committee Meetings

1-2. System Planning and Design

1-2.1. Systems Engineering Documentation Development and/or Refinement

This task refines existing systems engineering documentation previously developed by the Recipient in support of the delivery of their ITS projects. If the Recipient does not have previously developed systems engineering processes and documentation, then as part of this task the Recipient will develop and deliver the documentation described below.

Systems Engineering Management Plan (SEMP). The Recipient will describe the systems engineering process that will be followed during the execution of this project in a SEMP. The SEMP will describe how the Recipient will manage the systems engineering activities. Effective development and implementation of the technical and institutional solutions to enable an efficient, interoperable, secure, and replicable deployments requires rigorous application of

established systems engineering best practices. To reduce the risk of schedule and cost overruns and increase the likelihood that the deployment will meet users' needs, the Recipient will provide evidence of following a systems engineering process when implementing its concept. Benefits of following such an approach include improved stakeholder identification and participation; more adaptable, resilient systems; verified functionality and fewer defects; higher level of reuse from one project to the next; and better documentation.

The DOT recognizes the benefits of following a systems engineering approach. The DOT also supports innovative approaches that the Recipient may follow that are tailored to fit the needs of their deployment. The DOT recognizes that the Recipient may choose to use innovative approaches such as Agile Software Development, to build capability. These modern systems engineering techniques represent practical approaches that allow system developers to provide an initial capability followed by successive deliveries to reach the desired final product. Iterative development considers adaptive planning, evolutionary development, early delivery, continuous improvement, and encourages rapid and flexible response to change. This incremental, fast-paced style of development may help keep the solution open and flexible to accept new features and technologies. These techniques can be used to reduce the risk of failure and enable the ability to test and deploy so that features may be added often and put into production easily. The Recipient may refer to the following resources on Agile principles in Systems Engineering:

- Applying SCRUM Methods to ITS Projects. <https://rosap.ntl.bts.gov/view/dot/32681>
- Integration of Agile Principles into the Systems Engineering Lifecycle Model (INCOSE meeting 3/8/2017). <https://www.youtube.com/watch?v=leMXS6TXIY4>
- ITS-NY 2016 – See “We are all SCRUM Masters” presentation page 262. https://drive.google.com/file/d/1UhN5A5LWXJGYjP274Tf10_rnT4GLQL5C/view

Note: Applicants must propose both a proposed systems engineering approach as well as a set of systems engineering deliverables to support the over-arching Initiative goals regarding interoperable connectivity and replicability.

Note: Applicants should carefully consider the expected breadth and depth of systems engineering documentation they plan to deliver under this Initiative. The Attachment to this NOFO illustrates government expectations in terms of sufficient deliverables under a waterfall systems engineering approach. Note that this does not imply that a waterfall approach is preferred over other approaches.

Systems engineering documentation, source code, and code documentation, developed as part of the Initiative, are required to be shared with DOT and the community. Existing software and applications brought to the deployment need not be made open source, although new interfaces and enhancements (whether digital or software) are required to be made open source. The SEMP shall identify where the deployment will result in the contribution of open-source code and documentation and will include a source code management plan.

The Recipient will deliver a draft SEMP to DOT for review. The Recipient will revise the SEMP in response to DOT comments and deliver a revised SEMP and a companion comment

resolution log, showing how comments were resolved. Based on AOR approval of the revised SEMP and comment resolution log, the Recipient will deliver a final SEMP.

Phase 1, Task 1-2.1 Required Deliverables

- SEMP (Draft/Final)
- Systems Engineering Documentation per the SEMP.

1-2.2. Data Planning

In this task, the Recipient will develop a Data Plan that includes sections on Data Privacy Plan (DPP), Notice of Privacy Management Consistency, and a Data Management Plan (DMP). The Data Plan will document how data will be collected, integrated, managed, and disseminated in Phase 1 and Phase 2. This includes real-time and archived data (specifically identifying data to be publicly shared) in systems managed by the Recipient and its partners. When developing the DPP and DMP, Recipients must review the DOT's current Privacy Policy¹⁶ and Public Access Plan¹⁷ to ensure information in both reports is included where appropriate in the DPP and DMP sections of the Data Plan.

Data Privacy Plan (DPP). Improper handling of Personally Identifiable Information (PII) or Sensitive Personally Identifiable Information (SPII) by a Recipient could have significant adverse impacts on the privacy of individuals. For this reason, DOT is committed to ensuring that the Recipient institutes sufficient data privacy controls to mitigate the risk of harm to individuals that would result in the improper handling or disclosure of the PII and SPII collected from individuals in connection with a DOT-funded deployment project.

The DPP section of the Data Plan should be consistent with the ConOps, System Requirements Specification (SyRS), and DMP – any variances shall be identified and highlighted for DOT review. If DOT approves any variances, these variances shall be incorporated into updated Phase 1 documentation, as required.

Notice of Privacy Management Consistency. The DPP informs an overall Privacy Management Plan, prepared by the Recipient to be in accordance with relevant State and local laws for the deployment location(s). Note that the DPP should NOT address State and local laws, and the Privacy Management Plan details those state and local considerations and includes the plan to adhere to these State and local laws. In this section of the Data Plan, the Recipient must include a one-page letter on the “Notice of Privacy Management Consistency” to DOT, indicating that a Privacy Management Plan has been completed prior to the finalization of the Data Privacy Plan.

NOTE: The Privacy Management Plan is not a deliverable under this agreement.

¹⁶ <https://www.transportation.gov/individuals/privacy/dot-privacy-policy>

¹⁷ <https://www.transportation.gov/mission/open/official-dot-public-access-plan-v11>

Data Management Plan (DMP). The DMP serves as an operational guide for managing data collectively as a strategic asset, and, subject to applicable privacy, security, and other safeguards, making data available to enable transparent system performance measurement and evaluation, and fuel entrepreneurship, innovation, and economic development. The section on DMP shall document the flow of data from generation through its use to applications in the deployment, including, but not limited to:

- Data sources and destinations,
- Volume of data flow,
- Contents of data flow,
- Communications medium involved, and
- Long term storage plans.

The DMP section shall describe all data collection activities. Data will be needed to support, at a minimum, the development of applications (Task 1-3.2), system tests and operational readiness assessment (Task 1-4), operations and maintenance of system (Task 2-2), confirmation of interoperability (Task 2-3), and performance measurement and evaluation (Task 2-4).

This section shall include the plan for identifying, collecting, and managing baseline data; assess the variety, volume, and velocity (frequency of collection) of baseline data; and identify baseline data gaps and approach for addressing the gaps. This section shall also include metadata to provide appropriate context (including qualitative observations) for data collection. This section shall include the plan for identifying, collecting, and managing deployment-related data. Further, the plan shall assess the variety, volume, and velocity (frequency of collection) of deployment-related data that can be accommodated, in order to ensure the end-to-end delivery of data to all identified Recipients/users/systems. The plan shall establish consistent and systematic quality control procedures.

Data Sharing. Appropriately prepared system control, performance, and evaluation data, stripped of PII, are expected to be made available to the DOT and posted in a timely fashion on public-facing resources, freely available to the public and research community. Data sharing is subject to the protection of intellectual property rights and personal privacy and must be handled securely. The DOT envisions that this data sharing capability will support the needs of ITS researchers and developers while encouraging nationwide deployment replicability by reducing costs and encouraging innovation. Hence, in the DMP section of the Data Plan, the Recipient shall identify all appropriate data and processes (including privacy-related processes) to be utilized in enabling the progress of data from collection to processing and documentation to public-facing repository. Note that all data made available on public-facing resources must adhere to guidelines on preparation for submission and accompanying metadata determined by DOT.¹⁷

The DMP should be consistent with the ConOps, SyRS, DPP, and Performance Measurement and Evaluation Plan (PMEP) – any variances shall be identified and highlighted for DOT review. If DOT approves any variances, these variances shall be incorporated into updated Phase 1 documentation, as required.

The Recipient must deliver a draft Data Plan to the DOT for review. The Recipient will revise the Data Plan in response to DOT comments and deliver a revised Data Plan and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised Data Plan and comment resolution log, the Recipient will deliver a final Data Plan.

Phase 1, Task 1-2.2 Required Deliverables

- Data Plan (Draft/Final)

1-2.3. Acquisition and Installation Planning

This task covers planning for the acquisition, configuration, and installation of all in-vehicle, roadside, mobile device, center, and other equipment, software and supporting capabilities required to build, integrate, and test the designed system. The phrase “other equipment, software, and supporting capabilities” includes Commercial Off-the-Shelf (COTS) and Modifiable Off-the-Shelf (MOTS) software capabilities obtained from vendors and not explicitly covered under the Recipient’s partner-developed software capabilities (as a part of Task 1-3.2 Software Development and Integration).

Comprehensive Acquisition Plan (CAP). The Recipient will develop a Comprehensive Acquisition Plan (CAP) that identifies the type and number of devices, equipment, and software-based capabilities to be acquired. The CAP shall have one section for vehicles and in-vehicle equipment, one for roadside equipment, one for mobile devices, one for operations/management center equipment/capabilities, and one for other equipment, software, and supporting capabilities. The CAP shall provide an overview of the proposed acquisition approach that includes an assessment of time-to-procure relative to the overall deployment schedule. The CAP shall include a plan to equitably engage and inform prospective vendors over time in case of changes to requirements, quantities, and delivery timelines.

The Recipient must require prospective vendors to deliver a few sample devices, followed by a few production devices, for bench testing. Bench testing before agreeing to purchase the complete set of devices and equipment/capabilities can reduce risks for the Recipient. Bench testing may enable the Recipient to finetune specifications and applications and test vendors’ capabilities to inform vendor(s) selection.

In addition, for each identified type of equipment, the CAP shall include, at a minimum:

- Description of the item,
- Reference(s) to relevant requirements and specifications derived from the SDD,
- Identification of certification requirements (including interoperability certification),
- Description of the method of acquisition, and
- Identification of potential vendors/suppliers.

The DOT understands that there could be substantially different acquisition schedules depending on the nature and type of equipment/capability being acquired. The CAP is intended to document the process and provide assurance that this process is systematic, orderly, and well-documented. Individual item/capability acquisition is not subject to AOR approval prior to acquisition.

The Recipient will deliver a draft CAP to the DOT for review. The Recipient will revise the CAP in response to DOT comments and deliver a revised CAP and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised CAP and comment resolution log, the Recipient will deliver a final CAP.

Comprehensive Installation Plan (CIP). The Recipient will develop a Comprehensive Installation Plan (CIP) that incorporates the CAP and further identifies the types and number of equipment required to be configured and installed. Note that the installation of infrastructure related elements must adhere to and be consistent with State and local standards and installation approval procedures. The CIP shall have one section for vehicles and in-vehicle equipment, one for roadside equipment, one for mobile devices, one for operations/management center equipment/capabilities, and one for other equipment, software, and other supporting capabilities. The CIP shall provide an overview of the supplier base and procurement method(s), a high-level plan for inventory and configuration management, a high-level initial installation schedule, and one or more high-level installation plan(s) (including plans for developing training materials and videos for installers).

In addition, for each identified type of equipment, the CIP shall identify:

- Supplier(s),
- Inventory control method(s),
- Required configuration or pre-installation modifications,
- Pre- and post-installation inspection procedures,
- Detailed installation procedures (including training materials and videos for installers),
- QA/QC and maintenance processes (with identified responsible parties),
- A preliminary, high-level installation schedule,
- Hardware/software configuration control processes,
- Spare parts/warranty contingency plans, and
- Tech support/troubleshooting resources.

The Recipient will deliver a draft CIP to the DOT for review. The Recipient will revise the CIP in response to DOT comments and deliver a revised CIP and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised CIP and comment resolution log, the Recipient will deliver a final CIP.

Phase 1, Task 1-2.3 Required Deliverables

- Comprehensive Acquisition Plan (Draft/Final)
- Comprehensive Installation Plan (Draft/Final)

1-2.4. Operations and Maintenance Planning

This task covers planning for the operations and maintenance of all in-vehicle, roadside, mobile device, center, and other equipment, software, and supporting capabilities required in the deployed system.

Comprehensive Maintenance and Operations Plan (CMOP). The Recipient will develop a Comprehensive Maintenance and Operations Plan (CMOP) that identifies the types and number of equipment required to be maintained. Further, this document shall summarize key operational methods and procedures that ensure safe and efficient operations in Phase 2.

The CMOP shall have one section for operations and one section for maintenance. The maintenance section shall be further divided into sub-sections as applicable, one for vehicles and in-vehicle equipment, one for roadside equipment, one for mobile devices, one for operations/management center equipment, and one for other equipment, software, and supporting capabilities. The CMOP shall provide an overview of the proposed operational methods and processes, a high-level maintenance approach, as well as a high-level plan for inventory and configuration management.

In addition, for each identified type of equipment, the CMOP shall identify:

- Routine maintenance requirements/schedules,
- Inspection procedures (including verification of the accuracy of messages sent),
- Maintenance/replacement procedures and anticipated timeline (and responsible entities),
- QA/QC processes,
- Hardware/software configuration control processes,
- Recall processes, and
- Spare parts/warranty contingency plans.

Staff Training Plan. The CMOP shall include a section on plan for training operators, maintenance staff, and other personnel, to operate, maintain, and/or repair the deployed system. This plan shall include the development and delivery of the training, and schedule of activities.

The Recipient will deliver a draft CMOP to the DOT for review. The Recipient will revise the CMOP in response to DOT comments and deliver a revised CMOP and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised CMOP and comment resolution log, the Recipient shall deliver a final CMOP.

Phase 1, Task 1-2.4 Required Deliverables

- Comprehensive Maintenance and Operations Plan (Draft/Final)

1-2.5. Performance Measurement and Evaluation Planning and Baseline Reporting

In Phase 2 (Operate and Evaluate), the tested deployment system and technologies are placed into operational practice. The system operational performance and the impact of the deployment on a set of key performance measures will be monitored and reported on a periodic basis (at a minimum, bi-weekly).

A primary goal of the Initiative, as discussed in Section A.1, is to deploy, operate, and showcase integrated, advanced deployments featuring applications enabled by interoperable connectivity that *substantially* and *quantitatively*:

- improve system safety (particularly the safety of vulnerable road users);
- enhance traveler mobility;

- improve the efficiency of goods movement;
- mitigate environmental impacts;
- address disparities in transportation equity; and,
- demonstrate a significant return on (public and private) investment.

Recipients are expected to innovate, demonstrate interoperability, measure benefits, and share insights with the broader transportation community – and act as **key enablers of the vision of interoperable connectivity**.

The Recipient will develop a Performance Measurement and Evaluation Plan (PMEP) that identifies the Recipient’s goals, corresponding performance measures, and describes plans for measuring system operational performance, evaluating the impacts of the deployed system, and reporting system operational performance and deployment impacts. Performance against baseline measurements and targets are anticipated to be routinely and publicly reported throughout Phase 2.

Operational Hypotheses and Key Performance Measures. The Recipient’s deployment must solve one or more real problem(s) within an operational surface transportation system, and have an immediate, measurable impact on safety, mobility, efficiency of goods movement, environment, equity, and agency ROI. The PMEP shall include a section on operational hypotheses and corresponding key performance measures that the Recipient’s deployment will have an impact on, and suitable performance targets that are likely to be achieved within the timeframe of the deployment. In addition, the Recipient will identify system operational performance metrics that provide insight into the reliability of the system.

Use Cases. The PMEP shall describe methods used to create, identify, or otherwise generate the specific use cases where the deployment is expected to have the most impact in achieving performance targets. For example, if a reduction in the number of vehicles to vulnerable road user-related crashes is identified as a key measure, the process by which data and human resources are combined to identify near misses shall be detailed in the PMEP. The PMEP shall contain information on how suitable participants will be identified, recruited, and compensated.

Confounding Factors. The PMEP shall identify expected confounding factors that might influence deployment impacts. Confounding factors are external to the evaluation process and have the potential to compromise the accuracy of estimated impacts and resulting conclusions, if not controlled for. Potential mitigation approaches shall be identified for each confounding factor. The use of statistical techniques to mitigate these factors shall be described. For example, if fuel prices rise rapidly during Phase 2 and suppress overall transportation system demand, the plan should identify feasible methods (e.g., statistical or simulation based) to isolate the effect of this confounding factor and accurately estimate the impact of the deployment on the system as well as individual travelers.

Evaluation Design. The PMEP shall discuss the evaluation design(s) chosen to account for confounding factors and other threats to the validity of evaluation. For example, the Recipient may describe a time-series “before” and “after” approach. However, a more complex (and potentially revealing) plan may also be considered wherein participant actions and deployment

sub-elements are selectively activated to create control and treatment groups throughout Phase 2. The PMEP shall identify, by data source, the data elements, frequency, precision, and nature of observed data to be collected, processed, and utilized to measure deployment impact against targets.

Data Collection. The PMEP in conjunction with the Data Plan (Task 1-2.2) shall discuss the types of data the Recipient plans to collect to establish baseline and support ongoing measurement of system operational performance and evaluation of system impacts. This section shall document data sources and methodologies for collecting: (i) pre-deployment data that can be used as a performance baseline, (ii) continuous data during the life of the deployment to support performance measurement and evaluation, (iii) cost data including unit costs and operations and maintenance costs, and (iv) information on the timeframe that applications or other technology solutions are deployed.

Performance Measurement and Evaluation Methodology. The PMEP shall discuss the approach and methodologies for measuring the baseline, computing operational performance, and assessing system impacts, for each use case. The PMEP shall also discuss how the Recipient will assess if the key performance measures have improved from the baseline and how technological maturity has progressed from Phase 1 to the end of the deployment.

Qualitative Feedback Plan. The PMEP shall include a section on the plan for gathering qualitative feedback on the site's deployment.

Performance Reporting. It is expected that summaries/dashboards of performance to date covering key measures (deployment impacts as well as system operational performance) will be reported publicly by all deployment sites. The PMEP shall include a section that describes the system operational performance and deployment performance against baseline measurements and targets, that will be periodically (at a minimum, monthly) transmitted to the AOR as well as publicly reported throughout Phase 2. This section shall indicate how and in what form the Recipient will release these performance measures as open data (consistent with, and referencing, as needed, the DMP in Task 1-2.2).

Schedule. The PMEP shall include a detailed schedule of activities for performance measurement and evaluation and identify potential risks.

The Recipient will deliver a draft PMEP to the DOT for review. The Recipient will revise the PMEP in response to DOT comments and deliver a revised PMEP and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised PMEP and comment resolution log, the Recipient will deliver a final PMEP.

Baseline Data Collection and Sharing. The Recipient will follow the approved PMEP and Data Plan to collect pre-deployment data as well as cost data including unit costs and operations and maintenance costs, that will be used to establish the performance baseline. The Recipient will follow the approved Data Plan and the DOT guidelines for data sharing to prepare and share the baseline data on a DOT-identified public facing repository.

Baseline Performance Reporting. The Recipient will follow the approved PMEP to establish working end-to-end data collection and processing capabilities, as well as the collection and processing of baseline (“BEFORE”) data to support performance measurement and evaluation activities. The Recipient will also gather qualitative feedback as documented in the approved PMEP. The Recipient will prepare summaries/dashboards of baseline performance covering key measures (pre-deployment performance) as well as baseline qualitative feedback. The baseline performance summaries/dashboards shall be transmitted to the DOT based on the schedule established in the approved PMEP.

Coordination with a DOT Identified Group. The Recipient is expected to coordinate monthly with a DOT-identified group through the AOR. The purpose of these virtual coordination meetings will be to present the PMEP and baseline performance, as well as to discuss technical and non-technical issues related to performance measurement and evaluation.

Phase 1, Task 1-2.5 Required Deliverables

- Performance Measurement and Evaluation Plan (Draft/Final)
- Pre-Deployment / Baseline Data
- Periodic Baseline Performance Reporting
- Monthly Coordination with DOT-Identified Group

1-3. System Build

1-3.1. System Acquisition and Installation

In this task, the Recipient will follow the approved CAP and CIP (see Task 1-2.3) for the acquisition, configuration, and installation of in-vehicle, roadside, mobile device, center, and other equipment, software and supporting capabilities required to build, integrate, and test the designed system. These will need to be tailored, for example by vehicle type (e.g., public fleet vs. non-public fleet, bus vs. passenger vehicles vs. trucks), device vendor, etc.

Acquisition Report. The Recipient will prepare an Acquisition Report that includes a detailed schedule that identifies the work breakdown structure (noting all dependencies among activities) required for the acquisition of all equipment and capabilities identified in the CAP (Task 1-2.3). The Recipient will document progress against the plan, as well as any risks, issues, and mitigation plans and actions.

The Recipient will deliver a draft Acquisition Report to the DOT for review. The Recipient will revise the Acquisition Report in response to DOT comments and deliver a revised Acquisition Report and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised Acquisition Report and comment resolution log, the Recipient will deliver a final Acquisition Report. Following approval, the Recipient will provide monthly updates of the Acquisition Report until all equipment/capabilities have been obtained.

Installation Report. The Recipient will prepare an Installation Report that includes a detailed schedule that identifies the work breakdown structure (noting all dependencies among activities) required for the configuration and installation of all equipment and capabilities identified in the

CIP (Task 1-2-3). This includes developing training materials and videos for installers and conducting training, as well as getting required State and local approvals. The Recipient will document progress against the plan, as well as any risks, issues, and mitigation plans and actions.

The Recipient will deliver a draft Installation Report to the DOT for review. The Recipient will revise the Installation Report in response to DOT comments and deliver a revised Installation Report and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised Installation Report and comment resolution log, the Recipient will deliver a final Installation Report. Following approval, the Recipient will provide monthly updates of the Installation Report until all equipment/capabilities have been configured and installed.

Phase 1, Task 1-3.1 Required Deliverables

- Acquisition Report (Draft/Final)
- Monthly Updates to Acquisition Report
- Installation Report (Draft/Final)
- Monthly Updates to Installation Report

1-3.2. Software Development and Integration

This task covers all non-COTS/MOTS software development efforts conducted under this NOFO to support or create applications, integrate deployment functions, or enable testing at the system (or sub-system) level. Note that COTS and MOTS capabilities obtained from vendors are tracked separately under Task 1-3.1 (System Acquisition and Installation). When considered together, all required software development for the deployment should be reflected in Task 1-3.1 and Task 1-3.2 (this task). This task specifically addresses non-COTS/MOTS software development as well as all software integration activity (COTS/MOTS and non-COTS/MOTS). This task includes the documentation of all technical, cost, schedule considerations, and risks associated with software development and integration. Note that this task includes both the planning and execution of software development activities.

While some software development activities may have to wait until the system design work is complete, some activity may be initiated earlier. Given uncertainties in schedule and cost estimation associated with software development, managing these software activities is a critical action to mitigate risks with respect to overall deployment technical, schedule, and cost management.

Software Development Schedule (SDS). The Recipient will prepare an initial Software Development Schedule (SDS) that identifies the work breakdown structure (noting all dependencies among activities) required to make all Task 1-3.2 capabilities deployment ready. This includes, but is not limited to the following software capabilities:

- development/enhancement of individual applications or modules to meet deployment-specific needs,
- integration of applications, services, and technologies in a synergistic collection,
- management of data, safety, performance measurement, or other requirements,
- planning for user testing and engagement,

- interfacing (as required) with security and credential/user authentication systems,
- testing at sub-system or system levels,
- interfacing with existing legacy systems,
- development of software environments and architectures,
- adaptation and application of Continuous Integration (CI) systems (if any) to automate software releases and system deployment,
- optimization of code and refactoring, and
- development of documentation.

The SDS shall include a software testing schedule (as an appendix) and report progress against these tests as an element of updated SDS submittals. The software testing is a component of and is consistent with the overall system testing.

The Recipient will document progress against the plan, as well as any risks, issues, and mitigation plans and actions in the SDS.

The Recipient will deliver a draft SDS to the DOT for review. The Recipient will revise the SDS in response to DOT comments and deliver a revised SDS and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised SDS and comment resolution log, the Recipient will deliver a final SDS. Following approval, the Recipient will provide updates, as needed.

Open-Source Software and Supporting Documentation. Software development, enhancements, alterations, or adaptations for the purposes of the deployment that are developed through Federal funding are expected to be shared broadly with the community to inform other deployers and prospective deployers. Systems engineering documentation, source code, and code documentation are required to be shared with the DOT and the community. Existing applications brought to the deployment need not be made open source, although new interfaces and any enhancements are required to be made open source. Open-source software and supporting documentation shall be clearly identified within the SDS. Publicly posting all identified open-source software and supporting documentation is a deliverable in this task.

Phase 1, Task 1-3.2 Required Deliverables

- Draft Software Development Schedule (Draft/Final/Updates)
- Open-Source Software and Supporting Documentation (per the SDS)

1-4. System Test and Operational Readiness Demonstration

System operational readiness is established with a comprehensive set of tests and supporting demonstrations to be designed and conducted by the Recipient. A critical component of the demonstrations shall be intra-site and inter site interoperability demonstrations (see Section A.3.2). In Phase 1, the Recipient will plan for and demonstrate site interoperability (i.e., intra-site) among multiple devices, applications, and technologies that are planned for deployment at the site as well as with existing ITS systems in the region including (Advanced Traffic Management Systems, signal controllers, etc.). Additionally, the Recipient will collaborate with the other Recipients and DOT to plan for a joint interoperability demonstration (i.e., inter site), to

be conducted in Phase 2. The objectives of these tests and demonstrations are to assess and demonstrate that the deployed system operates as designed in a safe, secure, and interoperable manner.

This task covers the development of an Operational Readiness Concept Briefing, and a comprehensive Operational Readiness Plan (ORP), that describe both tests and demonstrations (Task 1-4.1). This task also covers the execution of the ORP, and documentation and reporting of results from the testing and operational readiness demonstrations to DOT (Task 1-4.2). When all testing is satisfactorily completed and all demonstrations are suitably successful, the deployment can be considered ready to move into an operational phase (see Section A.6, Approval to Proceed to Phase 2).

1-4.1. System Test and Operational Readiness Demonstration Planning

Operational Readiness Concept Briefing. The Recipient will develop an Operational Readiness Concept Briefing, which outlines the aspects of the deployment to be considered in the assessment of operational readiness and later documented in the ORP. This includes comprehensive systems engineering considerations (i.e., unit, subsystem, integration, and system acceptance testing) as well as assessments of whether the deployment can operate in a safe, secure, and interoperable manner, and whether staff and participants are suitably trained, human use approval has been obtained for all deployment participants, institutional and financial arrangements have been finalized, and whether the impact of the deployment can be discerned, measured, and reported. This also includes an approach for inter site coordination to support the interoperability demonstrations to be conducted in Phase 2.

The Operational Readiness Concept Briefing will be held virtually, using a web conferencing capability. The briefing shall include a preliminary list of proposed demonstrations.

Demonstrations must cover, at a minimum:

- Key use cases illustrating the capability of the system to perform in accordance with the ConOps,
- Safety-focused demonstration elements,
- Security-focused demonstration elements,
- Privacy-focused demonstration elements, and
- Intra-site interoperability-focused demonstration elements.

The Recipient will deliver the presentation materials for the Operational Readiness Concept Briefing to the DOT for review, prior to the briefing.

Operational Readiness Plan (ORP). The Recipient will incorporate discussions and/or written comments from the Operational Readiness Concept Briefing to develop a comprehensive Operational Readiness Plan (ORP) that describes both tests and demonstrations. The ORP includes two main sections, System Test Plan (STP) and Operational Readiness Demonstration Plan (ORDP).

System Test Plan (STP). The Recipient will develop a section on STP, which documents the approach to verifying that the system performs according to the documented System

Requirements. The STP shall define the system test strategy, from Unit Testing to Subsystem, Integration, and full System Acceptance Testing. Each stage of testing shall have a high-level overview of the types of testing that will be accomplished. The types of testing would include, but are not limited to, functional testing, performance testing, security testing, and end user testing/demonstrations. Each stage of testing shall also include a schedule showing when these stages will be accomplished as well as any interdependencies between activities in each stage. The Recipient will also document what specific test plans, test cases, and test procedures will be documented for each test stage and where that documentation will be maintained. The STP shall discuss the overall test processes within the program including how test failures are handled; how regression testing is accomplished; how deficiencies/defects are handled and reported; and how the test results, in this case the results from Unit, Subsystem, Integration and System Acceptance testing, and progress against the test schedule are reported. Finally, the STP shall include a Requirements Traceability Matrix that shows the traceability between every system requirement, its test verification method (e.g., Inspection, Demonstration, Analysis, or Test), and the specific test case(s) that it will be verified in.

The STP will incorporate (at a minimum) the following elements for each test:

- **Test Descriptions.** Test Descriptions shall include written descriptions of the individual verification and validation processes that will occur as part of the effort to ensure that the system was built correctly and that the correct system was built. Test descriptions shall contain links to documented System Requirement(s). The document should include a requirements-to-test procedure matrix that shows the test coverage relationship among the tests and the requirements. Every requirement shall have at least one test case associated with it and each test case should have at least one requirement associated with it when both STP and ORDP are considered.
- **Test Cases.** Each test case shall include a set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular path within a system or a software application or to verify compliance with a specific requirement or set of requirements.
- **Test Procedures.** Test procedures shall detail exactly how one verifies and validates that the component of the as-deployed system examined functions as intended and as desired. If test data are going to be used as part of the verification and validation process in this step, the test procedures shall also detail how one will determine that the as-deployed system performed the correct transformations on the data entered. Verification can use inspection, test, demonstration, and analysis but must be identified in each test.
- **Test Data.** This section shall include scripts used to execute software operations, data that must be entered by someone as part of the process of verification and validation of the system and its component integration, or a description of what system-generated data will flow through different components of the system to accomplish a system function.
- **Test Results.** This section shall describe the results of each test conducted. This section shall also describe how test results will be summarized and documented across all tests and delivered to DOT.
- **Test Failure Remediation.** This section shall describe the actions to be taken in the event of a failed test.

- **Schedule.** This section shall describe the schedule for conducting the tests and any interdependencies between the different tests. This section shall also describe any risks.

Operational Readiness Demonstration Plan (ORDP). The Recipient will develop a section on ORDP, which describes a set of demonstrations to show that the system performs as expected in key use cases/scenarios. A key set of demonstrations shall be focused on site interoperability. A second set of demonstrations shall be focused on inter-site interoperability (to be planned in Phase 1 and conducted in Phase 2). Both intra and inter-site interoperability demonstrations must provide over-the-road evidence of successful and secure communications as well as the effective operation of ITS applications among diverse roadside equipment, in-vehicle, and mobile devices. All deployment sites must include an IEEE 1609.2.1 compliant SCMS and demonstrate end-to-end certification management as part of the testing. The Recipient will discuss a plan for coordinating with the SCMS provider and SCMS Manager. The Recipient will also discuss a plan for collaborating with the other Recipients and DOT to develop a plan for coordinating and conducting the joint interoperability demonstrations (i.e., the inter-site interoperability demonstrations) in Phase 2. Note that the development of the inter-site interoperability demonstration plan will be led by DOT, with the sites providing feedback (see Section A.3.2).

The ORDP will incorporate (at a minimum) the following elements for each demonstration:

- **Demonstration Description.** This section shall identify the objective, general location, participants, equipment, and actions to be taken within the demonstration to illustrate the successful deployment of the key use case.
- **Demonstration Procedure.** This section shall describe the sequence of events expected to be demonstrated as well as observable validation criteria associated with the overall purpose of the demonstration.
- **Demonstration Data.** This section shall describe the data that are collected before, during or after the demonstration to support the observable demonstration validation criteria related to demonstration success (e.g., pass or fail).
- **Demonstration Results.** This section shall document how results of each demonstration will be captured. This section shall also describe how demonstration results will be summarized and documented across all demonstrations and delivered to DOT.
- **Demonstration Schedule.** This section shall document a schedule for conducting the demonstrations and any interdependencies between the different demonstrations (*to be updated monthly as part of Task 1-4.3*). This section shall also describe any risks.

The Recipient will deliver a draft ORP to the DOT for review.

Operational Readiness Plan Walkthrough. After the delivery of the draft ORP, the Recipient will conduct an Operational Readiness Plan Walkthrough in the Washington, DC metro area to demonstrate the completeness and technical soundness of the plan. The Recipient will prepare a Walkthrough Workbook to structure and expedite the Walkthrough process. A (completely) virtual meeting may replace the in-person meeting, subject to AOR approval.

The Recipient shall revise the ORP in response to DOT comments (verbal comments provided during the Walkthrough as well as written comments) and deliver a revised ORP and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised ORP and comment resolution log, the Recipient will deliver a final ORP.

Phase 1, Task 1-4.1 Required Deliverables

- Operational Readiness Concept Briefing and Presentation Materials
- Operational Readiness Plan (Draft/Final)

1-4.2. System Configuration and Unit/Subsystem/System Testing

This task shall be conducted in conjunction with Task 1-3.1 and Task 1-4.1.

System Test Results Summary (STRS). The Recipient will execute the approved STP to conduct Unit, Subsystem, Integration, and System Acceptance testing of devices installed as part of Task 1-3.1. The Recipient will develop a System Test Results Summary (STRS) that summarizes the test results for all tests outlined in the STP. The STRS shall include the pass/fail status of each test, the number of defects, and the number of defects resolved. The STRS shall also note any open defects, the severity/impact of those defects on the system, and the timeframe for when they will be resolved.

The Recipient will deliver a draft STRS to DOT for review. The Recipient will revise the STRS in response to DOT comments and deliver a revised STRS and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised STRS Report and comment resolution log, the Recipient shall deliver a final STRS. Following approval, the Recipient shall provide monthly updates of the STRS (as a companion document to monthly updates to the Installation Report), until all equipment/capabilities have passed all tests.

Phase 1, Task 1-4.2 Required Deliverables

- System Test Results Summary (Draft/Final/Updates)

1-4.3. Operational Readiness Demonstration

This task shall be conducted in conjunction with Task 1-4.1.

Operational Readiness Demonstration Schedule (ORDS) Updates. The Recipient will prepare periodic updates to the ORDS in response to DOT comments on format and content, as well as to document progress against the plan, and track risks/issues (see Section F.3). The frequency of these updates will be tied to the Sprint cycle, as defined by the Recipient, but shall be no less than monthly. The updated ORDS shall include a concise summary of activities underway, progress made since the last update, and any/all technical issues/risks with any/all mitigation actions taken since the last update (see Section F.3). Schedule and risk updates are expected to be delivered from the time that this task is initiated until the end of Phase 1.

As a part of the ORDS, the Recipient will provide updates on the operational health summary covering all devices, applications, and technologies (e.g., installed, installed and tested,

operational, under repair/not in operation). The Recipient will also provide an update on the numbers of participants, vehicles, mobile devices, certified devices, service area dimensions, roadside/wayside infrastructure elements, and other relevant countable deployment elements envisioned as a part of the *at-scale* deployment. *At-scale* here refers to the scope of the deployment when fully deployed and operational – i.e., the levels intended to be maintained as a part of a sustained deployment for a minimum of five years beyond the end of Phase 2. The ORDS shall also document at a minimum the status on applying for and receiving FCC waivers, certification of devices, and compliance with IEEE 1609.2.1 SCMS. Any major milestones with respect to the FCC waiver submission and reception should be noted in the Monthly Progress Report (see Task 1-1).

Operational Readiness Demonstration Report (ORDR). The Recipient will execute the approved ORDP to conduct site-specific Operational Readiness Demonstrations (ORD), including intra-site interoperability demonstrations. Demonstrations will be scheduled in conjunction with the AOR and key Federal staff. Demonstrations will be conducted per the processes identified in the ORDP. The Recipient may be asked by the AOR to demonstrate interoperable elements of their deployment in one or more relevant venues, e.g., [Plugfest](#) events. The Recipient will be responsible for transporting the relevant equipment to these venues. After completion of the ORD, the Recipient will prepare an ORDR, documenting the demonstrations and results, according to the processes identified in the ORDP.

The Recipient will deliver a draft ORDR to the DOT for review. The Recipient will revise the ORDR in response to DOT comments and deliver a revised ORDR and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised ORDR and comment resolution log, the Recipient will deliver a final ORDR.

Phase 1, Task 1-4.3 Required Deliverables

- Periodic Updates to Operational Readiness Demonstration Schedule
- Operational Readiness Demonstration Report (Draft/Final)

1-5. Stakeholder Outreach and Communications

1-5.1. Outreach Plan

Outreach Plan. The Recipient will develop an Outreach Plan for managing all stakeholder communications and outreach activities within the period of performance of Phase 1 and Phase 2. This plan shall cover both outreach activities and the accommodation of requests for site visits by media, researchers, and others.

The Recipient will update the Outreach Plan, as needed, throughout Phase 1.

The Outreach Plan shall identify a single Site Outreach Lead as well as a single Site Outreach Spokesperson. The Site Outreach Lead is responsible for the coordination of Outreach requests, while the Site Outreach Spokesperson (alone) is designated to speak for the Deployment in communication with the media. Further, the Outreach Plan shall articulate the proposed:

- Media strategy for both local and national press,

- Media coordination with the DOT,
- Web/social media presence,
- Trade show strategy,
- Outreach strategy to promote the deployment locally and nationally,
- Community awareness strategy,
- Crisis communications plan in case of unforeseen events, natural disasters, and other threats,
- Interaction with other Initiative deployment sites (including to plan for inter site interoperability demonstrations), and
- Accommodation of site visits and demonstration of capabilities (including intra site and inter site interoperability demonstrations).

The Outreach Plan will include a PR/Marketing plan describing the site end-to-end professional development and delivery of materials and events with language and accessibility accommodations:

- News articles, press releases, brochures, fact sheets in accessible formats and multiple languages, as needed,
- Photos,
- Accessible Website content,
- Videos including closed captioning capabilities,
- Talking points, Press events, PowerPoint slide decks, and
- Trade show events.

Anticipated levels of Outreach, at a minimum, are expected to include:

- Participation in two public meetings or press conferences per year,
- Three articles a year to be published in industry trade journals,
- A promotional video (6-12 minutes) about the deployment, including two additional updates,
- A deployment website,
- Travel and participation in three workshops/conferences/trade shows each year,
- Participation in monthly DOT-organized cohort meetings to share experiences regarding the deployment, and
- Participation in two DOT-organized webinars a year regarding the deployment progress/performance.

The Outreach Plan shall also include regular coordination with DOT communications staff, to facilitate the branding, re-use and re-distribution of materials developed by DOT and the Recipient.

The Recipient will deliver a draft Outreach Plan to DOT for review. The Recipient will revise the Outreach Plan in response to DOT comments and deliver a revised Outreach Plan and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised Outreach Plan and comment resolution log, the Recipient will deliver a final Outreach Plan.

Outreach Implementation Schedule (OIS). Based on the approved Phase 1 Outreach Plan, the Recipient will create an Outreach Implementation Schedule (OIS) that includes a work breakdown structure (see Section F.3) of activities required to implement the approved Outreach Plan within the period of performance. The Recipient will deliver an initial draft OIS to the DOT for review. The Recipient will revise the OIS in response to DOT comments and deliver a revised OIS.

Monthly OIS Update. Following approval of OIS, the Recipient will provide monthly updates of OIS until the end of Phase 2. The Recipient will prepare monthly updates to OIS in response to DOT comments on format and content, as well as to document progress against plan, and track risks/issues (see Section F.3). The updated OIS shall include a concise summary of activities underway, progress made since the last update, and technical issues/risks with mitigation actions taken since the last update. Monthly schedule and risk updates are expected to be delivered from the time that this task is initiated until the end of Phase 2.

Travel Costs Note: The Recipient shall not incur travel costs under this task without written prior approval from the AOR. The Recipient will document planned and conducted travel in the Outreach Plan and OIS.

Phase 1, Task 1-5.1 Required Deliverables

- Outreach Plan (Draft/Final)
- Outreach Implementation Schedule (Initial/Monthly Updates)

1-5.2. Cohort Participation

To meet overall program goals, the sites are expected to share insights and lessons learned with peers considering or actively deploying interoperable connectivity capabilities. In this task, the Recipient will participate in DOT-organized cohort meetings that are expected to be conducted monthly on interoperable connectivity. The Recipient will make available an appropriate SME from their team to participate in these monthly Cohort meetings. The SME is expected to participate in technical discussions and share insights, best practices, challenges, and lessons learned related to their deployment with the goal to accelerate interoperable connectivity nationwide.

Phase 1, Task 1-5.2 Required Deliverables

- Participation in monthly Cohort meetings

1-5.3. Design/Build/Test Lessons Learned and Webinars

Lessons Learned Logbook (LLL). The Recipient shall develop and maintain a Lessons Learned Logbook that captures for each lesson: a succinct title, relevant task (e.g., Task 1-4.1), a summary of the issue identified, the realized/potential impacts, mitigating action(s) taken, and results identified (to date). The LLL shall be updated monthly, and a summary of new or updated entries incorporated into the Part I: Technical Progress and Status Summary in accordance with Section F.3 Monthly Reporting (see Task 1-1).

Public Webinars. The Recipient will participate in two DOT-organized public webinars a year to share with the broader interoperable connectivity community their progress and performance. Some example topics include: Deployment Concept, Operational Readiness Demonstration Results, Deployment Site Interoperability Insights and Issues, etc. The specific topics for the webinars will be selected in conjunction with the AOR.

In preparation for each webinar, the Recipient will deliver a PowerPoint presentation for review by DOT. The Recipient will revise the presentation in response to DOT comments and deliver a final presentation. The Recipient will also coordinate with the DOT Communications staff, who will organize and facilitate the webinars.

Phase 1, Task 1-5.3 Required Deliverables

- Lessons Learned Logbook Updates (as part of Monthly Progress Report Part I)
- Webinar PowerPoint Presentations (2, Draft/Final)

1-5.4. Design/Build/Test Reference Implementation Guide

A key goal of the Plan is to develop, evaluate, and document a suitable reference implementation for secure interoperable connectivity. This reference implementation can serve as a practical template spurring broader, at-scale national deployment of interoperable connectivity.

Memo on Inputs to Reference Implementation Guide. In this task, the Recipient will assist with the development of a Reference Implementation Guide in collaboration with the DOT. In an effort to create a practical and effective reference implementation, the Recipient will prepare a memo identifying the functional and physical interfaces developed, communications standards and protocols used, and other technical insights gained, and lessons learned recorded from the deployment and intra-site interoperability demonstrations. The memo may include references to specific sections, figures, and tables included within the Systems Engineering documents developed and/or refined by the Recipient as a part of the Initiative.

Phase 1, Task 1-5.4 Required Deliverables

- Memo on Inputs to Reference Implementation Guide

PHASE 2: OPERATE AND EVALUATE

2-1. Program Management

This task is a continuation of the Phase 1 Program Management activity, with the same objectives, activities, and scope. See Task 1-1 and Section F.3 for details.

Phase 2 Kickoff Meeting. The kickoff meeting may occur at DOT in Washington DC, or at the Recipient site. If held in Washington DC, travel costs to attend the kickoff meeting shall be limited to a maximum of four individuals from the Recipient team unless otherwise approved by the AO. Specifically, DOT requests attendance at the kickoff meeting by the four key personnel identified in Section F.2.F, or their designees, plus one business manager or administrator. A webinar will be made available for remote participation by additional Recipient team members. A (completely) virtual meeting may replace the in-person kickoff, subject to AOR approval.

Phase 2, Task 2-1 Required Deliverables

- Phase 2 Kickoff Meeting
- Revised Project Management Plan (as required)
- Monthly Progress Report Part I: Technical Progress and Status Summary
- Monthly Progress Report Part II: Detailed Financial Summary
- Participation in Bi-weekly Site-Specific Coordination Teleconferences
- Participation in Monthly All-Sites Coordination Teleconferences
- Participation in Bi-weekly Roundtable Teleconferences
- Participation in SDO Working Group/Committee Meetings

2-2. System Operations and Maintenance

In this task, the Recipient will operate and maintain the system according to the approved CMOP, developed in Task 1-2.4.

System Operations and Maintenance Schedule (SOMS). In this task, the Recipient will document the system operational status and asset management status in a SOMS. The Recipient will deliver an initial draft SOMS to the DOT for review.

Monthly SOMS Update. The Recipient will prepare monthly updates to the SOMS in response to DOT comments on format and content, as well as to document progress against plan and track risks/issues (see Section F.3). The updated SOMS will include a concise summary of activities underway, progress made since the last update, and any/all technical issues/risks/incidents with any/all mitigation actions taken since the last update. Schedule and risk updates are expected to be delivered from the time that this task is initiated until the end of Phase 2.

As a part of the monthly SOMS update, the Recipient will provide updates on the operational health summary covering all devices, applications, and technologies (e.g., installed, installed and tested, operational, under repair/not in operation). The Recipient will also provide an update on the numbers of participants, vehicles, mobile devices, certified devices, service area dimensions, roadside/wayside infrastructure elements, and other relevant countable deployment elements envisioned as a part of the *at-scale* deployment. The SOMS update shall also document at a minimum the status on applying for and receiving FCC waivers, certification of devices, and compliance with IEEE 1609.2.1 SCMS.

Phase 2, Task 2-2 Required Deliverables

- Initial System Operations and Maintenance Schedule (SOMS)
- Monthly Updates to SOMS
 - *Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting*

2-3. Inter-Site Interoperability Demonstrations

This task shall be conducted in conjunction with Task 1-4.1.

Inter-Site Interoperability Demonstration Schedule (IIDS) Updates. The IIDS will be developed by DOT with inputs from the sites. The IIDS will include a concise summary of activities underway, progress made since the last update, and any/all technical issues/risks with any/all mitigation actions taken since the last update (see Section F.3). The Recipient will provide periodic updates to IIDS from the time that Phase 2 is initiated until the end of this task. The frequency of these updates will be as defined by DOT, but will be no less than monthly.

The Recipient will provide inputs on progress against plan as well as updates on risks/issues (see Section F.3). The Recipient will also provide updates on the numbers of participants, vehicles, mobile devices, certified devices, service area dimensions, roadside/wayside infrastructure elements, and other relevant countable deployment elements envisioned as a part of the inter site interoperability demonstration. The Recipient will provide inputs on the status on applying for and receiving FCC waivers, certification of devices, and compliance with IEEE 1609.2.1 SCMS.

Inter-Site Interoperability Demonstration. The Recipient will execute the Phase 2 interoperability demonstration plan, developed by DOT with feedback from the sites, to conduct inter-site interoperability demonstration. Demonstrations will be scheduled in conjunction with the AOR, other sites' AORs, key Federal staff, and other sites. The Recipient's SCMS provider may need to be on call to provide support as needed. Demonstrations will be conducted per the processes identified in the Phase 2 interoperability demonstration plan and the schedule agreed to by all parties and documented in IIDS. The Recipient and their relevant technology vendors will be responsible for preparing and transporting relevant equipment to the DOT-identified testing site per the Phase 2 interoperability demonstration plan. If directed by DOT, the Recipient will also participate in joint demonstrations with other Recipients at technical venues (e.g., Plugfest) or as a part of outreach activity. The Recipient will be responsible for transporting the relevant equipment to these venues (see Section A.3.2).

Phase 2, Task 2-3 Required Deliverables

- Periodic Updates to Inter Site Interoperability Demonstration Schedule
- Inter Site Interoperability Demonstration

2-4. System Performance Measurement and Evaluation

In this task, the Recipient will collect, and process data according to the approved PMEP to measure the system operational performance and the impact of the deployment on a set of key performance measures. The collection, scrubbing, sanitization, and transfer of data from the deployment site to a public-facing resource is documented within the Data Plan, which is consistent with the PMEP.

Deployment Data Collection and Sharing. The Recipient will follow the approved PMEP and Data Plan to collect: (i) continuous data during the life of the deployment to support performance measurement and evaluation, (ii) cost data including unit costs and operations and maintenance costs, and (iii) information on the timeframe that applications or other technology solutions are deployed. The Recipient will follow the approved Data Plan and the DOT guidelines for data sharing to prepare and share the deployment data on a public facing resource. If the Recipient

has defined in the PMEP a control area and/or group, as part of their Evaluation Design, then the “without” data shall also be delivered.

Deployment Performance Reporting. The Recipient will collect qualitative feedback on the deployment, as documented in the approved PMEP. The Recipient will follow the approved PMEP and prepare summaries/dashboards of deployment performance covering key measures (deployment impacts and system operational performance) as well as deployment qualitative feedback. The deployment performance summaries/dashboards shall be periodically transmitted to the DOT based on the schedule established in the approved PMEP.

System Performance Report. The Recipient will develop a report documenting:

- PMEP (including revisions to the PMEP since approval),
- detailed analytical models and methodologies utilized in performance measure calculation,
- approach for collecting qualitative feedback,
- system operational performance,
- deployment impacts compared to the baseline, and
- qualitative feedback.

The System Performance Report will summarize benefits and costs of the deployment, as well as challenges/limitations of the deployment and potential steps for addressing them in future interoperable connectivity deployments.

The Recipient will deliver a draft System Performance Report to the DOT for review. The Recipient will revise the System Performance Report in response to DOT comments and deliver a revised System Performance Report and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised System Performance Report and comment resolution log, the Recipient will deliver a final System Performance Report.

Coordination with a DOT Identified Group. The Recipient will coordinate with the DOT-identified group (see Task 1-2.5) to present performance measurement and evaluation results and discuss key technical and non-technical issues.

Phase 2, Task 2-4 Required Deliverables

- Deployment Data (including without data, if collected)
- Periodic Deployment Performance Reporting
- System Performance Report (Draft/Final)
- Monthly Coordination with DOT-Identified Group

2-5. Stakeholder Outreach and Communications

The Recipient will conduct Stakeholder Outreach and Communications in Phase 2 as described in the Phase 1 Outreach Plan. This includes, for example, the development of outreach materials, web/social media content, trade show and conference materials, and other supporting materials intended to inform/educate and engage stakeholders and the general public on interoperable connectivity.

Monthly OIS Update. The Recipient will continue to provide monthly updates of OIS until the end of Phase 2. The updated OIS shall include a concise summary of activities underway, progress made since the last update, and technical issues/risks with mitigation actions taken since the last update. Monthly schedule and risk updates are expected to be delivered until the end of Phase 2.

Deliverables. The Recipient will execute the approved Phase 1 Outreach Plan to prepare and deliver all planned deliverables (e.g., public meeting/press conference meeting materials, industry trade journal articles, promotional video) for review by DOT and revise as needed.

Travel Costs Note: The Recipient shall not incur travel costs under this task without the written prior approval from the AOR. The Recipient will document planned and conducted travel in the Outreach Plan and OIS.

2-5.1. Cohort Participation

The Recipient will continue to participate in DOT-organized cohort meetings that are expected to be conducted monthly on interoperable connectivity. The Recipient will make available an appropriate SME from their team to participate in these monthly Cohort meetings. The SME is expected to participate in technical discussions and share insights, best practices, challenges, and lessons learned related to their deployment with the goal to accelerate interoperable connectivity nationwide.

Phase 2, Task 2-5.1 Required Deliverables

- Participation in monthly Cohort meetings

2-5.2. Operate/Evaluate Lessons Learned and Webinars

Lessons Learned Logbook (LLL). The Recipient will continue to develop and maintain a Lessons Learned Logbook that captures for each lesson: a succinct title, relevant task, a summary of the issue identified, the realized/potential impacts, mitigating action(s) taken, and results identified (to date). The LLL shall be updated monthly, and a summary of new or updated entries incorporated into the Part I: Technical Progress and Status Summary in accordance with Section F.3 Monthly Reporting (see Task 1-1).

Public Webinars. The Recipient will participate in two DOT-organized public webinars a year to share with the broader interoperable connectivity community their progress and performance. Some example topics include, Deployment Performance Measurement and Evaluation, Inter Site Interoperability Insights and Issues, Transition Plan, etc. The specific topics for the webinars will be selected in conjunction with the AOR.

In preparation for each webinar, the Recipient will deliver a PowerPoint presentation for review by the DOT. The Recipient will revise the presentation in response to DOT comments and deliver a final presentation. The Recipient will also coordinate with the DOT Communications staff, who will organize and facilitate the webinars.

Phase 2, Task 2-5.2 Required Deliverables

- Outreach Plan Deliverables
- Monthly Updates to OIS
- Lessons Learned Logbook Updates (as part of Monthly Progress Report Part I)
- Webinar PowerPoint Presentations (2, Draft/Final)

2-5.3. Operate/Evaluate Reference Implementation Guide

Revised Memo on Inputs to Reference Implementation Guide. In this task, the Recipient will continue to collaborate with DOT on the development of a Reference Implementation Guide. The Recipient will prepare a revised memo identifying any updates to the functional and physical interfaces developed, communications standards and protocols used, data and performance measurement related interfaces, and other technical insights gained, and lessons learned recorded from the deployment and inter site interoperability demonstrations. The memo may include references to specific sections, figures, and tables included within the Systems Engineering documents developed and/or refined by the Recipient as a part of the Initiative.

Phase 2, Task 2-5.3 Required Deliverables

- Revised Memo on Inputs to Reference Implementation Guide

2-6. Post-Deployment Transition Planning

This task covers planning for the transition of the system from operations under the aegis of the Initiative and into routine operational practice.

Transition Plan. The Recipient will develop a transition plan that identifies the concepts, applications, governance framework, agreements, key documents, and equipment to be maintained as elements of routine operational practice after the completion of Phase 2. The transition plan will have one section for concepts and applications found to be successful and included in continuing operations, and one section for concepts and applications found to be unsuccessful and to be removed from continuing operations. The transition plan will provide rationale for each successful and unsuccessful element. The transition plan shall describe what organizational responsibilities will be taken in the post-deployment period compared to organizational responsibilities in Phase 2. The transition plan shall describe plans to add or expand the deployment system, including across jurisdictional boundaries. The transition plan shall discuss plans for supporting DOT's continued development/updates of the Plan and supporting technical guidance and reference implementation. The transition plan shall describe any plans for continued engagement with peers and for outreach/public education on interoperable connectivity. The transition plan shall include documentation of the financial resources and agreements required to ensure financial sustainability in the post-deployment period for all continuing elements as well as for expansion. Public and private sources of funds should be identified and if one or more new businesses are proposed to be a source of funds, a business plan containing standard elements shall be part of the documentation. Any dependencies on external organizations should be documented. The transition plan shall explicitly identify contingency plans with respect to identified uncertainties and other potential post-deployment issues posing a risk to successful post-deployment operations.

The Recipient will deliver a draft transition plan to the DOT for review. The Recipient will revise the transition plan in response to DOT comments and deliver a revised transition plan and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised transition plan and comment resolution log, the Recipient will deliver a final transition plan.

Phase 2, Task 2-6 Required Deliverables

- Transition Plan (Draft/Final)

6. APPROVAL TO PROCEED TO PHASE 2

The Recipient shall not proceed with Phase 2 without the express written authorization of the AO. Costs incurred in support of Phase 2 activities will not be allowable without receipt of the AO's written authorization to proceed with Phase 2 and obligation of funding for Phase 2. Obligation of funding and approval to incur costs and proceed with work in Phase 2 is subject to the following requirements:

- All Phase 1 deliverables finalized with AOR comments incorporated.
- Concurrence among AOR and Site Key Personnel regarding successful System Testing and Operational Readiness Demonstration(s) indicating:
 - Key use cases illustrating the capability of the system to perform in accordance with the Phase 1 Concept of Operations (identified in the ORDP) have been tested and suitably demonstrated.
 - Safety-related deployment capabilities (identified in the ORDP) have been tested and suitably demonstrated.
 - Intra-site interoperability-related capabilities (identified in the ORDP) have been tested and suitably demonstrated.
- As-built versions of the ConOps, SyRS, SAD, SDD, CAP, and CIP are complete.
- Deployed system aligns with Initiative's requirements, that is, the system features:
 - *Immediate and measurable impact to address critical needs within the transportation system, particularly safety-related needs.* The deployment addresses one or more real problem(s) within an operational surface transportation system within the time frame of this Initiative.
 - *Conformant, effective utilization of the 5.9 GHz ITS licensed spectrum.* The deployment's utilization of the ITS licensed 5.9 GHz spectrum conforms to all relevant FCC regulation, including obtaining all required waivers and the use of C-V2X standards.
 - *Demonstrable standards-enabled interoperability.* The deployment has successfully tested interoperability among equipment and processes within the site. The deployment team has developed a joint interoperability demonstration plan, working with other Recipients and DOT, to demonstrate and provide over-the-road evidence of successful and secure communications as well as the effective operation of ITS applications among diverse roadside equipment, in-vehicle, and mobile devices.

- *Successfully implemented and supported interoperable security credential management.* The deployment includes an IEEE 1609.2.1 compliant SCMS that is capable of supporting a path to national interoperability.

7. REQUIRED SUBMITTALS OR MILESTONES

Under Due Date, “Award” = Effective Date of the Agreement

| Task ID | Phase 1 Deliverable | Proposed Due Date | Section 508 compliance required¹⁸ |
|----------------|---|--------------------------------|---|
| 1-1 | Phase 1 Kickoff Meeting | award + 4 weeks | |
| 1-1 | Project Management Plan | award + 4 weeks | |
| 1-1 | Project Management Plan (updates) | As needed | |
| 1-1 | Monthly Progress Report (Parts I and II) | Monthly | |
| 1-1 | Site-Specific Coordination Teleconferences | Bi-weekly | |
| 1-1 | All-Sites Coordination Teleconferences | Monthly | |
| 1-1 | Roundtable Teleconferences | Bi-weekly | |
| 1-1 | SDO Working Group/Committee Meetings | As needed | |
| 1-2.1 | Systems Engineering Management Plan (SEMP) | award + 3 months | Yes |
| 1-2.1 | Systems Engineering Documentation, per the SEMF | per the SEMF, award + 9 months | per the SEMF |
| 1-2.2 | Data Plan | award + 10 months | Yes |
| 1-2.3 | Comprehensive Acquisition Plan | award + 10 months | |
| 1-2.3 | Comprehensive Installation Plan | award + 11.5 months | Yes |
| 1-2.4 | Comprehensive Maintenance and Operations Plan | award + 13 months | Yes |
| 1-2.5 | Performance Measurement and Evaluation Plan | award + 10 months | Yes |
| 1-2.5 | Pre-Deployment / Baseline Data | Per the PMEP | |
| 1-2.5 | Periodic Baseline Performance Reporting | Per the PMEP | |
| 1-2.5 | Coordination with DOT-Identified Group | Monthly | |
| 1-3.1 | Acquisition Report | award + 11 months | |
| 1-3.1 | Acquisition Report (updates) | Monthly | |

¹⁸ No proprietary or security-related materials should be included in the final documents that are made available to the public.

| Task ID | Phase 1 Deliverable | Proposed Due Date | Section 508 compliance required¹⁸ |
|----------------|---|--------------------------|---|
| 1-3.1 | Installation Report | award + 12 months | Yes |
| 1-3.1 | Installation Report (updates) | Monthly | |
| 1-3.2 | Software Development Schedule | award + 11 months | Yes |
| 1-3.2 | Software Development Schedule (updates) | As needed | |
| 1-3.2 | Open-Source Software and Supporting Documentation | Per the SDS | |
| 1-4.1 | Operational Readiness Concept Briefing and Presentation Materials | award + 10 months | Yes |
| 1-4.1 | Operational Readiness Plan (ORP) | award + 13 months | Yes |
| 1-4.2 | System Test Results Summary | Per the ORP | Yes |
| 1-4.2 | System Test Results Summary (updates) | Per the ORP | |
| 1-4.3 | Operational Readiness Demonstration Report | Per the ORP | Yes |
| 1-4.3 | Operational Readiness Demonstration Schedule (updates) | Per the ORP | |
| 1-5.1 | Outreach Plan | award + 4 months | Yes |
| 1-5.1 | Outreach Implementation Schedule | award + 3 months | |
| 1-5.1 | Outreach Implementation Schedule (updates) | Monthly | |
| 1-5.2 | Participation in Cohort meetings | Monthly | |
| 1-5.3 | Webinar PowerPoint Presentations (2) | Per the OIS | Yes |
| 1-5.4 | Memo on Inputs to Reference Implementation Guide | award + 17 mo. | |

Under Due Date, “NTP” = Notice to Proceed (with Phase 2)

| Task ID | Phase 2 Deliverable | Proposed Due Date | Section 508 compliance required¹⁹ |
|----------------|---|--------------------------|---|
| 2-1 | Phase 2 Kickoff Meeting | NTP + 4 weeks | |
| 2-1 | Revised PMP (as required) | As needed | |
| 2-1 | Monthly Progress Report (Parts I and II) | Monthly | |
| 2-1 | Site-Specific Coordination Teleconferences | Bi-weekly | |
| 2-1 | All-Sites Coordination Teleconferences | Monthly | |
| 2-1 | Roundtable Teleconferences | Bi-weekly | |
| 2-1 | SDO Working Group/Committee Meetings | As needed | |
| 2-2 | System Operations and Maintenance Schedule | NTP + 1 month | |
| 2-2 | System Operations and Maintenance Schedule (updates) | Monthly | |
| 2-3 | Updates to Inter Site Interoperability Demonstration Schedule | Bi-weekly | |
| 2-3 | Inter Site Interoperability Demonstration | Per the IIDS | |
| 2-4 | Deployment Data | Per the PMEP | |
| 2-4 | Periodic Deployment Performance Reporting | Per the PMEP | |
| 2-4 | System Performance Report | Per the PMEP | |
| 2-4 | Coordination with DOT-Identified Group | Monthly | |
| 2-5.1 | Participation in Cohort Meetings | Monthly | |
| 2-5.2 | Outreach Plan Deliverables | Per the OIS | Yes |
| 2-5.2 | Updates to Outreach Implementation Schedule | Monthly | |
| 2-5.2 | PowerPoint Presentations (2) | Per the OIS | Yes |
| 2-5.3 | Inputs to Reference Implementation Guide | NTP+10 months | |
| 2-6 | Transition Plan | NTP + 12 months | Yes |

NOTE: Section 508 requirements are included in the General Terms and Conditions available online at: <http://www.fhwa.dot.gov/aaa/generaltermsconditions.cfm>

¹⁹ No proprietary or security-related materials should be included in the final documents that are made available to the public.

SECTION B - FEDERAL AWARD INFORMATION

1. FUNDING

The total amount of funding available for awards under this NOFO is \$40 million.

Funding for Phase 2 will only be made available for obligation to award Recipients after successful completion of Phase 1.

2. ANTICIPATED NUMBER OF AWARDS

The Government anticipates making multiple awards as a result of this NOFO.

The government may make one, multiple, or no awards based on applications received.

3. TYPE OF AWARD

The planned award type is a cost reimbursement cooperative agreement.

4. PERIOD OF PERFORMANCE

The award period of performance is anticipated to be 30 months.

If the award Recipient will be a State Department of Transportation (State DOT) or if a State DOT will serve as a pass-through to a non-State DOT entity, the DOT Payment System will be FMIS and the start of the period of performance will begin on the date funds are obligated in FMIS and end on the project end date in FMIS. If the award Recipient will be a non-State DOT entity, the DOT Payment System will be DELPHI iSupplier and the grant funds will be obligated in Delphi after the grant award is executed by both parties. The grant period of performance will begin on the effective date of the award, as stated in the signed grant agreement, and end on the period of performance end date that is listed in the signed grant agreement.

5. DEGREE OF FEDERAL INVOLVEMENT

The DOT anticipates substantial Federal involvement between DOT and the Recipient during this project. The anticipated Federal involvement may include:

1. Technical assistance and guidance to the Recipient;
2. Close monitoring of performance;
3. Involvement in technical decisions;
4. Participation in status meetings and committee meetings; and
5. Review and comment on draft and final documents as appropriate.

SECTION C - ELIGIBILITY INFORMATION

1. ELIGIBLE APPLICANTS

Eligible applicants include:

- non-Federal domestic public sector organizations,
- domestic academic institutions, and
- private sector/other entities incorporated in the United States.

Multiple eligible entities that submit a joint application should identify a lead applicant as the primary point of contact and Recipient for purposes of financial administration of the project. Joint applications should include a description of the roles and responsibilities of each applicant and should be signed by each applicant.

For both individual applications and joint applications, it is strongly encouraged that the applicant responsible for financial administration of the project be familiar with the requirements associated with managing Federal assistance projects.

NOTE: Eligible applicants should carefully consider the Deployment Site Features and Attributes identified in Section A.3.1.

2. COST SHARING OR MATCHING

Cost sharing or matching is required under this award. The Federal share of the cost of a project or activity carried out by the Recipient shall not exceed 80 percent per section 516(c) of Title 23, U.S.C.

The FHWA will not consider previously incurred costs or previously expended or encumbered funds towards the matching requirement for any project. Matching funds are subject to the same Federal requirements as awarded funds.

Cost sharing or matching means the portion of project costs not paid by Federal funds or contributions (unless otherwise authorized by Federal statute). See 2 Code of Federal Regulations (CFR) Part 200.306 on Cost Sharing or matching.

Note: If applicable, any program income generated under the project must be handled in accordance with SECTION F.

3. OTHER

There is no limitation on the number of applications that may be submitted by an eligible applicant. However, only one project may be included in each application.

SECTION D - APPLICATION AND SUBMISSION INFORMATION

1. ADDRESS TO REQUEST APPLICATION PACKAGE

Applicants may obtain application forms at [grants.gov](http://www.grants.gov) under the Notice of Funding Opportunity Number cited herein. All application materials may be found on *Grants.gov* at <http://www.grants.gov>.

If potential applicants are unable to download the application package from the internet, they may send a written request for a paper copy to the below address. Requests should be sent to one of the individuals by either of the means below:

Rob Miller
Agreement Specialist
Office of Acquisition and Grants Management
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590
Email: Rob.Miller@dot.gov
Phone: 202-366-9167

Alternate:
Robin Hobbs
Agreement Specialist
Office of Acquisition and Grants Management
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590
Email: Robin.Hobbs@dot.gov
Phone: 202-366-4004

For a Telephone Device for the Deaf (TDD), please call 202-366-3993.

2. CONTENT AND FORM OF APPLICATION SUBMISSION

Application Content - Overview

The application package must consist of the following parts:

- 1) Standard Form (SF)-424 Application for Federal Assistance (OMB Control Number 4040-0004 [no page limit])

Note: A number of separate PDF flat files must be attached in Item 15 to provide required project information that is not included in the body of the SF-424.

Instructions for adding Item 15 Attachments:

- Click on “Add Attachments” in Item 15 to open the first pop-up window.
- Click “Add Attachment” and a second pop-up File Explorer/Directory window will appear, from which you can choose files to attach. Attachments can be added one at a time or all at once by holding down the CTRL key and selecting multiple files. Select “Open” to add the selected files as attachments.
- Click “Done” to finalize the attachments.
- Click “View Attachments” to see a list of files that have been added as attachments.

Required attachments: the following files must be added as Attachments to Item 15 of the SF-424:

- Volume 1 Technical Application / Project Narrative [50 page limit], as described in detail below.
- Volume 2 Budget Application [no page limit], as described in detail below.
- Additional Supporting Documentation (as needed)

SF-424A, Budget Information for Non-Construction Programs and SF-LLL, Disclosure of Lobbying Activities
Application Format

- Applications must be prepared electronically and formatted for 8½ x 11- inch paper. Pages that exceed this size, such as for supporting foldouts, are not allowable.
- Narrative text must be printed using a font size no less than 12-point font.
- Tables are permitted. Text in tables may be smaller than 12-point font but must be legible.
- Page margins must be a minimum of 1-inch top, bottom, and each side.
- Page numbers may be located within the 1-inch margin.
- A Header or Footer identifying the applicant/Team and the Volume or Part, may be located within the 1-inch margins.
- PAGE LIMITS: Application volumes shall adhere to the page count limitations listed above. The page limit includes all narratives, figures, tables, appendices, and all other ancillary materials with the exception of the items identified below. Material that exceeds the page limits will not be evaluated.
- EXCEPTION ON PAGE LIMITS: The following items do NOT count against the page limitation.
 - Document covers;
 - Cover letters;
 - Title pages;
 - Divider pages;
 - Table of contents;
 - Lists of acronyms;
 - Letters of intent to participate from proposed subcontractors, consultants,

- partners and proposed new hires; and
 - Resumes.
- RESUMES:
 - Resumes for Key Personnel shall not exceed 3 pages per individual. All Key Personnel must have a resume submitted in the application.
 - Resumes for other (non-Key) staff shall not exceed 2 pages per individual.
 - No more than 20 resumes shall be included as a part of the Application.

Sharing of Application Information – The Department may share application information within the Department or with other Federal agencies if the Department determines that sharing is relevant to the respective program’s objectives.

Application Content – Detailed Instructions

1) Standard Forms (SF)

SF-424, SF-424A, and SF-LLL.

2) Volume 1 Technical Application / Project Narrative

NOTE: The Volume 1 Technical Application/Project Narrative shall not exceed 50 pages. Resumes and Letters of Intent are excluded from the page count. Materials provided in excess of page limits will **not** be considered in the evaluation of the submission.

- A. Deployment Abstract (max 2 pages): Summarize the specific problem to be addressed by implementing interoperable connectivity solutions. Summarize the deployment concept and how it aligns with the Site Deployment Requirements and Goals (Technical Merit Criterion #1), Departmental Goals, and Initiative Goals (Technical Merit Criterion #2). Summarize total two-phase projected Federal funding and proposed total cost share.
- B. Deployment Concept Summary: This section should:
 - a. Describe the proposed Deployment site, including geographic and jurisdictional boundaries, topography, and transportation system features. Describe relevant transportation-related issues and safety, mobility, environmental, and other needs of the site.
 - b. Summarize the nature, state, and location/extent of relevant existing (pre-award) technology and supporting foundational infrastructure (e.g., backhaul communications).
 - c. Present an *Annotated Preliminary Deployment Site Map*. The map shall identify the specific geographic location being proposed for the Deployment and shall indicate locations related to key safety, mobility and environmental issues, existing and proposed roadside technology locations, and other explanatory features.
 - d. Outline performance measures relevant to identified needs, Initiative goals, and Departmental goals. Provide details on data and methods currently used

to measure and characterize these issues, and the suitability of these data to act as a baseline for post-award performance measurement.

- e. Describe the set of applications proposed, and how they relate to needs and performance goals.
- f. Describe the proposed number of equipped vehicles, mobile devices, roadside units, and other countable elements of the deployment concept.
- g. Illustrate how the proposed concept can synergistically combine to create measurable impact.

- C. Operational Readiness Summary: This section describes the state of operational readiness of the Deployment Site (see Technical Merit Criterion #3).
- D. Technical and Management Approach: Include a detailed description and scope of work including specific milestones. Provide a technical and management plan describing in detail how the applicant proposes to carry out the work. Include detailed information about the project schedule that identifies all major project milestones and, if applicable, requires submittals. See Technical Merit Criterion #4.
- E. Summary of Relevant Team Experience and Staffing Approach: Include detailed information about the proposed applicant team, including any partnerships or collaborations with other entities to deliver the project. The information should specifically describe the role of each entity in delivering the project. Provide a staffing plan to perform the work, including names and positions of key personnel. Provide an organizational chart identifying proposed staff members assigned to this effort. The chart must be supported with narrative text to include the title and a brief description of each position's responsibilities, as well as the proposed level of effort and allocation of time (percent in relation to their other duties) for each position on a yearly basis and in summary format. The level of effort may be displayed (single spaced) in a table format. One table can be presented if the level of effort will be constant over all years, and the table is annotated as such. The hours in this table must be consistent with the information presented in the Budget Volume. See Technical Merit Criteria #5 (Team Experience) and #6 (Staffing Approach).
- F. Past Performance: Provide a description of completed projects, ongoing projects, or both, that demonstrate organizational, and staff experience relevant to the scope and complexity of the proposed project. Provide specific information on past or present projects to include title, work description, value, dates, sponsor/customer point of contact, role of applicant in the project, and an explanation of why or how the project is considered relevant or similar to the project being proposed.
- G. APPENDIX A: Resumes: Provide resumes of key personnel and staff with significant roles, from both the prime applicant and team members/sub-awardees as necessary.
- H. APPENDIX B: Letters of Intent to Participate: Provide a letter of intent or commitment from each proposed subrecipient/subcontractor. This includes any

subrecipient/subcontractor that will be included in the Federal share, the non-Federal share or in a non-paid (volunteer) capacity. Provide a letter of intent to participate from significant team members as the applicant deems necessary.

3) Volume 2 Budget Application

NOTE: If needed, the FHWA may request additional budget information to clarify an application. The FHWA encourages applicants to submit the most relevant and complete information they can provide.

- A. Budget Tables: Provide a separate detailed budget table for each year and total budget table that summarize the information for all years for all activities. Clearly show Federal share; Non-Federal share; and Total. Spreadsheets can be formatted similarly to the format in DOT Form 4220.44, located at: https://www.fhwa.dot.gov/cfo/pdf/frm4220_44.pdf. **NOTE: Profit/fee is not allowable for the prime Recipient.**

Grant Funds, Sources and Uses of Project Funds: Project budgets should show how different funding sources will share in each activity and present those data in dollars and percentages. The budget should identify other Federal funds the applicant is applying for or has been awarded, if any, that the applicant intends to use. Funding sources should be grouped into three categories: non-Federal, Initiative, and other Federal with specific amounts from each funding source.

Budget tables must include the following cost elements as applicable to the project:

Labor Rates: Direct labor-by-labor categories to include hours, rates and escalation. The labor rates and annual direct labor escalations rate and its basis must be in accordance with 2 CFR 200.430.

Indirect Rates: Provide your organization's signed current approved indirect cost rate from the cognizant Federal Agency or letter of request to cognizant agency for rate establishment or adjustment. Indirect costs rates must be established according to 2 CFR 200.414. **NOTE**: Per 2 CFR 200.414(f), Indirect (Facilities and Administrative) Costs, any applicant that does not have a current negotiated (including provisional) rate, except for those non-Federal entities described in 2 CFR Part 200 appendix VII, paragraph D.1.b may elect to propose a de minimis indirect rate of 10 percent of modified total direct costs.

Other Direct Costs: Applicants must provide a breakout and justification of Other Direct Costs by Category (travel, equipment, etc.). Direct costs must be in accordance with 2 CFR Part 200 Subpart E (Cost Principals).

Subcontractors/subrecipients: If subcontractors/subrecipients (lower-tiered organizations and/or individual consultants) have been selected and are identified in the application to be used in carrying out this project, the following minimum information concerning such, must be furnished (note that all procurement of property or services under a Federal award must comply with 2 CFR 200.317-327 and 2 CFR 1201.317):

- 1) Name and address of the organization or consultant.
- 2) Description of the portion of work to be conducted by the organization or consultant.
- 3) Cost details for that portion of work.
- 4) Applicant's cost/price analysis of each subrecipient/contractor(s) showing how their price is fair and reasonable (this includes any subrecipient/contractor(s) that will be included in the Federal share or the non-Federal share).
- 5) Provide detail and support for cost share as part of overall project budget.
- 6) Clearly delineate cost share match versus Federal share.

B. Other Business Information: Provide the following information relative to the PRIME APPLICANT.

- 1) Identify any exceptions to the anticipated award terms and conditions as contained in Section F, Federal Award Administration Information.
- 2) Identify any preexisting intellectual property that the applicant anticipates using during award performance, and your position on its data rights during and after the award period of performance.
- 3) Applicant System for Award Management (SAM) Unique Entity Identifier (UEI).
- 4) A statement to indicate whether the applicant has previously completed an A-133 Single Audit and, if so, the date that the last A-133 Single Audit was completed.
- 5) A statement regarding Conflicts of Interest. The applicant must disclose in writing any actual or potential personal or organizational conflict of interest in its application that describes in a concise manner all past, present or planned organizational, contractual or other interest(s), which may affect the applicant's ability to perform the proposed contract in an impartial and objective manner. Actual or potential conflicts of interest may include but are not limited to any past, present or planned contractual, financial, or other relationships, obligations, commitments or responsibilities, which may bias the applicant or affect the applicant's ability to perform the project in an impartial and objective manner. The FHWA will review the statement(s) and may require additional relevant information from the applicant. All such information, and any other relevant information known to FHWA, will be used to determine whether an award to the applicant may create an actual or potential conflict of interest. If any such conflict of interest is found to exist, the FHWA may (a) disqualify the applicant, or (b) determine that it is otherwise in the best interest of the Government to contract with the applicant and include appropriate provisions to mitigate or avoid such conflict in the award pursuant to 2 CFR 200.112.
- 6) A statement to indicate whether a Federal or State organization has audited or reviewed the applicant's accounting system, purchasing system, and/or property

control system. If such systems have been reviewed, provide summary information of the audit/review results to include as applicable summary letter or agreement, date of audit/review, Federal or State point of contact for such review.

- 7) Terminated Contracts. List any contract/agreement that was awarded to the prime applicant then later terminated for convenience of the Government within the past 3 years, and any contract/agreement that was terminated for default within the past 5 years. Briefly explain the circumstances in each instance.
- 8) Describe how the applicant will obtain the necessary resources to fund and fulfill the proposed cost share, as applicable. The applicant should include letters of commitment from organizations that will provide a portion of the cost-share and identify the source of those funds (e.g., general treasury funds, revolving loan fund, capital budget, in-kind labor, in-kind equipment, etc.).
- 9) The applicant is directed to review Title 2 CFR Part 170 (http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title02/2cfr170_main_02.tpl) dated November 12, 2020, and Appendix A to Part 170 thereto, and acknowledge in its application that it understands the requirement, has the necessary processes and systems in place, and is prepared to fully comply with the reporting described in the term if it receives funding resulting from this NOFO. The text of Appendix A will be incorporated in the award document as a General Term and Condition as referenced under this NOFO's Section F, Federal Award Administration Information.
- 10) Disclose any violations of Federal criminal law involving fraud, bribery, or gratuity violations. Failure to make required disclosures can result in any of the remedies described in 2 CFR 200.339 entitled Remedies for Noncompliance, including suspension or debarment. (See also 2 CFR Part 180 and 31 U.S.C. 3321).
- 11) If a nonprofit or not-for-profit status, please provide evidence of this status preferably from the Internal Revenue Service.
- 12) The DOT is committed to considering project funding decisions holistically among the various discretionary grant programs available in BIL. The DOT also recognizes that applicants may be seeking grant program funding from multiple DOT grant programs and opportunities. An applicant may seek the same award amounts from multiple DOT grant programs opportunities or seek a combination of funding from multiple DOT opportunities. In those cases, the applicant must indicate, within the Federal funding description, details as to what other potential DOT grant programs and opportunities they are currently applying for or intend to apply for and what award amounts they will be seeking. This information will be reviewed by DOT to ensure that a single project, or its sub-elements, is not awarded Federal funding under multiple DOT grant programs. The DOT reserves the right to contact applicants to obtain additional information concerning those scopes of work to discuss any possible or actual overlap in scope.

- 13) Acknowledgement of acceptance of the NOFO terms and acknowledgement and acceptance of any Amendments issued to this NOFO. List Amendment numbers and issue dates, if any.

3. UNIQUE ENTITY IDENTIFIER AND SYSTEM FOR AWARD MANAGEMENT

Each applicant is required to:

- a. Have an active registration in SAM.gov at the time the applicant submits an application;
- b. Provide a valid UEI in their application; and
- c. Continue to maintain an active SAM registration with current information at all times during which the applicant has an active Federal award or an application or plan under consideration by a Federal awarding Agency.

The FHWA may not make a Federal award to an applicant until the applicant has complied with all applicable UEI and SAM requirements. If an applicant has not fully complied with the requirements by the time the Federal awarding Agency is ready to make a Federal award, the Federal awarding Agency may determine that the applicant is not eligible to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

NOTE TO APPLICANTS: The SAM requires the registrant to provide a UEI number to complete the registration. These processes can take several weeks to complete so should be started well before the application deadline.

4. SUBMISSION DATES AND TIMES

The application must be received electronically through www.grants.gov by the application due date/time listed on page 1 of this NOFO (or as updated by a NOFO Amendment, if applicable). The due date/time is the date and time by which FHWA must receive the full and completed application, including all required sections. Applicants are strongly encouraged to make submissions in advance of the deadline.

For the submitted application package, FHWA suggests that pictures, graphics, and other large files be reduced in number and quality to keep the size of the files of the application manageable and in line with the Grants.gov maximum size of 200 megabytes for the entire grant application package.

A late application will not be reviewed or considered unless the AO determines that doing so is in FHWA's best interest. The FHWA will not consider late applications that are the result of failure to register or comply with *Grants.gov* applicant requirements in a timely manner. If applicants are unable to use the system due to verifiable technical difficulties, applicants must email complete applications directly to the FHWA point of contact listed in the NOFO

Section G no later than the NOFO application deadline cited herein, with an explanation of the technical issue experienced and supporting documents regarding the nature of the technical difficulties. If you are experiencing difficulties with your submission, it is best to contact the Grants.gov Support Center and get a ticket number. Provide FHWA with a screen capture(s) of the technical issues experienced and the Grants.gov Help Desk Tracking Number since it will assist FHWA with tracking your issue and understanding background information on the system issue in the event of a late application. If the reported technical issues cannot be validated, late applications may be rejected as untimely.

GRANTS.GOV: Applicants must follow the instructions on Grants.gov to successfully use the website to submit an application. Use of Grants.gov may entail the following steps for those setting up new accounts or first-time users.

- a. Register with SAM at www.SAM.gov
- b. Obtain a valid UEI;
- c. Create a *Grants.gov* account; and
- d. Respond to the registration email sent to the E-Business Point of Contact from *Grants.gov*, and login at *Grants.gov* to authorize the applicant as the Authorized Organization Representative (AOR). Please note that there can be more than one AOR for an organization.

****Please note that the *Grants.gov* registration process may take 2-4 weeks.**

GRANTS.GOV HELP: For Grants.gov training resources, including video tutorials, refer to <https://www.grants.gov/>. For assistance with Grants.gov registration and application submittal, refer to the Grants.gov Support Center at <https://www.grants.gov/support.html>.

5. INTERGOVERNMENTAL REVIEW

An application under this NOFO is not subject to the State review under E.O. 12372.

6. FUNDING RESTRICTIONS

The FHWA will not reimburse any pre-award costs or application preparation costs under this proposed award. Grant funds may not be used to support or oppose union organizing.

SECTION E - APPLICATION REVIEW INFORMATION

1. CRITERIA

The Government will evaluate applications against the following evaluation criteria, considered of equal importance. These criteria are distinct from eligibility criteria (see Section C) that are addressed before an application is accepted for review and also distinct from application format requirements (see Section D.2).

TECHNICAL MERIT: The Government will evaluate applications against the following technical evaluation criteria, considered of equal importance.

1) Alignment with Deployment Site Features and Attributes.

Degree to which the proposed project and associated technical approach:

- a. successfully meets the Deployment Site Features and Attributes (Section A.3.1);
- b. is likely to result in *significant and measurable improvements* in traveler and/or system focused performance considering safety, mobility, efficiency, environmental impacts, equity, and return on investment;
- c. is likely to serve as a *replicable model for other prospective deployers* with similar needs that can be deployed at-scale across the nation; and
- d. is likely to meaningfully *inform a national reference implementation* for interoperable connectivity.

2) Alignment with Initiative Goals.

Degree to which the proposed project and technical approach successfully supports and addresses:

- a. Safety and as applicable, other Initiative Goals (Section A.4.2).

3) Operational Readiness for Phase 1 and Phase 2.

Applicant demonstrates a state of operational readiness aligned with the schedule and required pacing of both phases of the program structure, including:

- a. Technical readiness. Are relevant ITS and wireless communications technologies already deployed in an operational state that can be modified, enhanced, or augmented rapidly? Are there sufficient and relevant foundational technologies deployed (e.g., IPV6 fiber, signal controllers, and management center modules) to support the proposed deployment? Is an SCMS capability planned and/or tested?
- b. Documentation readiness. Are detailed and standards conformant systems engineering (and other) documentation available that may be readily updated?
- c. Baseline performance/impact assessment readiness. Are the key metrics related to safety and other factors already identified, proven to be practically measurable in the field, and suitably sensitive to the proposed deployment concept?
- d. Effective utilization of the ITS licensed portion of the 5.9 GHz spectrum. Does the proposed deployment utilize the pertinent attributes of the reserved spectrum (e.g., latency, range, and lack of interference) and properly and appropriately

- allocate applications dependent on these attributes (e.g., for safety-critical functions)?
- e. Comprehensive systems engineering approach. Does the proposed technical approach present a clear and structured systems engineering process (whether following a waterfall, agile, or hybrid model)?
 - f. Institutional readiness. Are institutional agreements in place to ensure timely project delivery after award? Are relevant waivers and documentations related to FCC regulation submitted/complete? Are agreements in place with a SCMS provider?
- 4) Technical and Management Approach: Demonstration of a sound, feasible, and achievable technical and management approach to successfully perform the proposed project, including the extent to which the proposed:
- a. Management approach ensures quality and consistency of all deliverables.
 - b. Schedule shows logical understanding of the relationships among deliverables and allocates sufficient time for the development of each deliverable.
 - c. Technical approach in each Task demonstrates clear understanding of task requirements, and a practical approach to identify and resolve barriers to success in each task area.
 - d. Performance measurement approach includes a practical, methodologically sound, and detailed strategy to provide a data-driven assessment of the overall performance of the deployment and the deployment's ROI.
 - e. Data management approach meets operational needs and supports decision making. Where possible, data management adheres to the principles of open data and the site demonstrates a commitment to make data available to the public.
 - f. Outreach and engagement plan provides a clear and compelling approach to engage key stakeholders throughout the program, including a commitment to share lessons learned and best practices with the ITS community, including participation in DOT cohort activities.
- 5) Relevant Team Experience: The proposed set of deployment partners comprises a strong and qualified team with experience working directly with ITS technologies, applications, and systems. Demonstration of sufficient knowledge and relevant experience of the proposed team to successfully perform the proposed project in the following areas:
- a. Program/project management.
 - b. Systems engineering.
 - c. Wireless communications, including security of transmitted messages and the implementation of an SCMS.
 - d. Connected Vehicle, V2X, and related ITS applications.
 - e. Data Management (particularly ITS data).
 - f. Performance measurement.
 - g. Standards.
 - h. Stakeholder engagement and outreach
 - i. Partnership/institutional agreements.

- j. Contracting/procurement and technology acquisitions.
- 6) Staffing Approach and Team Depth/Organization: Demonstration of a sound, feasible, and achievable staffing approach to successfully perform the proposed project, including:
- a. Sufficient team size and organization to conduct the proposed work with the required technical depth within the period of performance.
 - b. Clear lines of control and decision-making.
 - c. Key Personnel. Quality, availability, and utilization of proposed key personnel. See Section F.

COST: Cost will be considered in the award decision. The budget application information will be analyzed to assess the:

- degree to which the proposed costs are realistic, reasonable, conform to applicable cost principles, and are commensurate with the applicant's technical application; and
- degree to which the applicant provides the required matching funds and supporting detail for these funds, including the applicant's activities to maximize the non-Federal share of the project funding.

Funding availability will also be considered in the award decision. This evaluation factor will not be rated but will be considered in the award selection.

2. ADDITIONAL SELECTION CONSIDERATIONS

After completing the merit review, among projects of similar merit, DOT will prioritize projects based on the degree to which the proposed project and technical approach successfully supports and addresses: Safety and as applicable, other Departmental Goals (Section A.4.1).

- a. **Safety:** Applicants must address how their project provides substantial safety benefits. Prior to receiving funds, all projects are expected to, at a minimum, identify and mitigate to the extent practicable any significant safety risks that could result after the project completion. Applicants should include how their project will not negatively impact the overall safety of the traveling public.
- b. **Climate Change and Sustainability:** Applicants should address how the project will consider climate change and environmental justice in the planning stage and in project delivery. In particular, applicants should address how the project reduces greenhouse gas emissions in the transportation sector, incorporates evidence-based climate resilience measures and features, and reduces the lifecycle greenhouse gas emissions from the project materials. Applicants also should address the extent to which the project avoids adverse environmental impacts to air or water quality, wetlands, and endangered species, as well as address disproportionate negative impacts of climate change and pollution on disadvantaged communities, including natural disasters, with a focus on prevention, response, and recovery.
- c. **Equity:** Applicants should address how their project will include an equity assessment that evaluates whether a project will create proportional impacts and remove

transportation related disparities to all populations in a project area. Applicants should demonstrate how meaningful public engagement will occur throughout a project's life cycle. Applicants should address how project benefits will connect Americans to good-paying jobs, fight climate change, and/or improve access to resources and quality of life.

- d. Workforce Development, Job Quality, and Wealth Creation: Applicants should address as applicable how their project will create good-paying jobs with free and fair choice to join a union; and change hiring policies and workplace cultures to promote the entry and retention of underrepresented populations. Applicants should address how the project promotes local inclusive economic development and entrepreneurship such as the utilization of Disadvantaged Business Enterprises, Minority-owned Businesses, Women-owned Businesses, or 8(a) firms.

3. ORAL PRESENTATIONS

The DOT may request oral presentations from the highest rated applicants after submission of an application prior to any award. Selection for oral presentation is no guarantee of an eventual award. Presentations may be virtual, in-person, or as a hybrid in-person/virtual event at the sole discretion of the DOT. If in-person, DOT staff will travel to the proposer site to conduct the oral presentations. Whether in-person, virtual, or as a hybrid in-person/virtual event, the ground rules for conducting the oral presentation are the same, namely:

- Proposers selected for oral presentations will be notified a minimum of 10 working days prior to a DOT-selected date. The DOT will discuss mutually agreeable physical locations (if in-person), times of day, and other logistical considerations. The DOT may choose to provide specific questions at the time of the notification for oral presentation.
- Proposers will have up to 45 minutes (uninterrupted) to present materials based on their application, including addressing the questions (if any) provided by the government.
- After a 15-minute break, the oral presentations will resume for a maximum of 60 minutes wherein the government may ask additional questions.
- Applicant participation in the Oral Presentation is limited to seven (7) individuals: all four named Key Personnel (required), one staff covering financial/cost considerations from Volume II (required), and up to two other individuals (optional) named in the application.

The Government reserves the right to record video or audio of such Oral Presentation(s).

4. REVIEW AND SELECTION PROCESS

a. Application Review and Selection

The DOT will screen applications received to confirm applicant eligibility, project eligibility, completeness of submittal, and compliance with NOFO application requirements. An application determined to be ineligible, incomplete, and/or non-compliant with the NOFO application requirements may be removed from the competition and from further consideration for award or continued evaluation.

The DOT will utilize the following merit review process to evaluate applications: A panel of DOT experts will collectively evaluate and rate all eligible applications and Oral Presentations against the evaluation criteria listed in Section E.1 above and the additional considerations in Section E.2 above. The evaluation team will individually evaluate the applications. If deemed necessary, DOT may use outside experts and/or contractor support to review the applications. An application that receives an unacceptable rating in one or more selection criteria may be removed from the competition and from further consideration for award or continued evaluation. Technical evaluations will place all eligible projects into one of three rating categories: Highly Recommended, Recommended, and Not Recommended. The evaluations will not assign numerical scores, nor will there be any sorting or rankings within each of the three subcategories. In summary, any project slotted into each category will have the same weight of recommendation in that category.

Award selections will consider the best use of the funds, given program and Administration goals. Award selections may consist of a group of projects that collectively represent the most advantageous use of funds to achieve a combination of program and Administration goals.

As determined necessary to support the evaluation and selection process, FHWA may conduct discussions with applicants to clarify elements of the technical and budget applications and request additional detailed and itemized cost information. See Section E.2, above, regarding potential Oral Presentations.

The FHWA may, during the selection process, enter into discussions with an applicant that may include mutually agreeing upon a lesser amount of a potential award than originally requested in the application if necessary due to the quantity, size and scope of the applications received in response to this NOFO and the results of the application review process.

The adjectival rating categories to be used during the review and selection process as described in the paragraph above are defined as follows:

Highly Recommended:

- Applicant and proposed deployment align extremely well with Initiative Goals.
- As applicable, application demonstrates strong consideration for the Departmental Goals related to safety, equity, climate change and sustainability, and/or workforce development, job quality, and wealth creation.
- Application meets or exceeds NOFO requirements and demonstrates excellent alignment with the technical and cost merit criteria for selection.
- Application offers outstanding value towards advancing the overall vision of the Initiative.
- Application represents a low risk of unsuccessful systems engineering, deployment, testing, evaluation, and deployment documentation. Risks as well as potential mitigating strategies are well identified. NOTE: This assessment of risk applies only to the content of the application and is not an assessment of the risk posed by the

applicant as described in Section E.3.c below.

Recommended:

- Applicant and proposed deployment align with Initiative Goals.
- As applicable, application demonstrates consideration for the Departmental Goals related to safety, equity, climate change and sustainability, and/or workforce development, job quality, and wealth creation.
- Application meets NOFO requirements and demonstrates alignment with the technical and cost merit criteria for selection.
- Application offers reasonable value towards advancing the overall vision of the Initiative.
- Application represents a medium risk of unsuccessful systems engineering, deployment, testing, evaluation, and deployment documentation. Some risks are identified, and potential mitigating strategies offered. NOTE: This assessment of risk applies only to the content of the application and is not an assessment of the risk posed by the applicant as described in Section E.3.c below.

Not Recommended:

- Applicant and proposed deployment do not substantially align with Initiative Goals.
- As applicable, application demonstrates limited or no consideration for the Departmental Goals related to safety, equity, climate change and sustainability, and workforce development, job quality, and wealth creation.
- Application does not meet NOFO requirements and demonstrates no substantial alignment with the technical and cost merit criteria for selection.
- Application offers limited or no value towards advancing the overall vision of the Initiative.
- Application represents a high risk of unsuccessful systems engineering, deployment, testing, evaluation, and deployment documentation. Key risks and mitigating action are missing or not well described. NOTE: This assessment of risk applies only to the content of the application and is not an assessment of the risk posed by the applicant as described in Section E.3.c below.

The FHWA Administrator will serve as the Selection Official for this opportunity. In all cases, the ratings assigned by the teams of technical experts, and final selection decisions by the FHWA Administrator will be made in accordance with the evaluation criteria in Section E.1 and the additional considerations in Section E.2 of this NOFO. The FHWA will award the application or applications that are considered the most advantageous to FHWA using the criteria cited above and subject to the results of an applicant risk assessment, and subject to funding availability.

The FHWA is not obligated to make any award as a result of this notice.

b. Post selection Discussions and Method of Award

After the award selections are announced, FHWA and the selected applicant will reach an agreement on the method for the award. There are two possible options for administration of the anticipated awards: award through an allocation to the State department of transportation

or a direct award from FHWA. The FHWA will also conduct discussions with the selected applicant to clarify elements of the applicant's technical and budget applications. Discussions will include a request for detailed and itemized cost information, including: direct labor categories; hours and rates; fringe benefit rates; travel; equipment; supplies; subrecipient, contractor, and consultant costs and supporting documentation; construction costs (if applicable); other direct costs; indirect cost rates; and additional supporting budget narrative. The selected applicant will also be required to provide a finalized project management plan that is modified, as necessary, from the statement of work and schedule included in the project application.

c. Risk Assessment

Risk Assessment: Prior to award, each selected applicant will be subject to a risk assessment required by 2 CFR 200.206. If the Federal awarding Agency determines that a Federal award will be made, special conditions that correspond to the degree of risk assessed may be applied to the Federal award.

This Risk Assessment will include evaluation of some or all of the following items relative to the applicant and sub-applicants as applicable:

- (1) Applicant's financial stability;
- (2) Applicant's quality of management systems and ability to meet the management standards prescribed in 2 CFR Part 200;
- (3) Applicant's history of performance;
Note: History of performance includes the applicant's record in managing Federal awards, if it is a prior Recipient of Federal awards, including timeliness of compliance with applicable reporting requirements, conformance to the terms and conditions of previous Federal awards, and if applicable, the extent to which any previously awarded amounts will be expended prior to future awards. The Government will evaluate the relevant merits of the applicant's history of performance based on its reputation and record with its current and former customers with respect to quality, timeliness and cost control. The history of performance will be reviewed to assure that the applicant has relevant and successful experience and will be considered in the risk assessment. In evaluating history of performance, the Government may consider both written information provided in the application, as well as any other information available to the Government through outside sources.
- (4) Applicant's audit reports and findings from audits performed on the applicant pursuant to 2 CFR Part 200 Subpart F — Audit Requirements or the reports and findings of any other available audits;
- (5) Applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities;
- (6) Applicant's potential for conflict of interest if applicable; and
Note: The FHWA will review information provided by the applicant, and any other relevant information known to FHWA, to determine whether an award to the applicant may create an actual or potential conflict of interest. If any such conflict of interest is found to exist,

FHWA may (a) disqualify the applicant, or (b) determine that it is otherwise in the best interest of the United States to award to the applicant and include appropriate provisions to mitigate or avoid such conflict in the agreement pursuant to 2 CFR 200.112.

(7) Applicant's eligibility to receive Federal funding. Per the guidelines on governmentwide suspension and debarment in 2 CFR Part 180, the Government will confirm that the applicant and any named sub-applicants are not debarred, suspended or otherwise excluded from or ineligible for participation in Federal programs or activities.

NOTE: If an applicant is determined to be high-risk, additional reporting requirements or other special conditions may apply to the resulting award to mitigate risks.

Pursuant to 2 CFR Part 200.206, prior to making a Federal award, the Federal awarding Agency is required to review information available through any OMB-designated repositories of governmentwide eligibility qualification or financial integrity information, such as Dun & Bradstreet, and data available via SAM.gov. The Government's review of this information will occur as part of the risk assessment.

5. ANTICIPATED ANNOUNCEMENT AND FEDERAL AWARD DATES

The FHWA anticipates, but does not guarantee, announcing selections for the Initiative by June 2024.

SECTION F - FEDERAL AWARD ADMINISTRATION INFORMATION

1. FEDERAL AWARD NOTICES

Following the evaluation outlined in Section E, FHWA will notify the selected applicants and announce the selected projects. Notice that an applicant has been selected for award does not constitute approval of the application as submitted. Before the award, FHWA may contact the applicant's point of contact listed in the SF 424 to initiate negotiation of a project-specific agreement, if applicable. If the negotiations do not result in an acceptable submittal, FHWA reserves the right to terminate the negotiation and decline to fund the applicant. Only the AO or other authorized representative can commit FHWA and bind the Federal Government to the expenditure of funds.

Recipients of awards will not receive lump-sum cash disbursements at the time of award announcement or obligation of funds. Instead, FHWA will reimburse Recipients only after a project agreement or award has been executed, allowable expenses are incurred, and valid requests for reimbursement are submitted by the Recipient. Unless authorized by FHWA in writing after FHWA's announcement of Initiative awards, any costs that a Recipient incurs before FHWA executes a project agreement for that Recipient's project are ineligible for reimbursement and are ineligible match for cost share requirements.

2. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

All awards will be administered pursuant to the Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards found in 2 CFR Part 200, as adopted by DOT at 2 CFR Part 1201. Applicable Federal laws, rules and regulations set forth in 23 U.S.C. and 23 CFR and 49 CFR also apply.

GENERAL CLAUSES

The online clauses entitled "General Terms and Conditions for Assistance Award" apply to the resulting award, and are available in full text online at:

https://www.fhwa.dot.gov/cfo/contractor_recip/gtandc_generaltermsconditions.cfm

SPECIAL CLAUSES

In addition to the General Clauses cited above, the following Special Clauses will apply to the resulting award.

A. PUBLIC ACCESS TO DOCUMENTS

The applicant agrees that the resulting deliverables/documentation submitted to the FHWA under this Agreement may be posted online for public access and/or shared by FHWA with other interested parties. The FHWA anticipates the documents cited herein may be posted on an FHWA website or another appropriate website.

B. INDIRECT COSTS

Indirect costs are allowable under this Agreement in accordance with the Recipient's Federally Negotiated Indirect Cost Rates as documented in writing and approved by the Recipient's cognizant Government Agency. In the absence of such Government-approved indirect rates, the following rates are hereby approved for use under this agreement as shown below:

| Type* | Indirect Rate | Period | Rate (%) | Base |
|-------|---------------|--------|----------|------|
| | | | | |
| | | | | |

*Types of Rates: Pred - Predetermined; Fixed - Fixed; Final - Final; Prov - Provisional/billing; or De minimus.

In the event the Recipient determines the need to adjust the above listed rates, the Recipient will notify the AO of the planned adjustment and provide rationale for such adjustment. In the event such adjustment rates have not been audited by a Federal Agency, the adjustment of rates must be pre-approved in writing by the AO.

This Indirect Cost provision does not operate to waive the limitations on Federal funding provided in this document. The Recipient's audited final indirect costs are allowable only insofar as they do not cause the Recipient to exceed the total obligated funding.

C. DATA RIGHTS

The Recipient must make available to the FHWA copies of all work developed in performance with this Agreement, including but not limited to software and data. Data rights under this agreement shall be in accordance with 2 CFR 200.315, Intangible property.

D. PERSONALLY IDENTIFIABLE INFORMATION (PII)

Personally Identifiable Information (PII) as defined at CFR Part 200.1 at will not be requested unless necessary and only with prior written approval of the AO with concurrence from the AOR.

E. AVAILABLE FUNDING

The total estimated amount of Federal funding that may be provided under this Agreement is \$_____ (to be filled in at award) for the entire period of performance, subject to the limitations shown below:

- (1) Currently, Federal funds identified on page 1 of the award document, are obligated to this agreement for Phase 1 activities.
- (2) Subject to availability of funds, and an executed document by the AO, the difference between the current funding and the total estimated amount of Federal funding may be obligated to this Agreement.
- (3) The FHWA's liability to make payments to the Recipient is limited to those funds obligated under this Agreement as indicated above and any subsequent amendments.

F. KEY PERSONNEL

Pursuant to 2 CFR 200.308(c)(2), the Recipient must request prior written approval from the AO for any change in Key Personnel specified in the award. A single individual may not serve in more than one Key Personnel role. The following person(s) are/have been identified as Key Personnel:

- 1) Deployment Lead (DL): [NAME HERE]
The DL is responsible for ensuring the quality of all deployment deliverables and the safe and effective operation of the deployed system in an operational state. The DL serves as the primary point-of-contact between the AOR and the deployment site on all matters, business, technical, or institutional.
- 2) Systems Engineering Lead (SEL): [NAME HERE]
The SEL is responsible for ensuring the deployment follows an appropriate and effective systems engineering process and ensures the quality of all systems engineering deliverables.
- 3) Testing and Operational Readiness Lead (TORL): [NAME HERE]
The TORL is responsible for all test planning and execution and is responsible for the assessment of testing results and overall system operational readiness. In particular, the TORL is responsible for the planning and execution of all interoperability-related testing and will act as the primary technical point-of-contact for the deployment site in the planning and execution of the Phase 2 interoperability demonstration.
- 4) Project Management Lead (PML): [NAME HERE]
The PML is responsible for ensuring the timely and organized delivery of all deliverables, while ensuring the effective and ongoing coordination of the deployment team.

G. PROGRAM INCOME

Pursuant to 2 CFR 200.307, Program income earned during the agreement period must be added to the Federal award and used for the purposes and under the conditions of the Federal award, unless otherwise approved by the AO. Program income must not be used to offset the Federal or Recipient contribution to this project.

H. SUBAWARDS

Unless described in the application and funded in the approved award, the Recipient must obtain prior written approval from the AO or other cognizant FHWA division office personnel in the case of a project administered through a State DOT, for the sub-award, transfer, or contracting out of any work under this award. This provision does not apply to the acquisition of supplies, material, equipment, or general support services.

The following sub-award provisions will apply based on the DOT Office for contract authorization:

1. If FHWA Office for Subaward and Contract Authorization is “FHWA Division,” then the Recipient shall comply with sub-award and contract authorization requirements under 23 CFR Part 172 and 23 CFR Chapter I., subchapter G.
2. If FHWA Office for Subaward and Contract Authorization is “FHWA Office of Acquisition and Grants Management,” then the Recipient shall obtain prior written approval from the FHWA AO pursuant to 2 CFR 200.308 and 23 CFR 172 as applicable for the sub-award or contracting out of any work under this agreement.

Approvals under 2 CFR 200.308 will be contingent upon a fair and reasonable price determination on the part of the Recipient and the AO's concurrence on that determination. Consent to enter into sub-awards will be issued through a formal amendment to the agreement." This provision does not apply to the acquisition of supplies, material, equipment, or general support services.

The following sub-awards are currently approved under the agreement:
(*** to be filled in at award ***)

Approval of each sub-award is contingent upon a fair and reasonable price determination, and approval by the AO, or other cognizant FHWA division office personnel in the case of a project administered through a State DOT, for each proposed subcontractor/subrecipient. Consent to enter into sub-awards will be issued through a formal amendment to the agreement.

I. ORDER OF PRECEDENCE

The Recipient's technical and budget application volumes are accepted, approved, and incorporated herein as Attachments 1 and 2. In the event of any conflict between this agreement document and the Recipient's application, this Agreement document shall prevail.

J. DESIGNATION AS RESEARCH OR NON-RESEARCH AGREEMENT

This agreement is designated as: RESEARCH

K. CONFERENCE SUPPORT RESTRICTIONS

The Recipient must obtain written approval from the AOR prior to incurring any costs for conference support. See the definition of conference as contained in 2 CFR 200.432.

Food and beverage costs are not allowable conference expenses for reimbursement under this Agreement.

Note: Costs of meals are allowable as a travel per diem expense for individuals on travel status and pursuant to the Travel clause of this Agreement.

L. DISPUTES (for awards issued by Office of Acquisition and Grants Management)

The parties to this Agreement will communicate with one another in good faith and in a timely and cooperative manner when raising issues under this provision. Any dispute, which for the purposes of this provision includes any disagreement or claim, between the FHWA and the Recipient concerning questions of fact or law arising from or in connection with this Agreement and whether or not involving alleged breach of this Agreement, may be raised only under this Disputes provision.

Whenever a dispute arises, the parties will attempt to resolve the issues involved by discussion and mutual agreement as soon as practical. In no event will a dispute which arose more than three months prior to the notification made under the following paragraph of this provision constitute the basis for relief under this article unless FHWA waives this requirement.

Failing resolution by mutual agreement, the aggrieved party will document the dispute by notifying the other party in writing of the relevant facts, identify unresolved issues and specify the clarification or remedy sought. The AO will conduct a review of the matters in dispute and render a decision in writing within thirty calendar days of receipt of such written request. Any

decision of the AO is final and binding unless a party will, within thirty calendar days, request further review as provided below.

Upon written request to the FHWA Director, Office of Acquisition and Grants Management or designee, made within thirty calendar days after the AO's written decision or upon unavailability of a decision within the stated time frame under the preceding paragraph, the dispute will be further reviewed. This review will be conducted by the Director, Office of Acquisition and Grants Management. Following the review, the Director, Office of Acquisition and Grants Management, will resolve the issues and notify the parties in writing. Such resolution is not subject to further administrative review and to the extent permitted by law, will be final and binding. Nothing in this Agreement is intended to prevent the parties from pursuing disputes in a United States Federal Court of competent jurisdiction.

M. CLOSEOUT OF AGREEMENT FILE

The Government will initiate the administrative closeout of the cooperative agreement after receiving evidence that all technical work and administrative requirements have been completed. The Recipient shall furnish all required documents in support of the closeout of the cooperative agreement within the timeframes requested by the Government. The Government anticipates the timeframe to complete administrative closeout of the cooperative agreement will not exceed six (6) months.

N. TRAVEL

Travel and per diem authorized under the cooperative agreement will be reimbursed in accordance with the travel costs section of 2 CFR 200.475.

O. PUBLIC ACCESS REQUIREMENTS AND COMPLIANCE (if applicable)

In response to the White House Office of Science and Technology Policy memorandum dated February 22, 2013, entitled Increasing Access to the Results of Federally Funded Scientific Research, DOT is incorporating Public Access requirements into all funding awards (grants) for scientific research. This section sets forth the requirements a funding Recipient must satisfy to be in full compliance with the DOT Public Access plan. For all wholly or partially Federal funded scientific research agreements, the Recipient hereby agrees to comply with the requirements of the DOT Public Access plan. The Recipient is required to include these obligations in any sub- awards or other related funding agreements. The full requirements of the DOT Public Access plan requirements include, but are not limited to, the following:

A. Copyright License

Recipient hereby grants to the DOT a worldwide, non-exclusive, non-transferable, paid-up, royalty-free copyright license, including all rights under copyright, to any and all Publications and Digital Data Sets as such terms are defined in the DOT Public Access plan, resulting from scientific research funded either fully or partially by this funding agreement. Recipient herein acknowledges that the above copyright license grant is first in time to any and all other grants of a copyright license to such Publications and/or Digital Data Sets, and that DOT shall have priority over any other claim of exclusive copyright to same.

B. Reporting and Compliance Activities

Recipient hereby agrees to satisfy the reporting and compliance requirements as set forth in the DOT Public Access plan, including, but not limited to, the submission and approval of a Data Management Plan, the use of Open Researcher and Contributor ID (ORCID) numbers, the

creation and maintenance of a research project record in the Transportation Research Board's (TRB) Research in Progress (RiP) database, and the timely and complete submission of all required publications and associated digital data sets as such terms are defined in the DOT Public Access plan. Additional information about how to comply with the requirements can be found at: <https://ntl.bts.gov/public-access/how-comply>.

P. PROGRAM REQUIREMENTS

In connection with any program or activity conducted with or benefiting from funds awarded under this notice, Recipients of funds must comply with all applicable requirements of Federal law, including, without limitation, the Constitution of the United States; the conditions of performance, nondiscrimination requirements, and other assurances made applicable to the award of funds in accordance with regulations of the U. S. Department of Transportation; and applicable Federal financial assistance and contracting principles promulgated by the Office of Management and Budget. In complying with these requirements, Recipients, in particular, must ensure that no concession agreements are denied or other contracting decisions made on the basis of speech or other activities protected by the First Amendment. If the Department determines that a Recipient has failed to comply with applicable Federal requirements, the Department may terminate the award of funds and disallow previously incurred costs, requiring the Recipient to reimburse any expended award funds.

The following national policy considerations need to be addressed by project sponsors before they can receive Federal funds for the program:

a. Critical Infrastructure Security and Resilience:

It is the policy of the United States to strengthen the security and resilience of its critical infrastructure against both physical and cyber threats. Each applicant selected for Federal funding under this notice must demonstrate, prior to the signing of the grant agreement, effort to consider and address physical and cyber security risks relevant to the transportation mode and type and scale of the project. Projects that have not appropriately considered and addressed physical and cyber security and resilience in their planning, design, and project oversight, as determined by the Department and the Department of Homeland Security, will be required to do so before receiving funds for construction, consistent with Presidential Policy Directive 21 - Critical Infrastructure Security and Resilience and the National Security Presidential Improving Cybersecurity for Critical Infrastructure Control Systems.

b. Domestic Preference Requirements:

As expressed in E.O. 14005, 'Ensuring the Future Is Made in All of America by All of America's Workers' (86 FR 7475), the executive branch should maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States. Funds made available under this notice are subject to the domestic preference requirement at 23 U.S.C. 313, 23 CFR 635.410, and 2 CFR 200.322. The Department expects all applicants to comply with that requirement.

c. Civil Rights and Title VI:

As a condition of a grant award, grant Recipients should demonstrate that the Recipient has a plan for compliance with civil rights obligations and nondiscrimination laws, including Title VI of the Civil Rights Act of 1964 and implementing regulations (49 CFR § 21), the Americans with Disabilities Act of 1990 (ADA), and Section 504 of the Rehabilitation Act, all other civil rights requirements, and accompanying regulations. This should include a current Title VI plan, completed Community Participation Plan, and a plan to address any legacy infrastructure or facilities that are not compliant with ADA standards. The Department's and the applicable Operating Administrations' Office of Civil Rights may work with awarded grant Recipients to ensure full compliance with Federal civil rights requirements.

d. Federal Contract Compliance:

As a condition of grant award and consistent with E.O. 11246, Equal Employment Opportunity (30 FR 12319, and as amended), all Federally assisted contractors are required to make good faith efforts to meet the goals of 6.9 percent of construction project hours being performed by women, in addition to goals that vary based on geography for construction work hours and for work being performed by people of color. Under Section 503 of the Rehabilitation Act and its implementing regulations, affirmative action obligations for certain contractors include an aspirational employment goal of 7 percent workers with disabilities.

e. Performance and Program Evaluation:

As a condition of grant award, grant Recipients may be required to participate in an evaluation undertaken by DOT or another agency or partner. The evaluation may take different forms such as an implementation assessment across grant Recipients, an impact and/or outcomes analysis of all or selected sites within or across grant Recipients, or a benefit/cost analysis or assessment of return on investment. The DOT may require applicants to collect data elements to aid the evaluation and/or use information available through other reporting. As a part of the evaluation, as a condition of award, grant Recipients must agree to: (1) make records available to the evaluation contractor or DOT staff; (2) provide access to program records, and any other relevant documents to calculate costs and benefits; (3) in the case of an impact analysis, facilitate the access to relevant information as requested; and (4) follow evaluation procedures as specified by the evaluation contractor or DOT staff.

Recipients and subrecipients are also encouraged to incorporate program evaluation including associated data collection activities from the outset of their program design and implementation to meaningfully document and measure their progress towards meeting an agency priority goal(s). Title I of the Foundations for Evidence-Based Policymaking Act of 2018 (Evidence Act), Pub. L. No. 115-435 (2019) urges Federal awarding agencies and Federal assistance Recipients and subrecipients to use program evaluation as a critical tool to learn, to improve equitable delivery, and to elevate program service and delivery across the program lifecycle. Evaluation means "an assessment using systematic data collection and analysis of one or more programs, policies, and organizations intended to assess their effectiveness and efficiency." 5 U.S.C. § 311. Credible program evaluation activities are implemented with relevance and utility,

rigor, independence and objectivity, transparency, and ethics (OMB Circular A-11, Part 6 Section 290).

For grant Recipients receiving an award, evaluation costs are allowable costs (either as direct or indirect), unless prohibited by statute or regulation, and such costs may include the personnel and equipment needed for data infrastructure and expertise in data analysis, performance, and evaluation. (2 CFR Part 200).

3. REPORTING

ADDRESSES FOR SUBMITTAL OF REPORTS AND DOCUMENTS

The Recipient shall submit all required reports and documents, under transmittal letter referencing the award number, as follows:

Submit an electronic copy to the Agreement Specialist at the following address:
TBD (to be filled in at award **)**

Submit an electronic copy to the AOR at the following address:
TBD (to be filled in at award **)**

A. MONTHLY PROGRESS REPORTS

The Recipient shall provide monthly progress reporting in two parts:

- Monthly Report Part I: Technical Progress and Status Summary, and
- Monthly Report Part II: Financial Status Summary.

Monthly reports shall be delivered using the templates provided at Phase 1 kickoff.

Monthly Report Due Dates. Monthly reports (complete Part I and Part II documents) shall be delivered no later than the tenth calendar day of the month following the reporting period. For example, the monthly report for April 2024, will be due by May 10, 2024. If the tenth of the month falls on a non-business day (i.e., weekend day or Federal holiday), then the monthly report may be delivered on the following business day.

Monthly Report Part I: Technical Progress and Status Summary. Part I provides an overall summary of technical progress to date and (to streamline reporting) provides a single deliverable comprising schedules used for status tracking in tasks under this agreement and a single deliverable comprising project risks and risks/issues in tasks under this agreement. Part I monthly report documents are intended to be shared among the Federal team, and technical support contractors. The Recipient shall provide monthly progress reports that identify all deliverables and deliverable status (not initiated, in progress X% complete, draft delivered, in revision X% complete, final delivered, accepted). Elements of these reports may be extracted for use in public-facing status materials and program dashboards. Required elements of the Part I document include:

- *Activity Narrative (by Task)*, a narrative of activity undertaken by task (with reference to the Task-Level Reporting Schedules for more detail) and activities planned for the next monthly period (in MS Word)
 - *Updated Project Schedule* (in MS Project)
 - *Updated Risk Register*, includes (to streamline reporting) a single Excel Workbook with a tab for Tasks 1-1/2-1 for overall project-level risks, and a separate tab for tasks requiring detailed risk reporting:
 - Acquisition, Tasks 1-2.3 and 1-3.1
 - Installation, Tasks 1-2.3 and 1-3.1
 - Performance Measurement and Evaluation, Tasks 1-2.5, and 2-3
 - Software Development, Task 1-3.2
 - System Testing, Tasks 1-4.1 and 1-4.2
 - Operational Readiness Demonstration, Tasks 1-4.1 and 1-4.3
 - Outreach, Tasks 1-5.1 and 2-5.2
 - System Operations and Maintenance, Tasks 1-2.4 and 2-2
 - Inter-Site Interoperability Demonstration, Task 2-3
 - *Program-Level Cost Narrative*, including a retrospective cost narrative, and a projected cost-to-complete narrative.
 - Note that this Program-Level Cost Narrative should include only aggregate project cost information and should not include detailed cost information (e.g., individual rates and hours).
 - *Lesson Learned Logbook (LLL)*, identifying and excerpting entries created or updated (in MS Excel).
 - *Task-Level Reporting Schedules*, includes (to streamline reporting) an initial and updated versions of the following in a single Excel Workbook with several tabs for tasks that require schedule reporting:
 - Acquisition, Tasks 1-2.3 and 1-3.1
 - Installation, Tasks 1-2.3 and 1-3.1
 - Performance Measurement and Evaluation, Tasks 1-2.5, and 2-3
 - Software Development, Task 1-3.2
 - System Testing, Tasks 1-4.1 and 1-4.2
 - Operational Readiness Demonstration, Tasks 1-4.1 and 1-4.3
 - Outreach, Tasks 1-5.1 and 2-5.2
 - System Operations and Maintenance, Tasks 1-2.4 and 2-2
 - Inter-Site Interoperability Demonstration, Task 2-3
- NOTE: The WBS in these schedules should be consistent with the WBS in the project schedule identified in Task 1-1. However, these schedules could go to lower WBS levels in order to provide appropriate schedule detail.

Monthly Report Part II: Financial Status Summary. Part II is intended to provide the AO/AOR insight on detailed status for financial reporting. The Part II document is not intended to be shared with the broader Federal team or the technical support contractors. Part II shall include:

- A summary of costs incurred for the reporting period and to date. Report costs incurred by major cost elements such as Direct Labor, Travel, Subcontractor Costs, Indirect Costs, etc. Present Federal share, Cost share, and Total.

- A comparison of total costs incurred to the total budgeted costs for the reporting period and to date.
- Projected total cost-to-complete.

B. QUARTERLY PROGRESS REPORT

The Recipient must submit an electronic copy of the SF-PPR to [insert instructions, for example the AOR and the Agreement Specialist/AO] on or before the 30th of the month following the calendar quarter being reported. Final SF-PPRs are due 90 days after the end of the agreement period of performance.

Calendar quarters are defined as:

| | |
|------|--------------------|
| 1st: | January – March |
| 2nd: | April – June |
| 3rd: | July – September |
| 4th: | October – December |

Reports due on or before:

| |
|--------------|
| April 30th |
| July 30th |
| October 30th |
| January 30th |

The quarterly progress report must include the required certification pursuant to 2 CFR 200.415.

Quarterly Progress Reports shall include the following:

- Work performed for the current quarter;
- Work planned for the upcoming quarter;
- Description of any problem encountered or anticipated that will affect the completion of the work within the time and fiscal constraints as set forth in the agreement, together with recommended solutions to such problems; or a statement that no problems were encountered; and
- A tabulation, clearly delineated by Federal share, cost share and total, of the current and cumulative costs expended by quarter versus budgeted costs.

In the SF-PPR Block 11, Other Attachments, include the following information as attached pages:

- SF-425, Federal Financial Report; and
- SF-425A, Federal Financial Report Attachment (if applicable).

C. ANNUAL BUDGET REVIEW AND PROGRAM PLAN

The Recipient must submit an electronic copy of the Annual Budget Review and Program Plan to the AO and the AOR at least 60 days prior to the anniversary date of this agreement. The Annual Budget Review and Program Plan must include the required certification pursuant to 2 CFR 200.415. The Annual Budget Review and Program Plan must provide a detailed schedule of activities, estimate of specific performance objectives, include forecasted expenditures, and schedule of milestones for the upcoming year. If there are no proposed deviations from the Approved Project Budget, the Annual Budget Review must contain a statement stating such. The Recipient must meet via teleconference or Webconference with FHWA to discuss the Annual Budget Review and Program Plan. Work

proposed under the Annual Budget Review and Program Plan must not commence until AO's written approval is received.

D. RECIPIENT INTEGRITY AND PERFORMANCE MATTERS

In accordance with 2 CFR 200.211 and Appendix XII to 2 CFR Part 200, if the total value of a selected applicant's currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds \$10 million at any time during the period of performance, then the applicant must maintain the currency of information reported to the SAM and made available in the FAPIIS about civil, criminal, or administrative proceedings as described in the terms and conditions of any resultant award. This is a statutory requirement under Section 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by Section 3010 of Public Law 111-212, all information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

SECTION G - FEDERAL AWARDING AGENCY CONTACTS

Address any questions to:

Rob Miller
Agreement Specialist
Office of Acquisition and Grants Management
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590
Email: Rob.Miller@dot.gov
Phone: 202-366-9167

Secondary point of contact is:

Robin Hobbs
Agreement Officer
Office of Acquisition and Grants Management
Federal Highway Administration
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590
Email: Robin.Hobbs@dot.gov
Phone: 202-366-4004

The FHWA will not review applications in advance, but FHWA staff are available for technical questions and assistance. In addition, FHWA will post answers to questions and requests for clarifications at Grants.gov under this NOFO's page.

SECTION H - OTHER INFORMATION

1. PROTECTION OF CONFIDENTIAL BUSINESS INFORMATION

All information submitted as part of or in support of any application shall use publicly available data or data that can be made public and methodologies that are accepted by industry practice and standards, to the extent possible. If the application includes information you consider to be a trade secret or confidential commercial or financial information, the applicant should do the following:

(1) Note on the front cover that the submission "Contains Confidential Business Information (CBI)," (2) mark each affected page "CBI," and (3) highlight or otherwise denote the CBI portions and (4) at the end of the document, explain how disclosure of the confidential information would cause substantial competitive harm. The FHWA will protect confidential information complying with these requirements to the extent required under applicable law. If FHWA receives a Freedom of Information Act (FOIA) request for the information that the applicant has marked in accordance with this section, FHWA will follow the procedures described in its FOIA regulations at 49 CFR 7.29

2. PUBLICATION/SHARING OF APPLICATION INFORMATION.

Following the completion of the selection process and announcement of awards, DOT intends to publish a list of all applications received along with the names of the applicant organizations and funding amounts requested.

ATTACHMENT – SAMPLE SYSTEMS ENGINEERING DOCUMENTATION

The materials presented in this attachment are intended to help guide applicants when considering the expected breadth and depth of systems engineering documentation under this Initiative. Note the example provided here assumes a “waterfall” systems engineering approach, however, applicants may propose waterfall, agile, or hybrid models. Note that regardless of the proposed approach, the applicant must propose a set of systems engineering deliverables to support the over-arching Initiative goals regarding interoperable connectivity and replicability.

Concept of Operations (ConOps). The Recipient will develop or refine and improve the proposed deployment concept and document this in a complete ConOps.

The ConOps will refine the set of proposed high priority needs through structured stakeholder interaction, rigorously define a set of key performance measures and identify associated quantitative performance targets for each performance measure that are achievable within the time frame of the deployment. The ConOps will focus on combinations of applications that result in improved and measurable system performance in one, or preferably more, of the high-level categorical areas of safety, traveler mobility (including reliability), equity, environment, efficiency of goods movement, and agency return on investment.

The ConOps will define the specific real-world problems or challenges that the agency is trying to address. The ConOps will describe the specific combination of applications that will be deployed to address those problems, and how operational practice will be altered based on the introduction of these applications. The ConOps will identify and detail the specific use cases relevant to the proposed deployment concept, specifically the use cases where applications associated with the Initiative are expected to have the most impact in achieving target performance goals. The ConOps will include a schematic context diagram illustrating a high-level physical description of the proposed system.

The Recipient will follow the guidelines for format and content in IEEE Standard 1362-1998 to develop the new or refined draft ConOps and deliver to the DOT for review. The Recipient will revise the ConOps in response to DOT comments and deliver a revised ConOps and a companion comment resolution log, showing how comments were resolved.

System Requirements Specification (SyRS). The Recipient will develop new or update their existing SyRS to describe what the proposed, enhanced system must accomplish (without providing details on how that would be accomplished); identify the subsystems; and define the functional and interface requirements among the subsystems.

At a minimum, the following requirements shall be included: (i) Functional requirements, including communications, security, and safety requirements; (ii) Interface requirements, including identification of relevant standards (where appropriate); (iii) Performance requirements, including system performance targets and performance requirements; (iv) Data requirements, including data-sharing requirements.

Every user need identified in the refined ConOps should have at least one corresponding system requirement that addresses that need. Every system requirement must be traced back to at least one user need. Each performance measure and target identified in the refined ConOps should have a corresponding performance requirement. The role of each subsystem in supporting system-level performance requirements must be identified, including associated subsystem functional, interface, data, and performance requirements. Further, the SyRS must be consistent with and support all essential elements of the Performance Measurement and Evaluation Plan (see Task 1-2.5).

The Recipient will follow the guidelines for format and content in IEEE Standard 1233-1998 to develop the new or refined draft SyRS and deliver to DOT for review. The Recipient will revise the SyRS in response to DOT comments and deliver a revised SyRS and a companion comment resolution log, showing how comments were resolved.

System Architecture Document (SAD). The Recipient will develop new or refine their existing SAD to develop a well-structured architecture for the deployment concept.

The SAD should cover: (i) Enterprise Architecture, which describes the relationships between organizations required to support the overall system architecture; (ii) Functional Architecture, which describes abstract functional elements (processes) and their logical interactions (data flows) that satisfy the system requirements; (iii) Physical Architecture, which describes physical objects (systems and devices) and their application objects as well as the high-level interfaces between those physical objects; and (iv) Communications Architecture, which describes the communications protocols between application objects.

The SAD will include a Standards Plan and Interface Control Document that identifies the nature of required interfaces to other systems, which should be defined to utilize existing networking or other standards when available. In following the systems engineering process, the Recipient will identify information exchange needs and/or use cases in the Interface Control Document section. To the extent that such exchanges are supported by standards, the Recipient should catalog applicable standards that will be used. Where new standards are needed, these needs should be fully documented in the Standards Plan section. To accelerate deployment of interoperable deployments, the Recipient will use existing standards, architectures, and certification processes whenever viable, and document those cases where such use is not viable. To provide information required to refine ITS architecture and standards in support of nationwide deployment, the Recipient will also document their experiences to help improve the quality of these products based on lessons learned in deployment. These will be captured as a part of Task 1-5.

The Recipient will follow the guidelines for format and content in IEEE Standard 42010-2011 (IEEE Recommended Practice for Software Architecture Descriptions) to develop the new or refined draft SAD and deliver to the DOT for review. The Recipient will revise the SAD in response to DOT comments and deliver a revised SAD and a companion comment resolution log, showing how comments were resolved.

Systems Engineering Walkthrough. The Recipient will schedule and conduct a walkthrough of the revised ConOps, the revised SyRS, and the revised SAD. The Recipient will develop walkthrough workbooks for the three systems engineering documents to structure and expedite the walkthrough process. This walkthrough will be conducted either in-person in Washington, DC, at a DOT-designated facility that supports a webinar function or as a completely virtual meeting. If conducted in-person, the Recipient's key personnel associated with the SE deliverables (i.e., ConOps, SyRS, and SAD) must attend in person.

The Recipient will revise the ConOps in response to DOT comments and deliver a revised ConOps and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised ConOps and comment resolution log, the Recipient will deliver a final ConOps. The Recipient will revise the SyRS in response to DOT comments and deliver a revised SyRS and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised SyRS and comment resolution log, the Recipient will deliver a final SyRS. The Recipient will revise the SAD in response to DOT comments and deliver a revised SAD and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised SAD and comment resolution log, the Recipient will deliver a final SAD.

System Design Document (SDD). The Recipient will develop new or refine and prepare a detailed design based on the architecture that embodies the full scope of the deployed system. Subsystems of the system shall be identified and decomposed further into components. Requirements shall be allocated to the system components, and interfaces shall be specified in detail. Detailed specifications shall be created for the hardware and software components to be developed, and final product selections shall be made for off-the-shelf components.

The Recipient will follow the guidelines for format and content in IEEE Standard 1016-2009 (IEEE Recommended Practice for Software Design Descriptions) to develop the new or refined draft SDD and deliver to DOT for review. The Recipient will revise the SDD in response to DOT comments and deliver a revised SDD and a companion comment resolution log, showing how comments were resolved. Based on AOR approval of the revised SDD and comment resolution log, the Recipient will deliver a final SDD.

Example Deliverables

- ConOps Walkthrough Workbook and Walkthrough
- ConOps (Draft/Final)
- SyRS Walkthrough Workbook and Walkthrough
- SyRS (Draft/Final)
- SAD Walkthrough Workbook and Walkthrough
- SAD (Draft/Final)
- SDD (Draft/Final)