

# Phase 1 Integrated Complete Trip Deployment Plan

## California Association for Coordinated Transportation ITS4US Deployment Project

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# 1 Refined Phase 1 Deployment Concept

## 1.1 Introduction

### 1.1.1 Document Purpose

This Integrated Complete Trip Deployment Plan (ICTDP) for the VVTA/CALACT ITS4US project provides a complete scope of the intended activities during the proposed Phase 2 and 3 continuation of the project. It draws from the research and corresponding reports drafted during Phase 1 of the project, which was led by the California Association for Coordinated Transportation (CALACT), including the following documents.

- Task 1: Project Management Plan (PMP)
- Task 2: Complete Trip Deployment Concept of Operations (ConOps)
- Task 3: Data Management Plan (DMP)
- Task 4: Safety Management Plan (SMP)
- Task 5: Performance Measurement and Evaluation Support Plan (PMESP)
- Task 6: System Requirements Specification (SyRS)
- Task 7: Enabling Technology Readiness Assessment (ETRA)
- Task 8: Human Use Approval Summary (HUAS)
- Task 9: Participant Training and Stakeholder Education Plan (PTSEP)
- Task 10: Institutional, Partnership, and Financial Plan (IPFP)
- Task 11: Outreach Plan
- Task 12: Systems Engineering Management Plan (SEMP)

This ICTDP combines the work documented in each of the reports above to describe an organizational structure and technical approach that will fulfill the original goals of the CALACT application for Phase 1 ITS4US Program. This document also serves as an application by Victor Valley Transit Authority (VVTA) for Phase 2 and 3 of the ITS4US program. VVTA will collaborate with CALACT and other members of the project team to fulfill on the goals of the project design during Phase 1.

## 1.1.2 Organization of this Document

This document is organized into four sections. Section 1 provides an overview of the project as well as project deployment goals, the deployment concept, the planned team organizational structure for Phases 2 & 3, and plans for post-deployment finances and governance. Section 2 details the technical approach for Phase 2 and Phase 3. Section 3 describes the deployment schedule for Phases 2 & 3 and identified risks to this schedule. Finally, Section 4 includes a cost summary for the project and identified cost risks.

## 1.2 Deployment Concept

The VVTA project addresses the need for all transit riders to have equal access to the real-time trip planning user experience that is already available for most urban fixed-route transit riders. The particular underserved communities the project focuses on are people with mobility disabilities, people with vision disabilities, people with cognitive and developmental disabilities, people with hearing disabilities, older adults, low-income populations, rural residents, veterans, and people with limited English proficiency. Riders in these communities are likely to rely heavily on demand-responsive transit services or rely on information regarding fixed-route transit that are not represented in data standards such as GTFS that are used by most transit rider apps.

Most fixed route users in the three-state region have access to real-time information about transit services through any mobile device. However, very few users have that information about public demand-responsive transit, and those that do have it through custom proprietary systems implemented at only a few local agencies. Further, users of both demand-responsive and fixed-route services cannot easily access details regarding the transit system accessibility features and other amenities. The trip planning experience of demand-response systems is further and uniquely burdened by a complex web of questions that riders must answer by determining the operator coverage area, the specific services within that operator's service menu they qualify for, if the operator has availability, and if they need to pay and how. Unlike fixed route services, which have a well-established data standard and a stable industry of third-party trip planning services, and private Transportation Network Companies (TNCs), which produce their own seamless and instantaneous booking and payments flows, demand-responsive transit lacks the technical solutions which could ease these burdens for their riders. There is no comparable desktop or smartphone experience and no other innovations which exist to untangle these webs of availability, reservations, or payments.

The VVTA/CALACT project is supported and staffed by a broad coalition of public, non-profit, and for-profit organizations, and will leverage the resources and expertise of those organization to develop a regional data governance system. The intended outcome of the VVTA/CALACT deployment is to improve the user experience and cost efficiency of demand-responsive and fixed route transit for underserved riders (and all riders) at agencies throughout the Washington, Oregon, and California. This outcome will be achieved by coordinating public, non-profit, and for-profit transit stakeholders across the region through the development of public information resources that help those stakeholders align their investments in data standardization and develop efficient processes that allow for the improved and extended data to be used in common rider applications.

Project partner organizations include:

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- [Victor Valley Transit Authority \(VVTA\)](#): Phase 2 & 3 Public Agency Site Lead
- [California Association for Coordinated Transportation \(CALACT\)](#): Project Management Organization (PMO)
- [Oregon Department of Transportation \(ODOT\)](#): Agency outreach in Oregon, member of PMT,
- [Washington Department of Transportation \(WSDOT\)](#): Agency outreach in Washington, member of PMT,
- [California Department of Transportation \(Caltrans\)](#), including [California Integrated Travel Project \(Cal-ITP\)](#) partner [Capitol Corridor Joint Powers Authority \(CCJPA\)](#): Agency outreach in California, member of PMT,
- [Washington State Transit Association \(WSTA\)](#): Support agency outreach in WA and assist with event coordination
- [Trillium](#), an Oregon small business: Data management, data quality reviews, and technical advice
- [Compiler LA](#), a California small business: Software systems requirements and data management technical advice
- [Garnet Consulting LLC](#), an Oregon small business: Report writing and technical advice
- [California Partners for Advanced Transportation Technology at UC Berkeley](#): Project evaluation and stakeholder safety and human use leads
- [MobilityData IO](#), a Canadian nonprofit: Data specification development and technology readiness assessment lead
- [Transit](#), a Canadian private corporation registered for business in the US: Technical advice and licensed software
- [Navilens](#), a Spanish private corporation registered for business in the US: Digital accessible signage technical advice and licensed software
- [Google](#), an American public corporation (unfunded): Participation in an advisory role
- The following companies participated as paid subcontractors in Phase 1, but will not continue as paid subcontractors during Phase 2 and 3 of the project. The organizational plan that led to a more focused team model can be found in Section 1.4.
  - [Tamika L. Butler Consulting](#), a California small business: Internal evaluation and stakeholder engagement
  - [Mark Wall Associates](#), a California small business: Agency outreach and support for reporting and project administration

- [Estolano Advisors](#), a California small business: Agency and stakeholder outreach support

### 1.2.1 Proposed System

A system of data exchange that drives rider applications for fixed route transit already exists and has increasingly been leveraged for regional planning and other activities where transit service data are needed. In this system, transit operators use scheduling or CAD/AVL software (usually provided by a vendor) to produce GTFS data, which is provided to many rider application developers. However, public agencies and other organizations in the region do not have any common governance or knowledge sharing system that helps them ensure operators publish the data that is most useful for agencies or for underserved riders. During Phase 1, the project performed research and interviews with stakeholders from target underserved groups, and identified that many gaps exist in the current system where information important to underserved riders is not captured and published. The proposed new system is based off the user needs identified in that research process, which are defined in the ConOps.

The changes proposed for the new system finalize proposed extensions to the GTFS data specification, define a new data standard related to booking integration, develop new open-source software applications to provide easy access to transit data to riders and other users, and create intergovernmental-coordination processes to ensure that ongoing investments effectively maintain and improve the developed data, data specifications, and software. The proposed approach defines new responsibilities for state DOTs, MPOs, and other transportation organizations that improve data outcomes from transit agencies and their software vendors, creates a standardized interface for reviewing key transit service information, provides a feedback loop that improves the quality and accessibility of rider interfaces on an ongoing basis, and integrates demand-responsive transportation services into the GTFS data ecosystem. We expect these responsibilities will be adopted because they align with the long-term interests of the state DOTs and because each DOT on the West Coast—as well as stakeholders representing other public agencies—is coordinating directly with the project team in the development and deployment of the system.

These enhancements will be carried out within the organizational context of the following proposed system, as illustrated in the diagram on the next page. The proposed system is primarily a governance system which coordinates functions that might look very different depending on the transit operators involved. Section 1.2.4 below will describe the different geographic regions within which the system will be deployed.

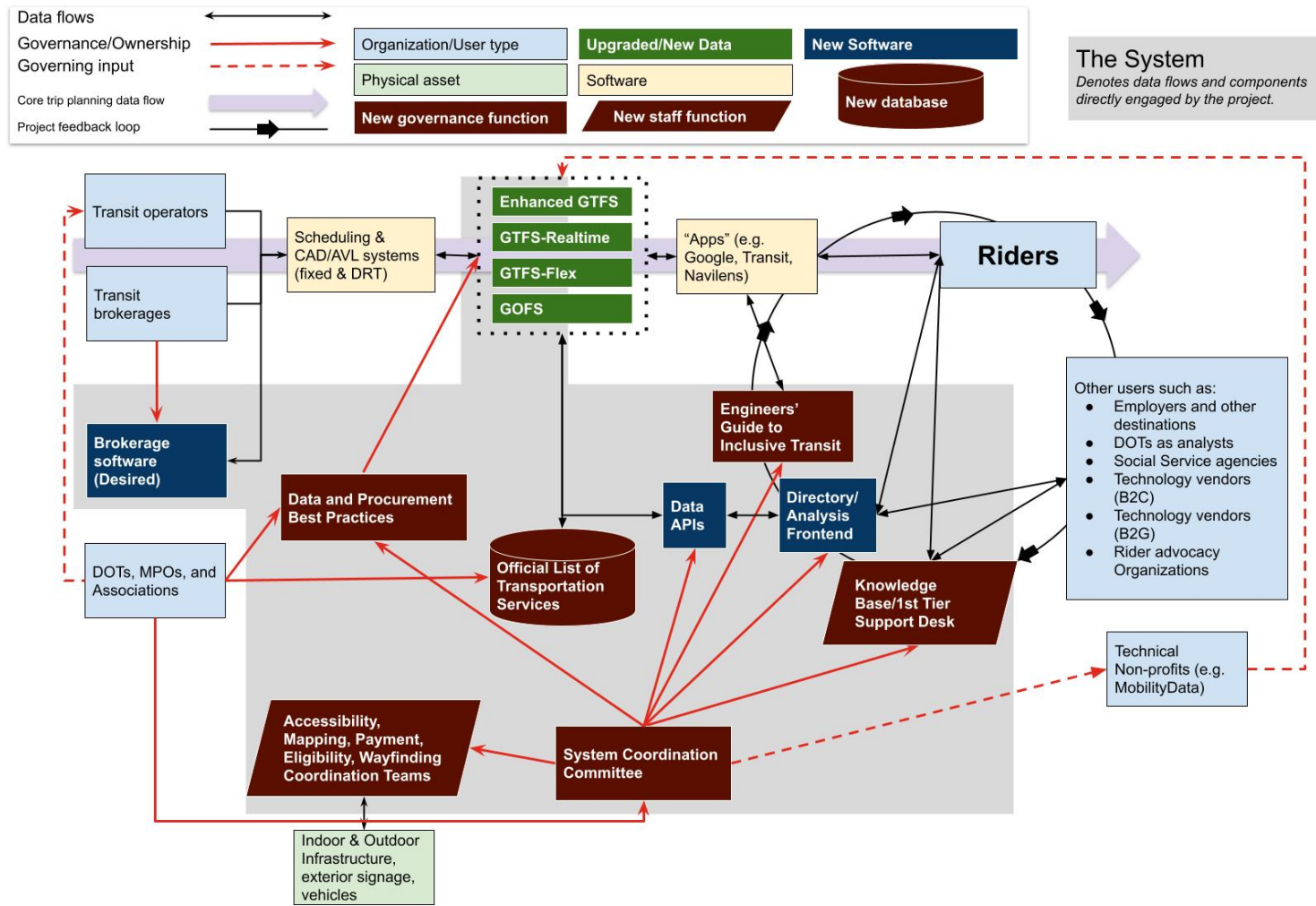


Figure 1: Proposed System Diagram





## 1.2.2 Sub-System Breakdown

The individual components that together form the proposed system are described in more detail in this section. These systems will be developed to meet the defined system requirements specified in the SyRS and are traced within the ETRA from their component technologies to individual user needs that are specified in the ConOps.

### 1.2.2.1 Transit Data Enhancements

As shown in Figure 1: Proposed System Diagram, transit data enhancements are impacted by the system and within the system of interest, but also regularly produced outside the system of interest by scheduling and CAD/AVL systems. The proposed system is meant to encourage the development of enhanced transit data in the long-term, and will participate in defining and finalizing the specification that would structure that data. However, it is not the intention for the system to produce data sets directly in the long-term. That should be the responsibility of scheduling software and where possible this data will be produced by the operator and their vendor, through the implementation of the Data and Procurement Best Practices described in Section 1.2.2.2 below.

Much of this data (Pathways, Text-to-Speech, Translations, Vehicles, Fares v2, Flex, a limited amount of service alerts) could be built directly by the VVTA ITS4US project staff with minimal need for operator effort, by the use of the Data Junior Staff identified in Section 2.2.20. Use of this approach will be limited to operators for which there is a strategic reason to build data sets manually in the short-term. Such strategic reasons may include the ability to import that information into another agency system or planned system, willingness of the state DOT or other party to assume long-term costs of data maintenance, or where the development of data may be an effective and economical way to encourage adoption of the best practices by vendors or operators.

The following subsections describe at a high-level what is accomplished by various transit data enhancements.

#### Enhanced GTFS Schedule

GTFS Schedule refers to basic GTFS data that describes a fixed route service. “Enhanced GTFS Schedule data additionally includes the Pathways, Text-to-Speech, Translations, and likely Vehicles and Fares v2 extensions to GTFS.

- The Pathways extension describes the physical environment of a stop or station as it relates to on-foot or wheelchair navigation and accessibility.
- Text-to-Speech provides screen reader applications improved notation for difficult-to-pronounce information found in a GTFS dataset (for example, a stop name like “Stop ‘n Save @ NE C. Chávez Blvd”).
- The Translations extension provides text in multiple languages for information found in a GTFS dataset.
- Vehicles describes the attributes and behaviors of the vehicles in operation of a bus schedule.

- Fares v2 describes complex transit fare systems, taking into account features like fare capping, zone or route-based fares, and discount groups.

### **GTFS Realtime**

GTFS Realtime is an API specification that provides alerts regarding transit services and also allows for the update of arrival times and vehicle locations. While it is not feasible for the VVTA/CALACT ITS4US project to produce real-time information for operators, the Data and Procurement Best Practices can include definitions of GTFS Realtime quality standards.

### **GTFS-Flex**

GTFS-Flex is a proposed extension of GTFS that incorporates demand-responsive services for the purpose of service definition and trip discovery. This “static” data consists primarily of geometries, and does not require real-time information, so it can be built by the Data Junior Staff. This specification will also be included within the Data and Procurement Best Practices to encourage scheduling systems to export GTFS-flex data for agencies within the three-state region that are not able to produce that data during the course of the project.

### **GOFS**

General On-Demand Feed Specification (GOFS) is the name given to the MobilityData working group defining a new specification that would allow for real-time scheduling and booking of demand responsive transit in third-party rider applications. Both during the ITS4US project timeframe and after, GOFS would need to be produced by scheduling software used by the transit operator, so that an automated API could transmit real-time booking opportunities to riders. These would be promoted within the region through the Data and Procurement Best Practices.

#### **1.2.2.2 *New Governance Responsibilities***

New governance features identify important roles for the State DOTs, MPOs, associations, and other planning or training organizations in the three-state region to support the long-term maintenance of the transit data enhancements initiated by the project.

### **Data and Procurement Best Practices**

The VVTA/CALACT ITS4US project would coordinate the development of Data and Procurement Best Practices that define a standard of transit data quality that accounts for the needs of riders from underserved groups. This system component would be a versioned website containing the written best practices, and an operational process to keep the text up-to-date and supported. Other similar existing resources have been identified but this core use case is not currently covered by existing documentation. The project team will develop the resource in collaboration with the broader GTFS community.

These best practices would include clear requirements for GTFS data producing companies, developed in partnership with operators and vendors, to be inserted into agreements between operators and vendors to govern data quality. State DOTs will be essential in encouraging agencies in their states to adopt the best practices in their vendor agreements.

### **System Coordination Committee**

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The System Coordination Committee (SCC) is the governance body overseeing the proposed system (see the organizational chart in Section 1.4.3). The SCC will direct CALACT as Project Management Organization (PMO) to implement and manage the components of the system governed by the SCC. The SCC would continue to function after Phase 3 of the project, although whether a PMO would continue to support the SCC or if DOT and MPO representatives would assume operations will not be defined until Phase 3 after project evaluation begins. See Section 2.2.14 for more information regarding the SCC.

### **Official List of Transportation Services**

To fulfill this project component, each state will need to maintain a list of transportation services operating within its borders. These lists must have a standardized schema and publication specifications, to be designed in Phase 2, that can ensure a regional list of all agencies and their related GTFS feeds can be coordinated and in sync with the global list of all transit services. This information may include additional fields and metadata as defined by the SCC. The SCC would also collaboratively define standards for which services are included, based on factors including the feasibility of collecting data for some services (e.g., small non-profits, taxi companies, etc.). The Official List for each state is not meant to be a complex data product, and will be designed to be as practical to meet the purposes of the component, which is first to be ingested by the Data APIs, and second to serve as a model for how an official list of Transportation Services could be structured by any state or region.

### **Engineers' Guide to Inclusive Transit**

Many stakeholder interviews conducted during Phase 1 identified desired application features that are not fulfilled by rider-facing transit apps today. This project does not intend to design customer interfaces, but will recommend that some user interface features be provided or some engineering practices be followed by app developers and revisit and update those recommendations as the project progresses. The Engineers' Guide to Inclusive Transit would be governed by the SCC and developed by the project team. This system component would be a versioned website containing the optional interface suggestions, and an operational process to keep the text up-to-date and supported. Both suggestions for established applications with a large number of users as well as for start-ups and custom operator applications would describe the best practices for communicating transit information to riders accessibly.

#### **1.2.2.3 Coordinated Technology Services**

The governance functionalities identified above will be supplemented by technology services provided by the PMO under the direction of the SCC to transit operators and all potential users depending on the type of service. These technology services include some software applications and some staff functionalities that provide labor services.

### **Data APIs**

The Data APIs are a database and backend software application which ingests GTFS data from the GTFS data sets listed on the Official List of Transportation Services, and provides to other applications a series of API endpoints that expose useful data elements from the GTFS feeds as well as aggregations, calculations, and abstractions from those GTFS feeds which are useful to application developers (the SyRS and ETRA define specific information to be provided by these endpoints and trace those requirements to user needs in the ConOps). The Data APIs would be a

software application of some shared model that allows the State DOTs to administer appropriate licensing and hosting of the application and transmit it to other state parties to allow evolution of the interface on a consistent basis and after the project using a financial model shared across the three states.

### **Directory/Analysis Frontend**

The Directory/Analysis Frontend would be a single website where users (e.g., data analysts, software developers) are able to find transit operator data, such as contact information, a list of routes and stops, demand-responsive services and their service times and areas, fares, GTFS downloads, and a list of other endpoints provided by the Data APIs. The Directory/Analysis Frontend would be a software application of some shared model that allows the SCC to administer appropriate licensing and hosting of the application and transmit it to other state parties to allow evolution of the interface on a consistent basis and after the project using a financial model shared across the three states. One or multiple websites and servers could host the application, and those websites could be owned by the PMO, a partnering public organization, or other parties.

### **Knowledge Base/1<sup>st</sup> Tier Support**

This Knowledge Base and 1<sup>st</sup> Tier Support Desk would provide basic educational resources and use rider apps to provide answers to simple questions, and to connect them with the right agency staff for more complicated questions. Any user would be able to receive support regarding the right contacts for transit information in their region and assistance commercial mobile applications such as Google Maps, Transit, or others. The Support Desk would be a staffed functionality with a consistent team of technicians (level and hours of service to be determined) managing the answers to user questions. Such data could provide for feedback to other components of the system. During the course of Phase 2 and 3, the Knowledge Base and Support Desk would be deployed only within Deployment Site 3 (see Section 1.2.4).

### **Accessibility, Mapping, Payment, Eligibility, and Wayfinding Coordination**

There will be a technical team made up of project staff who are responsible for providing technical advice and training to the SCC, state DOTs, and individual transit operators. This team will maintain lists of ongoing multi-agency and standards-based technology projects around the three-state region that will help team members connect operators with others in their region working on the same data and technology issues.

#### **1.2.2.4 Transit Operator Software Applications**

##### **Brokerages (desired)**

The broker age is a desired (i.e., not required) component of the system. Many transit operators interviewed, (but only operators, not other system stakeholders) expressed a need to save resources through better coordination of rides with neighboring agencies. Data models exist to exchange information between demand-responsive agencies via brokerages, and could fulfill this use case. A brokerage could be a standalone feature governed through a different model than other system components, and no other system components would rely on it. If implemented, brokerage software would be built or deployed in partnership but operated, maintained, and governed by Hopelink in Deployment Site 2.

The SEMP assigns a timeframe of 14 months after the initiation of Phase 2 as the point at which the determination must be made of whether there is sufficient budget to build the brokerage software application.

### 1.2.3 System Data Needs and Outputs

The data needed by the project are both quantitative and qualitative, supporting the creation of new digital tools and resources—such as websites and software—for state departments of transportation, riders, operators, and other stakeholders of transit systems. These data will also support the project’s independent evaluators in measuring and assessing the effectiveness of the system to meet the needs and operational scenarios identified in the Phase 1 ConOps. Additional details regarding the data needs and outputs of the system can be found in the Phase 1 DMP.

Regarding data security, each state DOT follows information management policies and procedures set by the authority for information technology within their state’s government, including for determining the appropriate data system for any given category of data asset, with oversight and compliance with those policies and procedures also provided by the appropriate personnel and processes determined by the state government (e.g., designees within each DOT such as a Chief Information Officer). As each state is considered the owner of its respective project-related datasets, each state will determine the appropriate data system, including those appropriate for data in the public domain or open data, and subsequent details follow from those determinations.

The specific data storage systems that will be used by vendors for project-related data that are not state-owned are unknown at this point in the project’s development. The project, however, does expect that vendors will use data systems that meet minimum security, back-up, access, and related standards for work with government partners.

### 1.2.4 Deployment Sites

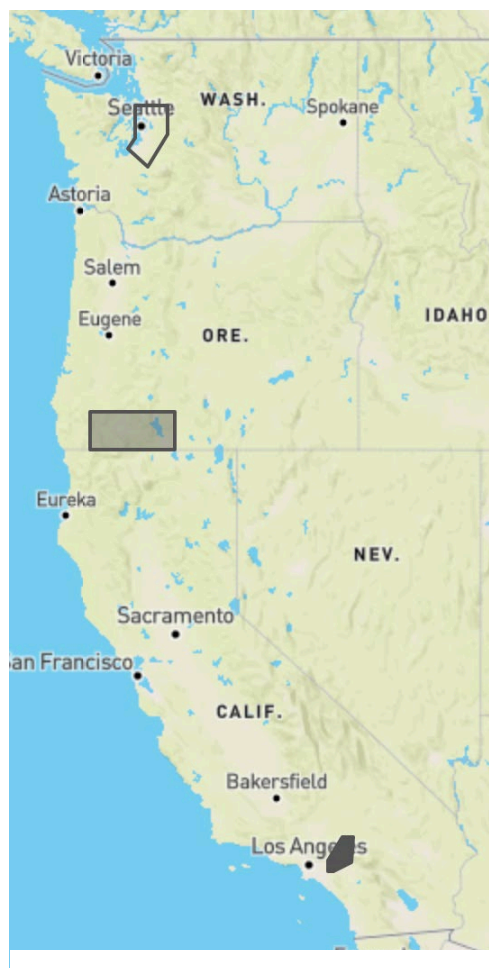
The VVTA/CALACT ITS4US project is being deployed across four different sites. A brief description of each Deployment Site is included below.

#### Deployment Site 1: Region-wide

*Key operators: All operators in the three-state region*

*Key system components:*

- *System Coordination Committee*
- *Data and Procurement Best Practices*



**Figure 2: Deployment Site Map**

- *Official Lists of Transportation Services*
- *Data APIs*
- *Directory/Analysis Frontend*
- *Engineers' Guide to Inclusive Transit*

This deployment site encompasses the three states of Washington, Oregon, and California and can include any operator with service in that region. The focus of Deployment Site 1 is to provide GTFS and various GTFS extension data for as many operators as possible to establish as much data coverage as possible. The Deployment Site is also characterized by the coordinated effort between the three state DOTs to establish agreed-upon data guidelines for regional transit, and the publication of standardized data through the Data APIs. Because Deployment Site 1 encompasses the entire region, the three additional Deployment Sites below are subsidiary deployment sites to Deployment Site 1. In those areas, Deployment Site 1 system components will be implemented along with additional components.

### **Deployment Site 2: Coordinated community transportation region**

*Key operators: Hopelink (and affiliated operating agencies)*

*Key system components:*

- *Data APIs*
- *Technology Coordination Teams: GTFS Flex and Eligibilities data*

*Partner technology:*

- *Hopelink One-Call-One-Click built on top of Data APIs*

This deployment site encompasses the Puget Sound area of Washington State, and is shown in a box with no fill color in Figure 2: Deployment Site Map. Hopelink will serve as the lead agency in this deployment site and provide a connected One-Call One-Click system. This third-party One-Call One-Click system will be built on top of the Data APIs among other software dependencies. This One-Call One-Click system will integrate transit services in the area, including non-emergency medical transportation and community transit. This deployment site serves a number of diverse communities. In particular, the community transit services within this region connect with many people with disabilities and with Limited English Proficiency.

### **Deployment Site 3: Rural area with connecting services and small urban communities**

*Key operators: Rogue Valley Transportation District, Josephine Community Transit, ODOT POINT SW route*

*Key system components:*

- *Data and Procurement Best Practices*

- *1<sup>st</sup> Tier Support Desk*

*Partner technology:*

- *Microtransit scheduling system procured according to Data Best Practices*
- *Real-time Demand Response in Transit app interface based on GOFS*

This deployment site encompasses Jackson, Josephine, and Klamath counties in Southern Oregon including multiple small urban communities and rural areas, and is shown in transparent fill in Figure 2. Deployment Site 3 has various overlapping demand-response and fixed route services and thus will serve as a good location to pilot the 1<sup>st</sup> Tier Support Desk, which will be more useful in regions where multiple services may be required to travel or the relevant agency for a rider may not always be apparent. Further, the integration of a microtransit service into a frontend interface through the use of an open data specification will demonstrate how small agencies could provide demand responsive booking in third-party apps. RVTD, JCT, and ODOTs intercity POINT service will be the primary local deployment agencies, and may be joined by other connecting agencies.

**Deployment Site 4: Large urban and suburban region with diverse service offerings including rail**

*Key operators: Omnitrans, Victor Valley Transit Authority*

*Key system components:*

- *Technology Coordination Teams: GTFIS-Pathways, GTFIS-TextToSpeech, GTFIS-Fares v2*

*Partner technology:*

- *Digital signage and related APIs and app deployed by Navilens*

This deployment site encompasses the San Bernardino County area in California with a focus on the city of San Bernardino around the regional transit center, and is shown in solid fill in Figure 2. This area has frequent intercity bus and rail connections which present complex wayfinding accessibility challenges. The project intends to provide better pathway information, digital wayfinding, and fares data showing inter-agency discounts to improve the rider experience in the deployment area. Omnitrans and VVTA will collaborate with other regional transit agencies and project staff to design and finalize the deployment site details.

## 1.3 At-Scale Deployment Summary

The proposed system at full deployment will be used by or include information regarding every transit rider, operator, vehicle, stop, and every other transit feature within the three-state region. In total, there are more than 500 transit operators, approximately 100,000 bus stops, thousands of vehicles, and millions of transit riders (estimated from NTD and other public records; see Section 2.2.11 below for an overview of the expected performance measurements which would track the deployment success at reaching these agencies).

The proposed system overlays a governance process and technical documentation and services, which together will incentivize standardizing certain processes and roles that are already active in the current system. State DOTs, MPOs, and associations already provide technical assistance of different types to transit operators, but they will have new resources and training with which to provide that assistance. Transit agencies already use scheduling software to produce GTFS and other data exports, but they will use the Data and Procurement Best Practices to define more clearly their requirements of their vendors. Riders already use apps to get transit information, but they will begin to have more information available to them and presented to them more accessibly within those apps. Planners already analyze the transit network, but they will have access to uniform data sets that save them time in collecting the needed information and make the outcomes of their analyses more accurate.

Thus, at full deployment, subsequent to Phase 3 of the proposed project, the SCC will be meeting occasionally to consider improvements to established system components, and minimal staffing (either contract or from partner organizations) will be required on an ongoing basis to implement those improvements. The Intergovernmental Agreement which will be developed during Phases 2 and 3 will govern the ongoing operations of the system. As desired, the SCC will coordinate on providing, via contractors or resources provided by state DOTs or partners, ongoing technical services to agencies and vendors, as well as other stakeholders. However, resources required to be dedicated to the system at the minimum level of operations will be limited, and most of the operations of the system will be performed by various market players, as happens today, but with the increased efficiency of established working relationships and communal goals.

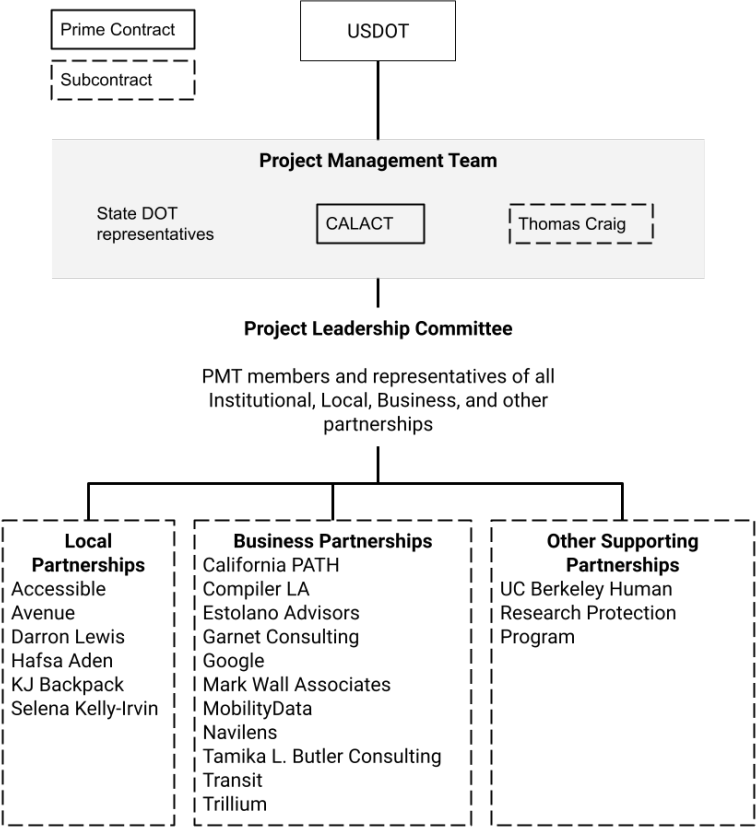
## 1.4 Team Organizational Structure

This section summarizes team organization, key personnel, changes in staff from Phase 1, and organizational/governance processes.

### 1.4.1 Team Organization

During Phase 1, the project has been led by senior leadership on the PMT. Initially, the PMT included only the three key personnel originally identified for the project, SDL Thomas Craig (contractor to CALACT), PML Jacklyn Cuddy (CALACT), and CDL Gillian Gillett (Caltrans). The PMT was expanded early on in the project to include representatives from ODOT (Sarah Hackett) and WSDOT (Stan Suchan). The PMT takes direction from the USDOT and oversees the PLC, which includes all project consultants. Project consultants in turn are divided into Local Partnerships, which includes stakeholder chairpersons, Business Partnerships, which includes all technical consultants, and Other Partnerships, which includes the Independent Review Board (IRB).





**Figure 3. Phase 1 Organizational Structure**

Organization structure for Phases 2 & 3 is laid out in Section 1.4.3.

**1.4.2 Key Personnel**

The key personnel for Phases 2 & 3 of this project will be as follows:

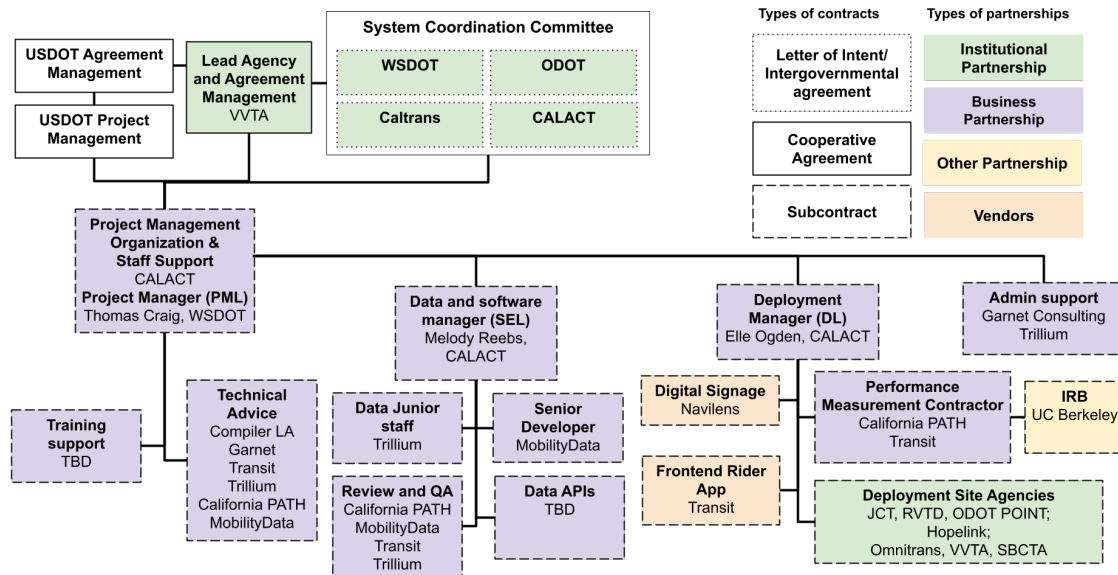
Thomas Craig – Co-Project Management Lead and Point of Contact, CALACT and Marie Downing – Co-Project Management Lead and Point of Contact, VVTA

Elle Ogden – Deployment Lead, CALACT

Melody Reeb – Systems Engineering Lead, CALACT

**1.4.3 Changes in Organizational Form from Phase 1**

An organizational chart showing the relationship between the above team members is in the figure below. Additional information regarding the responsibilities of these team members and contractors can be found in Sections 2.2 and 2.3, including a description of the plan for how products and services for which a contractor has not already been specified will be procured.



**Figure 4. Phase 2 & 3 Organizational Structure**

For Phases 2 & 3 the project team will be organized under three managers who are responsible for designing, developing, and implementing the proposed system. These managers are responsible for the system delivery according to the system requirements identified in the SyRS. Any change in the system requirements defined in that plan must be considered by the SCC.

- Project Manager – The Project Manager is the Project Management Lead (PML) for the project. This individual
  - reports to the SCC and USDOT COR on the progress of system deployment and performance
  - oversees the work of the Data and Software Manager
  - oversees the work of the Deployments Manager
  - is responsible for the delivery of all project reports and Systems Engineering deliverables
  - owns the Technology Coordination Teams system component, including leading the creation of architecture and design documentation for that system component, managing all staff contributing to the development of that component, and managing all staff contributing to the operations of that component except within deployment sites 2 through 4.
  
- Data and Software Manager – The Data and Software Manager is the System Engineering Lead (SEL) for the project. This individual
  - reports to the Project Manager

- oversees the work of the Data Junior Staff, Senior Developer, and Contract Developers
- owns all system components other than the Technology Coordination Teams and SCC, including leading the creation of architecture and design documentation for these components and managing all staff contributing to the development of these components
- collaborates with Deployments Manager to ensure fitness of system components to deployment site needs, supports deployment of system components, and manages new design and development work that arises during system operations
- Deployments Manager – The Deployments Manager is the Deployment Lead (DL) for the project. This individual
  - reports to the Project Manager
  - performs all project management communications related to the local deployment sites and coordinates resources to support successful local deployment sites
  - collaborates with the Data and Software Manager to ensure fitness of system components to deployment site needs and project manages the deployment process for all system components except the Technology Coordination Teams
  - collaborates with internal evaluation team to support successful performance measurement data collection
  - manages ongoing work directly associated with deployment site activities necessary for the operation of software components of the project, and requests maintenance or enhancement of the software components from the Data and Software Manager
  - manages the operations of the Technology Coordination Teams within Deployment Sites 2 through 4, and manages the operations of the 1<sup>st</sup> Tier Support Desk in Deployment Site 3 including any allocation of labor from the project contributing to those operations

The three managers will be in charge of all project activities, and each is allocated to the project at least 24 hours per week. They will meet with each other at least weekly, to ensure consistent coordination between different aspects of the project.

Other team functionalities include

- System Coordination Committee – this is the governance body of the project, and is responsible for overseeing the work of the Project Manager and considering any change to the system requirements. It is also responsible for the development of a long-term governance framework for the project after Phase 3. This group will meet at least monthly, discussing items sequentially based on an agenda distributed in advance, with

notes including all follow up actions and decisions recorded. Any decisions by this group will be made through a process to be defined in the Phase 2 PMP. Until that PMP is written the SCC will make decisions by consensus only.

- Training Assistance Contractors – these contractors report to the Project Manager, and provide services related to training users of the system such as DOTs, operators, and vendors.
- Technical Advice Contractors – these contractors report to the Project Manager, and provide technical advice related to their subject matter expertise, for use by the project.
- Data Junior Staff – these contractors report to the Data and Software Manager, and provide data development and data quality review services.
- Senior Developer – this contractor reports to the Data and Software Manager, and provides development services across all software components of the project.
- Contract Developers – these contractors report to the Data and Software Manager, and provide development services specifically for scopes related to individual software components.
- Deployment Contractors – these contractors report to the Deployments Manager and provide services relevant to specific local deployment sites.
- Performance Measurement Contractor – these contractors report to the Deployments Manager and own the collection and reporting of data as defined in the PMESP.
- Admin Support – this contractor reports to the Project Manager and supports the development of Systems Engineering Deliverables and project management activities.

#### **1.4.4 Summary of Financial and Organizational Models for Sustained Operations**

A goal of Phases 2 and 3 is to not add significant new long-term costs for DOTs, MPOs, transit agencies and other actors, but instead to redirect current costs into programs and services that are more useful to those organizations as well as to riders. This is plausible because there are significant known inefficiencies in the current system, including many data connections within the current system that do not function or function poorly (see ConOps Section 3.2 for details of the current system). Further, the organizations, especially DOTs, MPOs, and associations, which would need to adjust operations are partners to the project and willing to consider changes that are supportive of the goals of this project and within their organizational scope. Current known inefficiencies include:

- Data are unstandardized or even uncollected, many system actors are operating with poor information.
- Transit agencies cannot easily procure CAD/AVL or scheduling software because the optimal software solution to address their needs is difficult to identify.

- DOTs and MPOs in their regulatory role spend significant resources duplicating various data efforts and re-collecting core operator information like points of contact or demand response service areas because that information is not stored for easy accessibility.

The proposed changes in Phases 2 and 3 will split the responsibilities of system maintenance across operators, vendors, and regulators, coordinating currently inefficient activities, with continued maintenance of the core system components by the SCC. If successful, the result would be enhanced information for users, specifically the groups of underserved users identified by this project and institutional users such as the DOTs in their analysis role and rider advocacy groups, without significant long-term increased costs. This ensures that the project is sustainable after program funding ends.

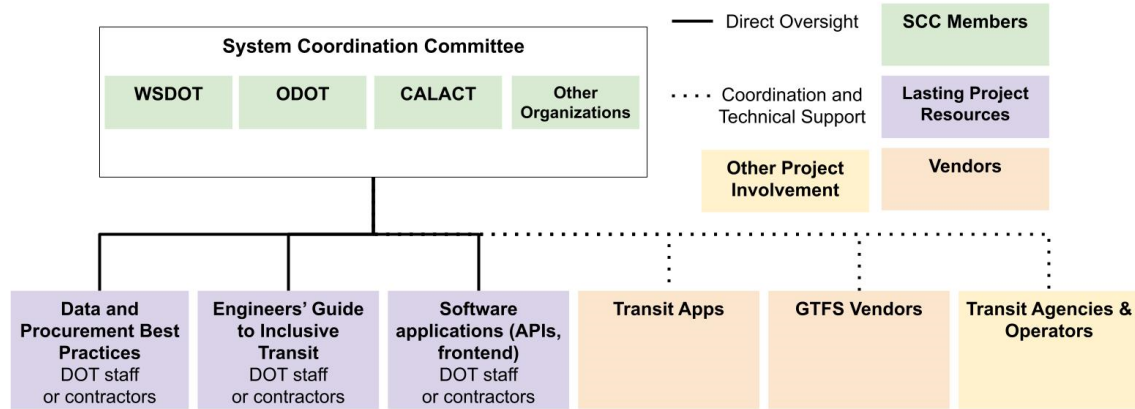
In other words, the components of the project in need of continued operational funding after the end of Phase 3 will be funded by continued local contributions from the project partners, through the inter-governmental agreement developed to define the long-term relationship between those parties. The state DOTs have moved forward with their local match funding obligations, understanding the commitment to maintain the system for five years after the Phase 3 deployment. The actual required long-term direct costs of maintaining the software system components at their minimum level of operations is relatively small (estimated at \$50,000 or less per year) and thus while a legal vehicle for the use of those funds is critical (the governance structure discussed in the next section), the financial plan is relatively simple granted the financial resources of project partners.

Larger but indirect long-term costs are related to staff use of the system resources, and continued technical assistance for operators, vendors, and DOT, MPO, or association staff, so that system resources continue to be used effectively. These costs are difficult to estimate, and there is risk that insufficient funding will be available if extensive training is needed. This risk will be mitigated by regularly assessing the progress of agencies towards operationalizing the enhancements that the project has focused on, and emphasizing the development of long-term sustainable processes rather than pushing to adopt as many enhancements as possible. A project that yields a sustainable system meeting only the necessary system requirements would be a more successful than a system meeting all desired and optional requirements, but that cannot be sustained.

Another large potential long-term cost that will be monitored to prevent overcommitment is the 1<sup>st</sup> Tier Support Desk. This feature will not be designed until a year into Phase 2, and could take on many different forms as it evolves. If a model is chosen that leverages current agency customer service staff, and supplements those staff with tools that provide an improved level of service, then ongoing costs may be minimal and absorbed into the operations of certain operators. However, if a centralized approach staffed by dedicated team members is developed, then long-term costs could be high, especially if scaled beyond the current plan for deployment within one geographical region. These long-term costs will be weighed during design, and lower maintenance cost innovations will be preferred, even while building tools that would also be useful in a centralized and labor-intensive approach.

Post-deployment governance will continue to be led by the SCC, under the terms developed in the inter-governmental agreement as it stands at the end of Phase 3 and after further ongoing development. SCC membership may vary to include additional agencies and government bodies as applicable. The SCC and state DOTs will continue to directly manage and supervise ongoing project resources, such as the Knowledge Base/1<sup>st</sup> Tier Support Desk, Data and Procurement

Best Practices, and the Directory/Analysis Frontend. The SCC will provide some coordination and technical advice to transit apps, GTFS vendors, and transit agencies.



**Figure 5: Post-Deployment Governance Structure**

### 1.4.5 Organizational Risks

The following table provides an overview of the identified organizational risks to the project:

**Table 1. Identified Organizational Risks**

Risk Title	Description	Mitigation Strategy
<p><b>COVID-19 Pandemic</b></p>	<p>The COVID-19 pandemic has impacted the way transit operates, how riders interact with transit, and how project partners work and interact with each other. COVID-19 is an ongoing risk to this project in that it may make it difficult to meet and coordinate with project partners, travel to deployment sites, and collect feedback from riders, and also impacts the operations of the transit systems the project will partner with.</p>	<p>The project team has successfully implemented the use of Google Meet and Google Drive as well as other online tools to ensure project partners are able to meet and work together virtually. The use of these tools will continue into Phases 2 and 3. Outreach team will take COVID-19 precautions into account when planning and implementing outreach plans and requesting survey feedback. The Outreach team will stay in close contact with deployment site operator staff when planning events to ensure coordination in covid mitigation approaches.</p>
<p><b>Inaction by Deployment Site Agencies</b></p>	<p>This project recognized that transit agencies face a number of challenges to operation and that adding additional responsibilities to these already overburdened agencies presents a risk that these responsibilities may not be fulfilled or may be fulfilled behind schedule.</p>	<p>Deployment site agencies will be given minimal responsibilities to limit the additional burden placed on them. The Deployments Manager will ensure deadlines are communicated early and that communication with agencies is frequent and clear to decrease miscommunications and increase the likelihood of timely deliverables.</p>
<p><b>Incomplete Deployment Site Deliverables</b></p>	<p>Despite mitigation of the above risk “inaction by Deployment Site Agencies,” there is still a risk that deliverables will not be completed in a timely manner or not completed at all.</p>	<p>The Deployments Manager will ensure deadlines are communicated early and that communication with agencies is frequent and clear so that if deliverables will be late or will not be delivered, project management will have ample notice to make adjustments. This may involve transferring certain responsibilities to project team members or more involved deployment site partners, extending timelines, providing additional trainings/support, or adjusting project plans.</p>

Risk Title	Description	Mitigation Strategy
<p><b>Retention of Cost-Matching Partners</b></p>	<p>This project’s ongoing success into Phases 2 &amp; 3 is reliant on project partners providing financial and in-kind support to the project. This project would be at risk if partners withdrew or altered their support.</p>	<p>Project management engaged in conversations with cost-matching partners early on in the project, and requested formal agreements committing matching before the start of Phase 2. This gave enough time for project management to adjust expectations and plans and recruit additional partners.</p>
<p><b>Lack of Third-Party Developer Support</b></p>	<p>This project relies on the assumption that third party apps will be motivated to use data created by the project and will use their own resources to update their apps to publish this data to riders. If this assumption is incorrect, riders will not be able to access the data created by the project.</p>	<p>This risk is mitigated through communication with third party app developers such as Transit, who have confirmed an interest in and commitment to using created data.</p>
<p><b>Lack of Impact on Global Standards Process</b></p>	<p>The project hinges on the development of publication best practices regarding data specifications which are used globally and officially governed by a process controlled outside the project. This means decisions by the project may have a limited impact if some changes are not also adopted within the global governance process.</p>	<p>This risk will be mitigated by advocating for changes proposed by the project within the global governance process as well. Progress within global governance discussions and specification extensions more likely to be adopted through that process will be considered when balancing priorities within the project.</p>
<p><b>Insufficient Funding</b></p>	<p>This is a large project and funding is limited, so running out of funding before finishing goals or before the end of the project deadline is a possibility.</p>	<p>Project management has planned out budget use early and will track budget use continuously throughout the project. Procurement processes take price and budget into account when selecting the best options. Project partners have taken steps to limit project scope to ensure all goals are manageable within resource limitations.</p>



Risk Title	Description	Mitigation Strategy
<p><b>Extensive Training and Technical Support Needed Long-Term</b></p>	<p>The project aims to spur changes in operation at organizations that will be sustained with minimal long-term effort. However, extensive additional training and technical support may be necessary after Phase 3 to continue effective if the system is too confusing or not aligned with agency operational processes.</p>	<p>The SCC and Project Manager will monitor the effectiveness of operators and vendors in adopting sustainable processes for data maintenance. Performance Measures of the project will monitor the breadth of data creation even at operators not supported by the project.</p>
<p><b>Loss of Staff</b></p>	<p>This is a long-term project and there is the possibility of specific staff moving to different roles and leaving the project.</p>	<p>Project partners will take steps to ensure all processes are documented and that there is transparency and clear communication among all project staff. All project documentation, deliverables, and working files will be maintained within shared servers. This means that in the case that someone leaves a position, they will not be taking project knowledge with them that is not known to other project partners. The project will also use contracting and agreement resources to the best of its abilities to ensure all project partners are committed to all phases of the project in which they are engaged.</p>
<p><b>Differing needs of Partners</b></p>	<p>This project relies on the cooperation of many different actors with different goals, interests, priorities, and resources. It is a risk to this project that these goals may conflict and jeopardize the project team’s ability to work together and agree on next steps.</p>	<p>Project leadership has engaged all project partners in the ongoing development of project plans and documentation, ensuring consensus at all phases thus far in the project. Project management will ensure frequent and clear communication among all project partners throughout Phases 2 &amp; 3 and maintain messaging about the overarching project goal of improving transit access for people in the specific communities identified by this project.</p>

Risk Title	Description	Mitigation Strategy
<b>Intergovernmental Agreement for SCC</b>	The establishment of an intergovernmental agreement of some type between SCC members is critical to complete the project and continue operations of the system after Phase 3.	Begin working on IGA on day one, receive regular detailed reports from each DOT.
<b>Maintenance of coordinated technology services</b>	Each of the system services deployed will have long-term maintenance costs that will require coordination between different parties from different organizations.	Develop multiple relationships between different staff members at different organizations to increase partnership resilience.

# 2 Phase 2 and Phase 3 Technical Approach

## 2.1 Introduction

This section describes the overall technical approach to Phases 2 (Section 2.2) and 3 (Section 2.3). Each task within these Phases is identified in a separate subsection, with corresponding deliverables and responsibilities listed at the end of that subsection.

## 2.2 Phase 2 Technical Approach

This section provides a task-by-task outline of the work being performed in Phase 2 of the project. The first 12 sections are dedicated to the tasks outlined in the Notice of Funding Opportunity (NOFO), regarding the deliverables due to USDOT during the project. The subsequent sections describe the various technical tasks identified by the project team required to design, develop, and deploy various components of the proposed system.

### 2.2.1 Task 2-A: Project Management

Project management in Phase 2 will continue to work from the plans and practices established in the Phase 1 PMP and SEMP, to be adapted and updated to apply to the new organizational structure of Phase 2 in the Phase 2 PMP.

Project management areas and responsibilities are outlined in the following table:

Title	Description	Responsible Party
<b>Scope Management</b>	The Project Manager will bring all potential scope changes to the SCC (and USDOT) for consideration. A scope change will be the change of any user need, the addition of a new or change of a parent-level system requirement, or change of the system components and technologies which are planned to meet those needs and requirements.	Project Manager, SCC

Title	Description	Responsible Party
<b>Schedule Management</b>	This includes managing the timely execution of work activities. The Project Manager will meet weekly or more with the Data and Software Manager and the Deployments Manager, to review current sprint progress and near-term planned work. Due dates for internal tasks will be reviewed within a project management system application to ensure schedule expectations are aligned. Long-term schedule expectations for the remainder of the current Phase will be reviewed at least monthly.	Project Manager
<b>Communications Management</b>	The Project Manager will lead internal team communications management, and be the outreach lead for the project. The Deployments Manager will be the primary operator point of contact and outreach spokesperson.	Project Manager, Deployments Manager
<b>Cost Management</b>	The Project Manager will maintain the project budget, and leverage the resources and advice of PMO staff support for accounting. All budget decisions will be submitted to the SCC for review.	SCC, Project Manager, PMO Staff Support
<b>Quality Management</b>	Quality management addresses both Quality Control (QC) and Quality Assurance (QA) processes. These will be directed by the Data and Software Manager, because they are in charge of nearly all system components. The Data and Software Manager will review all design, development, and testing work performed by partners of the project, and validate system components are delivered according to the specified requirements.	Data and Software Manager
<b>Configuration Management</b>	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 of deliverables submitted to the USDOT will be managed by the Project Manager. Configuration Management regarding architecture and design documentation for system components will be managed by the Data and Software Manager, although architecture changes and changes that affect multiple system components must be reviewed with the Project Manager.	Data and Software Manager, Project Manager

Title	Description	Responsible Party
<b>Risk Management</b>	The Project Manager will maintain risk matrices related to known risks of the project, and define and enact a monitoring or mitigation approach for all risks. Risks related to the responsibilities of the Data and Software Manager or Deployments Manager will be reviewed with those managers during regular meetings.	Project Manager

Similar to Phase 1, Phase 2 will begin with a kick-off meeting and will have its own Phase 2 PMP. The Kick-Off Meeting will be organized by the AOR, with cooperation and support as needed from the SCC. All key personnel will attend as well as additional representatives if needed depending on the exact agenda.

Project Management deliverables including the PMP, revised PMP, Monthly Progress Report Part 1 (including the Lessons Learned Logbook), and Monthly Progress Report Part II will be drafted by the Project Manager with help from Administrative Support using templates provided by the USDOT.

The biweekly teleconferences will be planned by all key personnel, with at least one key personnel or designee attending the monthly coordination teleconferences. The Project Manager in discussion with the SCC will determine the best representative to attend the five roundtable meetings as appropriate, based on staff member workload and appropriateness to planned discussions at those meetings.

Task 2-A will include the following deliverables:

1. Phase 2 Kick-off Meeting
2. Draft Project Management Plan (PMP)
3. Revised PMP (as required)
4. Monthly Progress Report Part I: Technical Progress and Status Summary
  - a. Includes: Project Milestone Schedule, Updated Task Schedules, Project and Task Detailed Risk Register, and Lessons Learned Logbook (LLL).
5. Monthly Progress Report Part II: Detailed Financial Summary
6. Participation in site-specific bi-weekly coordination teleconferences
7. Participation monthly all-site coordination teleconferences
8. Participation in periodic roundtable teleconferences

## 2.2.2 Task 2-B: System Architecture and Design

The architecture and interface development process will iteratively produce a system architecture that accomplishes the critical components of a standard Systems Architecture Document (SAD) within a work plan that matches the evolving nature of a market-based intergovernmental coordination plan. Each component of the system will have its own architecture document produced in a simple, shared-document format, with development of that document led by the manager for that component. Those documents will evolve and be updated in the course of the

ongoing development of each system component. Delivery of a “final” architecture for each project component will be staggered throughout Phase 2, and architectures will continue to evolve after initial delivery. The architecture for each individual component will be relatively simple and consist primarily of brief written text and diagrams. No special tooling will be utilized to develop the systems architecture.

A miniature system architecture walkthrough will take place for each system component after delivery of the final architecture document for the corresponding component, held online and lasting 1 to 3 hours (10 expected architecture documents and walkthroughs total). After the completion of all individual component walkthroughs, subsequent to design and development having begun or even been completed for some of the system components, a combined SAD will be developed and a miniature system architecture walkthrough convened for the overall system architecture. Feedback will be incorporated with consideration for what should continue to evolve moving forward, and the overall architecture may be revised based on this process before final publication.

The system architecture documentation will identify for each component of the interfaces between those component and other components. This will include a variety of types of interfaces at appropriate levels of specification.

- Staff interfaces: many of our system components are governance bodies, documents, and staff functionalities which require human communications rather than automated communications in order to exchange information between systems. These “human interfaces” (in other words, connections between systems that require person-to-person communication) will be defined by the message types, partner responsibilities, and communication needs.
- Data interfaces: some interfaces between system components will depend upon particular data standards or software data connections, which will be identified in the Standards Plan or the Interface Control Document portion of the SAD.

The intention of the system design is to evolve rather than simply be maintained over the system life cycle, so configuration management will be integral to the systems engineering process. Further, the architecture of the proposed system will be a high-level representation of the key functional operations of the system and so should not change frequently. Therefore, unlike the more detailed design documents described below, all architecture changes will be reviewed and authorized by the Project Manager in addition to the manager in charge of that project component. This confirmation of architecture changes will supplement the configuration management process described in Section 2.1.7. Thus, all system architecture changes affecting interfaces between system components will be reviewed by both the Data and Software Manager as well as the Project Manager.

The draft and final System Design Document (SDD) will describe exactly what subcomponent technologies are included within each system component, what process or infrastructure connects, what needs to be custom developed and the technical work that development will consist of, and which system requirements need to be accounted for by each subcomponent technology. Like the SAD, the SDD will be developed iteratively and only be fully aggregated into a single formal document after each of the individual system components has been designed, developed, and in some cases deployed. A component level design document developed by the component manager will provide for the required information in the final SDD, but will be

maintained in an easily editable format until incorporation into the final SDD. This document will specifically trace the subcomponent technologies to be used to individual system requirements, and identify any particular pre-existing open-source code to be integrated into the system or off-the-shelf products to be purchased for the system.

Similar to the architecture process, a miniature system design walkthrough will take place for each system component after delivery of the final design document for the corresponding component, held online and lasting 1 to 3 hours (10 expected design documents and walkthroughs total). After the completion of all individual component walkthroughs, subsequent to design and development having begun or even been completed for some of the system components, a combined system design will be developed and a miniature system design walkthrough convened for the overall system design. Feedback will be incorporated with consideration for what should continue to evolve moving forward.

The Data and Software Manager (SEL) will be the key personnel in charge of design decisions related to the most system components (the Technology Teams being the exception, as described in Section 1.4). The Senior Developer, Data Junior Staff, and Software contractors will be available to assist and advice on design decisions, as will the Project Manager and other project partners. However, while configuration management processes for component design will require the confirmation of the Component Manager, the confirmation of the Project Manager will not be required, unless the design change affects project budget, other system components, or other considerations under the purview of the Project Manager.

Task 2-B will include the following deliverables:

- Draft Systems Architecture Document (SAD)
- Systems Architecture Walkthroughs and Workbooks
- Revised SAD with Comment Resolution Report
- Final Systems Architecture Document
- Draft Systems Design Document (SDD)
- Systems Design Walkthroughs and Workbooks
- Revised SDD with Comment Resolution Report
- Final Systems Design Document
- Updated Phase 1 Deliverables, at a minimum:
  - Revised Concept of Operations
  - Revised Systems Requirements
  - Revised Integrated Complete Trip Deployment Plan

### **2.2.3 Task 2-C: Data Management Planning**

Data Management Planning efforts will continue to be documented through revisions to the Phase 1 Data Management Plan (DMP). A high-level description of the data needs of the system per the Phase 1 DMP can be found above in Section 1.2.2.

Revisions to the Data Management Plan, as well as the development of the Data Privacy Plan, and the Notice of Privacy Management Consistency will be coordinated and drafted by the Project Manager and Administrative Support. These documents will be development in collaboration with the Data and Software Manager, to ensure consistency with all technical aspects of the system.

The minimum specification of these documents will meet the requirements laid out by the USDOT AOR and include a description of how the Independent Evaluator (IE) and USDOT will retrieve all required data feeds. The CA Berkeley IRB will be presented with information on the data published by the project and how it will be used when considering the project for Human Use Approval.

Task 2-C will include the following deliverables:

- Draft Data Privacy Plan (DPP)
- Revised DPP with Comment Resolution Report
- Final Data Privacy Plan (DPP)
- Notice of Privacy Management Consistency
- Draft Phase 2 Data Management Plan (DMP)
- Revised Phase 2 DMP with Comment Resolution Report
- Final Phase 2 Data Management Plan (DMP)

### **2.2.4 Task 2-D: Acquisition and Installation Planning**

The degree of product acquisition and installation is relatively minimal in the VVTA ITS4US project relative to a technology and infrastructure investment where numerous hardware and software systems must be installed in a certain order. Most products and services required for Phase 2 and 3 have already been identified and budgeted within this ICTDP, and only one product being used in the project requires physical installation of new products. Some products and services will require procurement processes, including some where Requests for Proposals must be published by the project. These have been identified and will be detailed in the Comprehensive Acquisition Plan (CAP).

The Project Manager and Administrative Support team will coordinate with the Deployment Manager (and Data and Software Manager if necessary) on the development of the draft and final CAP and Comprehensive Installation Plan (CIP). These plans will focus on technologies identified for Deployment Site 4 and the software and services for which a procurement process will be required. The Navilens technology identified as a pilot in Deployment Site 4 (see below, Sections 2.2.31 and 2.2.32) will require the physical installation of printed signs at a large number (hundreds) of individual locations across the deployment site. These signs will be placed based on consulting from Navilens and planning along with the Omnitrans, SBCTA, and VVTA teams within the deployment site. No licensing or permitting should be required for the signs, as they will be applied via adhesive to existing transit operator signs and require any feature but a flat surface to install, but these details will be accounted for by discussing installation in detail during the first year of Phase 2. Deployment Site 3 will require the procurement of a microtransit booking and scheduling system, and the Data APIs Development, 1<sup>st</sup> Tier Support Desk Development, and Outreach Support tasks will also require RFPs or other procurement processes which will be accounted for in the CAP.

Task 2-D will include the following deliverables:

- Draft Comprehensive Acquisition Plan (CAP)
- Revised CAP with Comment Resolution Report
- Final Comprehensive Acquisition Plan
- Draft Comprehensive Installation Plan (CIP)



- Revised CIP with Comment Resolution Report
- Final Comprehensive Installation Plan

## 2.2.5 Task 2-E: Software Development and Integration

The VVTA/CALACT ITS4US project will use Agile development methods in the development of software applications. There are at least three software applications expected to be subject to the development methods described in this section:

- Data APIs
- Directory/Analysis Frontend
- 1<sup>st</sup> Tier Support Desk
- Three additional project components may include software:
  - Official lists
  - Data and Procurement Best Practices
  - Engineers' Guide to Inclusive Transit

Each software component developed through this project will follow the same Agile development methodologies. We will use Agile methodologies as defined and implemented by 18F, using a Scrum framework of sprints and meetings, led by the Data and Software Manager (SEL).<sup>1</sup> 18F's practices have modified some of the best software development practices in the private sector to be specific for governments, especially in regard to risk and inclusive design. The core components of this approach are an iterative cycle of (1) user-centered design (2) development (3) testing (4) deployment, and (5) feedback. Agile software development reduces the risk of failure and cost overruns in software projects.<sup>2</sup>

Accessibility is core to all services delivered by and on behalf of government agencies, the project team will adopt and implement appropriate accessible design practices to service the project's core users and meet state and federal guidelines.<sup>3</sup>

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<sup>1</sup> See the complete list of 18F guides at <https://18f.gsa.gov/guides/>. 18F is an office of federal employees within the General Services Administration (GSA). More organizational info at <https://18f.gsa.gov/about/>.

<sup>2</sup> see the 18F guide to de-risking software projects: <https://derisking-guide.18f.gov/>.

<sup>3</sup> The project will follow the accessibility guide at <https://accessibility.18f.gov/>. Additional resources which may be referenced in the pursuit of equitable and accessible technology investment include: LA Metros' equity framework for making project and policy decisions to impact software design, <http://metro.legistar1.com/metro/attachments/dabba808-fdf7-4f71-8869-66f2f60d40c7.pdf>; and National Rural Transit Assistance Program resources on accessibility, <https://www.nationalrtap.org/Technology-Tools/Website-Builder/Support/Accessibility>.

The CALACT project manager and administrative staff will support the Agile team through the Task 2-E work on the Initial Software Development Schedule (SDS) and ongoing updates to that schedule.

All code produced by the project will be open source and provided the USDOT.

Task 2-E will include the following deliverables:

- Initial Software Development Schedule (SDS)
- SDS Update with Progress/Risk Summary
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary

### 2.2.6 Task 2-F: Participant and Staff Training

Participant and staff training efforts will continue to be documented through revisions to the Phase 1 PTSEP, where details regarding the participant training plan can be found.

Participant and stakeholder training will focus on the four identified deployment sites described in Section 1.2.2 above, differing as needed to engage the specific stakeholders in each location. The success of participant and stakeholder training efforts will be assessed using the methods outlined in the following table:

**Table 2. Assessment Methods for Each Participant Group**

Group/Sub-Group	Key Training Objectives	Assessment Methods
Operators	Operators will <ul style="list-style-type: none"> <li>• understand how the Data Best Practices can be used</li> <li>• know how to access online resources pertaining to the project</li> <li>• have a list of project representative points of contact for requests</li> </ul>	Initial assessment of the participating operators’ understanding of the project will take place at the end of various webinars that will be held for Operators (see Outreach Plan). Operators will be asked to self-assess their understanding so that project leadership can conduct targeted additional training as needed. Assessment for operators will be ongoing to ensure they continue to understand how the project impacts operation and how they can continue benefiting from and coordinating with project outcomes and adjust course as needed. Regular check-ins with operator and state DOT representatives are expected to take place throughout Phases 2 and 3. These check ins will be at least quarterly for state DOTs and agencies within local deployment sites. For agencies only participating in Deployment Site 1, assessment will only be performed through data quality reviews, which will be primarily automated.

Group/Sub-Group	Key Training Objectives	Assessment Methods
State DOTs	<p>State DOTs will</p> <ul style="list-style-type: none"> <li>• know how to point agencies to technical resources provided by the project team</li> <li>• be proficient in using the Data APIs and Directory/Analysis Frontend tool for regulatory and analysis purposes</li> <li>• understand how the flow of data works within the transit data ecosystem and what role state DOTs play</li> </ul>	<p>As training administered by project staff will be secondary to internal DOT training, there will not be any formal assessment. Rather, project staff will assess DOT staff within the context of regular interactions as part of carrying out the project goals. This informal assessment will consist of open-ended conversations that arise during those interactions. State DOTs may internally choose to institute their own formal training and assessment policies for staff members based on local goals, and the project will assist in development of such training plans.</p>
Rider Application Vendors (B2C)	<p>Rider Application Vendors will</p> <ul style="list-style-type: none"> <li>• be aware of the new Data Best Practices and understand their requirements in general terms</li> <li>• know how and where to access project news and updates</li> <li>• understand the advantages of more rider application developers following the Engineers' Guide to Inclusive Transit</li> </ul>	<p>These vendors will demonstrate they have met the objectives of their training and education by successfully utilizing the Directory to access transit data, as well as other avenues provided by the project to publish data within their applications.</p>
Scheduling/CAD/AVL Software Vendors (B2G)	<p>Scheduling/CAD/AVL software vendors will</p> <ul style="list-style-type: none"> <li>• understand data best practices they must follow under new contracts with operators</li> <li>• know how and where to access project news and updates</li> <li>• understand the outcomes of more agencies publishing data according to the Data Best Practices</li> </ul>	<p>The project team will assess these vendors by the quality of data they produce on behalf of their clients participating in the Deployment Sites. The project team may use tools such as the GTFS Grading Scheme or other validation tools.</p>

Group/Sub-Group	Key Training Objectives	Assessment Methods
Riders	<p>Most “training” for riders will not be directly performed by the research project staff. Riders will use apps reliant on data from the project but that require little training. Riders may receive some training to help them use apps from operator staff, or at project outreach events. Riders participating in the project research through a survey do have specific training objectives. Those riders will</p> <ul style="list-style-type: none"> <li>• understand the purpose of the in-app survey.</li> <li>• be aware of the project efforts specific to Deployment Site 2 (or 4) and its overarching goals for transportation in the region.</li> </ul>	<p>No targeted assessment strategy is needed for riders, as successful completion of the rider surveys with any responses will demonstrate the ability of participants to complete the survey. Additionally, the survey may include questions asking riders to self-assess their understanding of the project goals.</p>

The Initial Training Implementation Schedule, monthly reporting, Training Materials, and Human Use Approval Confirmation Materials will be coordinated and drafted by the Project Manager and Administrative Support.

Task 2-F will include the following deliverables:

- Initial Training Implementation Schedule (TIS)
- TIS Update with Progress/Risk Summary
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- Training Materials (Initial and Updates, as specified in the PTSEP and TIS)
- Human Use Approval Confirmation Materials (per the HUAS)

### 2.2.7 Task 2-G: System Test Planning

The proposed system will not be entirely designed, then developed, then tested, then deployed all together. Instead, various system components will be designed, developed, and deployed at different times. After deployment, which for some components will happen prior to the design of some other components, components will continue to be changed through the identification of new system requirements or defects in the defined approach to meet the system requirements.

For this reason, implementation, integration, and verification processes will be performed at different times for each system component, and the verification process will often involvement deployment and testing with users in a pilot or live environment. This is true for both software and non-software components of the project, although software development will also be subject to testing within the Agile process described in Section 2.2.5, and all software applications will be subject to integration testing and regression testing processes at each release. Testing will follow

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the approach specified for each component in the subsections below, along with information about the expected timeframe of testing and first deployment (defined in parentheses e.g., “signing of first intergovernmental agreement”). These expected timeframes are not required, and may be adjusted during the course of the project. Some of these timeframes are however related to key delivery milestones from Section 2.1.5 above, which are more critical as a result of identified software dependencies.

The type of testing taking place within this project is often not related to software or hardware, and based on the SMP drafted during Phase 1 of the project, there are not expected to be safety risks during deployment that justify an extensive safety management approach.

Thus, the verification will typically take place by inspection of drafted resources and procedural documents, or consist of gathering feedback from project stakeholders in a structured environment. System and component tests will be performed and tracked during the course of Phase 2, with a miniature testing plan developed for each component at different times, and many tests performed prior to the testing plans for all components being fully developed. Plans and results from those tests will be integrated into a System Test Plan (STP) which will contain the information related to all system tests.

After the submission of the STP, the Operational Readiness Plan (ORP) will be developed including a process to verify each of the Operational Scenarios identified within the ConOps is adequately supported by the system. The proposed verification processes in the ORP will be presented in a remote, half-day walkthrough at least three months prior to the end of Phase 2. This walkthrough will yield further feedback which will be incorporated into the final Operational Readiness Testing Schedule. These verification processes will be performed by the project team under the direction of the Project Manager. The results of these processes will be showcased in an Operational Readiness Demonstration, which will be a public, online presentation of the user-facing functionalities of the system.

Below are subsections describing in more detail the approach to testing individual system components. The system components listed in these sections are described in Section 1.2.1 above.

#### **2.2.7.1 System Coordination Committee**

As the governance body of the system and also a system component, the SCC will be immediately deployed at the beginning of Phase 2, at the same time that formal architecture and design work for the component begins (although much of that work has been performed during Phase 1 of the project). There will be no formal testing of the SCC, but the design of the committee will change over time as it incorporates feedback received regarding the project and SCC activities.

Anticipated timeframe of first testing and deployment (signing of first intergovernmental agreement): 18 months after initiation of Phase 2.

#### **2.2.7.2 Data and Procurement Best Practices**

The testing process for the guidelines will primarily include stakeholder outreach to transit agencies and software providers, to present a draft form of the guidelines and receive feedback. This will be done iteratively, and each time there is a release and request for comments, there will

be a webinar or meeting open to the public to receive an overview on updates, ask questions, and get information on how to provide feedback and by when feedback is required. See the Outreach Plan Section 4.2 for more information regarding the outreach processes that will support the collection of feedback.

Anticipated timeframe of first testing and deployment (first publication on public website): 6 months after initiation of Phase 2.

### **2.2.7.3 *Engineers' Guide to Inclusive Transit***

The testing process for the Guide will primarily include stakeholder outreach to transit agencies, software providers, and riders, to present a draft form of the Guide and receive feedback. This will be done iteratively, and each time there is a release and request for comments, there will be a webinar or meeting open to the public to receive an overview on updates, ask questions, and get information on how to provide feedback and by when feedback is required. See the Outreach Plan Section 4.2 for more information regarding the outreach processes that will support the collection of feedback.

Anticipated timeframe of first testing and deployment (first publication on public website): 15 months after initiation of Phase 2.

### **2.2.7.4 *Official List of Transportation Services***

The testing process for the Official List of Transportation Services will be performed through the development of the Data APIs. The Data APIs will be a consuming application of data from the Official List. The use of data from the Official List within the Data APIs will serve to identify defects within the Official List, through the development of integration tests which identify unexpected data changes within those lists.

Anticipated timeframe of first testing and deployment (first publication by a state DOT): 3 months after initiation of Phase 2.

### **2.2.7.5 *Data APIs***

The Data APIs will be tested through the Agile software development process to be described in Section 3. Additionally, two other applications which will use the Data APIs will provide critical testing processes for the Data APIs through their development and deployment. The Directory/Analysis Frontend and the Deployment Site 2 website (to be developed by a local agency within that deployment site) will call endpoints from the Data APIs and provide feedback to the project team. The deployment of those applications will provide real users for the Data APIs to confirm the usability of the software.

Anticipated timeframe of first testing and deployment (first release allowing testing and use by external development parties): 8 months after initiation of Phase 2.

### **2.2.7.6 *Directory/Analysis Frontend***

The Directory/Analysis Frontend is a relatively minor system component and will receive a very basic testing process, such as manual reviews of the agencies listed and data presented by members of the Data Junior Staff. Because the exact use cases of the Directory/Analysis

Frontend will be undefined until after the exact budget is set for the application late during the first year of Phase 2 (see above Section 2.5.1.2), the appropriate testing processes also cannot be defined until after that time.

Anticipated timeframe of first testing and deployment (launch of publicly accessible website): 18 months after initiation of Phase 2.

#### **2.2.7.7 1<sup>st</sup> Tier Support Desk**

Testing of the 1<sup>st</sup> Tier Support Desk will consist of confirming that software tools to support certain communications channels provide an effective user experience for the rider seeking support and also integrate as needed into the backend support desk technology used by the project team. Testing will generally be performed on a channel-by-channel basis. Because different channels will be released sequentially, it is likely that multiple testing processes will be performed, and the relevant channel deployed prior to beginning development on the next planned channel.

Anticipated timeframe of first testing and deployment (first communication with rider): 21 months after initiation of Phase 2.

#### **2.2.7.8 Technology Coordination Teams**

There will be no formal testing of the technology coordination teams, but similar to the SCC, this staff functionality will be initiated quickly as described in Section 2.2.5.4 above. Feedback will be consistently incorporated based on the activities pursued and the needs which arise from project partners and incorporated into design documents as system processes change. The project team will specifically request feedback from operators, vendors, and other stakeholders regarding whether the work with the Technology Coordination Team was useful, as well as collect details on specifically how the work was useful and what tangible solutions have been implemented as a result. Depending on how and what types of solutions are implemented, the project team may plan follow up evaluation as appropriate. In the event that feedback indicates the Technology Coordination Team has not been useful, the project team will work toward implementing changes to address these issues.

Anticipated timeframe of first testing and deployment (first communication with agency): 3 months after initiation of Phase 2.

#### **2.2.7.9 Overall system testing**

Because each component of the system operates independently, and integrated components will be tested through the deployed integration of those components, there is no need perform an overall system test separate from the validation process. Upon the testing and deployment of all components, the test results summaries for each component will be updated and incorporated into a retroactive ORP that describes the tests which have occurred prior to system validation.

The ORP will be developed after the STP has recorded the individual component tests. The ORP will design tests to confirm whether the operational scenarios described in the ConOps have been fulfilled, and, if not, which user needs in the operational scenario were not addressed.

Task 2-G will include the following deliverables:

- Draft System Test Plan
- Revised System Test Plan with Comment Resolution Report
- Final System Test Plan
- Operational Readiness Concept Briefing (Held in DC metro area)
- Draft Operational Readiness Plan (ORP)
- ORP Walkthrough and Workbook (Held in DC metro area)
- Revised ORP with Comment Resolution Report
- Final Operational Readiness Plan (ORP)

### **2.2.8 Task 2-H: Installation and Operational Readiness Testing**

Task 2-H work will follow on from the work done in task 2-D and 2-G, to identify the precise installation and testing dates of the Navilens technology in Deployment Site 4 (in the Installation and Operational Readiness Testing Schedule) and to report on the results of system tests for the consideration of stakeholders and other parties interested in the deployment of the system (in the System Test Results Summary). These reports will be drafted by the Project Manager and Administrative Support in collaboration with the Deployment Manager.

Task 2-H will include the following deliverables:

- Installation and Operational Readiness Testing Schedule (IORS)
- IORS Updated with Progress/Risk Summary
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- System Test Results Summary (STRS) (per the STS)
- Test Results Summary Documentation (per the ORP)
- Operational Readiness Demonstrations (per the ORP)

### **2.2.9 Task 2-I: Maintenance and Operations Planning**

Depending on the system component, different operations and maintenance processes will govern ongoing work to ensure the component performs as expected and continues to change in response to feedback from system users and stakeholders. The central process that will govern all operations and maintenance work will be the issue resolution and configuration management processes described in the SEMP. Beyond the process of incorporating feedback into fixes and new features, each system component will have Standard Operating Procedures that identify recurring activities as well as responses to known operational scenarios to be encountered. These operating procedures will be incorporated into a single Comprehensive Maintenance and Operations Plan (CMOP) prior to the end of Phase 2. The CMOP will exist as a living document in an online knowledge base or other website application that can be easily loaded, navigated, and edited by multiple users. The manager of each system component will review and confirm the documentation is up to date at least twice annually.

#### **2.2.9.1 Governance body**

The SCC will begin operations at the beginning of Phase 2 and will consistently be open to adjust its own processes as they are being finalized for the long-term through the creation of an intergovernmental agreement between the three states for the ongoing maintenance of the



system. However, development of that long-term maintenance system will also continue through Phase 3. The Phase 3 Comprehensive Transition Plan will be the first document presenting a static, long-term vision of the SCC, and until that time it will be adjusted and maintained through action taken by the Project Manager with the consent of all members.

#### **2.2.9.2 Published documents**

The Data and Procurement Best Practices will each have two maintenance processes: 1) scheduled major updates and 2) simple clarifications and corrections. Scheduled major updates will be quarterly or annually and consist of significant changes to the content, published design, and outreach materials related to those components. These updates will be based on internal lessons learned and the continued progress of the project to adopt further structured stakeholder outreach and feedback collection. Simple clarifications and corrections will include actions taken as needed to correct typos or styling errors on the project websites containing the published documents.

#### **2.2.9.3 Manually maintained databases**

Each of the manually maintained databases will be maintained on an as needed basis by project or DOT staff. The technology coordination teams and DOTs will establish more precise internal procedures regarding the modes of maintenance during component design. These design decisions will include details such when data was last reviewed and expected frequency of review.

#### **2.2.9.4 Staff functionalities**

The staffed functional components of the project, the technology coordination teams and the 1<sup>st</sup> Tier Support Desk, will require ongoing assessment of issues being raised and resolved as well as work towards incorporating all identified system requirements. This will require ongoing maintenance through management activities, carried out by the Project Manager and the Deployments Manager, as well as the provision of training to support staff involved in these system components. These processes will begin immediately upon the deployment of these systems, as training materials and other operational documentation will be included in component development, or if they are found to be lacking will be identified for integration into future activities of the component.

Task 2-I will include the following deliverables:

- Draft Comprehensive Maintenance and Operations Plan (CMOP)
- Revised CMOP with Comment Resolution Report
- Final CMOP

### **2.2.10 Task 2-J: Stakeholder Outreach**

Stakeholder outreach plans and efforts will be documented through the development of and revision to the Phase 2 Outreach Plan. Outreach activities will be conducted by the Outreach Plan Team. The Outreach Plan Team administrators are the Site Outreach Lead, the Site Outreach Spokesperson, and the Outreach Materials Development Lead.

The Site Outreach Lead will be the VVTA/CALACT ITS4US Project Manager, Thomas Craig. The Site Outreach Lead is responsible for organizing the site outreach activities and ensuring efficient and consistent activity. The Site Outreach Lead will coordinate with other Outreach Team members to oversee outreach preparation and implementation. This includes significant coordination with the VVTA/CALACT ITS4US Deployment Manager to communicate with and collect feedback from transit operators, riders, rider advocacy organizations, and other local partners. The Site Outreach Lead may delegate the organization and attendance of certain outreach activities to other project personnel, as needed.

The Site Outreach Spokesperson will be the VVTA/CALACT ITS4US Deployment Manager, Elle Ogden. The Site Outreach Spokesperson is the sole person designated to speak on behalf of the site to media and to process media inquiries, as they arise.

The Outreach Materials Development Lead will also be the VVTA/CALACT ITS4US Admin Support Lead, Taylor Bailey. The Outreach Materials Development Lead will be responsible for developing or overseeing the development of outreach materials needed for each deployment site. This work will require significant coordination with local transit operators and other partners to obtain input and approval. It will also necessitate collaboration with the Site Outreach Lead to ensure that materials are completed on time, within budget, and with USDOT approval.

The overarching communication objective for this project is to encourage adoption of Data and Procurement Best Practices or usage of sponsored technologies. The project also aims to collect feedback from some target audiences, through the technical process described in ConOps and SEMP. The CALACT Outreach Team will work with local partners to refine these communication objectives over time and further develop specific messages for audiences in each deployment site as those partnerships and deployments evolve. Significant work must be performed to detail exactly what outreach activities will take place, based on local operator outreach processes and capacities. These refinements will be made within the Phase 2 Outreach Plan, and specify the precise actions to be taken at each deployment site in order to support the project.

Revisions to the Outreach Plan, the Initial Outreach Implementation Schedule, monthly reports, and required outreach materials will be coordinated and drafted by the Project Manager and Administrative Support. This task accounts for the Outreach Plan and related deliverables due to the USDOT. Outreach activities from the Outreach Plan will be performed by the Deployments Manager and additional contractors through work on Task 2-M-19 described below.

Task 2-J will include the following deliverables:

- Draft Phase 2 Outreach Plan
- Revised Phase 2 Outreach Plan with Comment Resolution Report
- Final Phase 2 Outreach Plan
- Initial Outreach Implementation Schedule (OIS)
- OIS Updated with Progress/Risk Summary
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- Outreach Materials (as specified in the Phase 2 Outreach Plan and OIS)

### 2.2.11 Task 2-K: Performance Measurement and Independent Evaluation Support

Performance measurement efforts will continue to be documented through revisions to the Phase 1 PMESP.

The goals of proposed system are to improve the quality and breadth of data published in standardized formats which include information needed by underserved riders, and to encourage more rider applications to ingest that data and provide “complete trip” planning. These high-level goals imply three different general approaches to measuring the performance of the system:

- Is there more GTFS data published that is in compliance with the accessibility-focused enhancements encouraged and facilitated by this project?
- Are general public and underserved users able to successfully answer their questions regarding transit services by using the tools and resources provided by the project?
- Do third-party application developers implement the accessibility features suggested by the project?

These general performance measurements are broken down into a series of precise performance metrics drawn from

- The Directory/Analysis Frontend and 1<sup>st</sup> Tier Support Desk: these tools and resources sponsored by the project will create user analytics and communications data sets that can be used to evaluate the amount of data created and how it is accessed by users.
- Data sources developed in collaboration with transit operators: transit operators at deployment sites will have access to their riders and the capacity to request rider feedback through surveys conducted as part of this project, as well as provide data to the project such as rider feedback and complaints, or operational metrics such as number of riders.
- Data sources provided by software vendors: both Business to Government (B2G) and Business to Consumer (B2C) software vendors will have access to data from their users which may support the measurement of project performance.

The Phase 1 Performance Measurement Team identified the performance measures listed in Table 3 to be tracked in Phase 2 & 3. The data needs and general statistical approach (e.g., frequency of time series and key metrics) have been defined within the Phase 1 PMESP, but a detailed and complete research methodology must still be defined within the Phase 2 PMESP. This documentation will describe exact design of data sources, process to perform need analyses, and to whom the data is distributed, including the IE and USDOT. This work will be performed by the Phase 2 performance measurement team, which will begin this process immediately upon the initiation of Phase 2.

**Table 3. Identified Performance Measures**

Performance Measure ID	Performance Measure Description
<b>PM 1.1</b>	The project will increase the number of transit agencies providing access to booking through two open-data-based rider applications from the baseline to 50 across Deployment Area 1 (three-state region).
<b>PM 1.2</b>	The project will increase the number of transit agencies publishing GTFS data including all project-sponsored extensions (appropriate to the agency) to an open directory of data from the baseline to 80% of all agencies across Deployment Site 1.
<b>PM 1.3</b>	The project will increase the average quality of GTFS data published by transit agencies across Deployment Site 1.
<b>PM 2.1/4.1</b>	The project will increase the satisfaction reported by riders across different demographic groups with regard to stop and station wayfinding by 0.3 on a 5-point Likert scale, without an increase in the variance of satisfaction, as reported within Deployment Sites 2 and 4.
<b>PM 2.2/4.2</b>	The project will increase the satisfaction reported by riders, across different demographic groups with regard to trip planning by 0.3 on a 5-point Likert scale, without an increase in the variance of satisfaction, as reported within Deployment Sites 2 and 4.
<b>PM 3.1</b>	The project will increase the percentage of trips booked by riders on online or mobile booking tools for demand responsive or paratransit services by 100%, or to a proportion of 10% of trips if no such rides are currently booked that way, within Deployment Site 3.
<b>PM 3.2</b>	The project will increase the % of origins or destinations of demand-response trips that service key fixed-route transfer locations by 10% from the baseline.

Revisions to the PMESP, the Performance Measurement and Evaluation Support Schedule, revisions to the HUAS, and required supporting materials will be coordinated and drafted by the Project Manager and Administrative Support.

Task 2-K will include the following deliverables:

- Initial Performance Measurement and Evaluation Support Schedule (PMESP)

- PMESS Updated with Progress/Risk Summary (monthly)
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- Updated PMESP (minimum one update)
- Revised HUAS (updated as necessary with IRB approval)
- Performance Measurement Materials identified in the PMESP and PMESS (e.g., Pre-Deployment Performance Data, System Performance Reports) and other supporting information.

### 2.2.12 Task 2-L: Participation in Standards Development

Standards development through participatory governance systems is at the heart of the VVTA/CALACT ITS4US project, and will be done through a number of tasks identified over Phases 2 and 3. As discussed with and required by the USDOT and outlined in the SAD, the Project Manager or Data and Software Manager will submit specific Technical Memoranda, generally in the form of communications to standards organizations through their desired format (e.g., some organizations prefer comments to be submitted as comments and tracked changes on a document). The project will establish a specific staff member to be the primary contact point for each individual standards organization the project collaborates with.

Many project partners are members of MobilityData, which is also a partner organization to the project. As the global non-profit steward of the GTFS data format, MobilityData leads working groups and committees that focus on standards development, and thus many project activities may leverage that partnership and community. The Data and Software Manager will be the official representative of the project to MobilityData.

The project team will also participate in other working group or committee meetings as required by the USDOT. The Project Manager will be the primary point of contact to all working groups and committees required by the USDOT, unless that responsibility is delegated to another key person.

Task 2-L will include the following deliverables:

- SDO-specific Technical Memoranda (as defined in the Standards Plan within the SAD)
- Participation in SDO working group or committee meetings/activities (as required)

### 2.2.13 Task 2-M-X: Phase 2 Deployment-specific tasks

This project is accounting for its scope and budget by interpreting the tasks listed in the NOFO as related to only work on the deliverables specifically listed in the NOFO. These additional tasks, identified as 2-M-1, 2-M-2, etc., are the tasks associated with delivering specific system components, or staffing functionalities that support system design, development, and deployment. These are work tasks assigned to specific contractors or groups of contractors (or that will be procured) during Phase 2.

### 2.2.14 Task 2-M-1: System Coordination Committee (Phase 2)

The SCC is the governance body which oversees the system. Upon the initiation of Phase 2, the current PMT will be reconstituted with the same membership as the SCC, although that

membership may be adjusted as the project progresses. The SCC will meet at least once monthly by web conference technology provided by the PMO to provide high-level direction of the system and make key governance decisions. The staff provided by each organization to attend and administer SCC meetings constitutes work on Task 2-M-1. The method of these meetings and correspondence outside of these meetings is described in the PMP, and will be updated in the Phase 2 PMP.

The Project Manager (see Section 2.2.15) will draft an agenda including collecting resources for review prior to the SCC meeting, and provide that agenda to SCC members one week prior to each meeting (though additional information may also be provided closer to the time of the meeting). Agenda items will always include a standing update regarding the project, and additionally include specific decision points for the consideration and consent of the SCC. Members of the SCC may request additional presentations or discussions be added to the meeting agenda. The Project Manager may delegate reports to other project partners, or postpone suggestions to the next meeting based on project capacity to collect information for requested discussion topics.

### **2.2.15 Task 2-M-2: Project Manager (Phase 2)**

The Project Manager will be Thomas Craig, employee of WSDOT. The following are the responsibilities of the Project Manager.

- Reports to SCC
  - Enacts all specific direction from SCC
  - Provides updates to SCC
  - Seeks authorization from SCC for any adjustment to planned scope
- Owns the development, design, and deployment of the SCC (as a system component)
  - Maintains the PMP and other documentation that defines the activities of the SCC
- Owns the development, design, and deployment of the Technology Coordination Teams
  - Manages the lists of wayfinding, eligibility, payments, and accessibility projects
- Supervises activity of the
  - Data and Software Manager
  - Deployments Manager
  - Training Support staff
  - Technical Advice team
  - Admin support staff
  - PMO staff support

### **2.2.16 Task 2-M-3: PMO Staff Support (Phase 2)**

This task accounts for work by the PMO (CALACT) to support the Project Manager with accounting, contracting, and facilities services. Most PMO services will be directed by the Project Manager, who will make requests of specific support staff. The PMO will hold all subcontracts related to Phase 2.

### 2.2.17 Task 2-M-4: Training support (Phase 2)

The training support contract has not been assigned to a particular contractor. It will be assigned to a current project partner or subcontracted through a federally compliant procurement process during the course of Phase 2. The responsibilities for this task include the following.

- Reports to Project Manager
- Provides as needed support to Project Manager and other staff for activities related to training DOTs, MPOs, or agencies
- Provides staffing and technical assistance to the Technology Coordination Teams

### 2.2.18 Task 2-M-5: Technical advice (Phase 2)

The Technical advice contract will be distributed across six different specialist contractors including Compiler LA, Garnet Consulting, Transit, Trillium, California PATH, and MobilityData. The responsibilities for this task include the following.

- Reports to Project Manager
- Provides as needed technical advice to Project Manager and other staff, or the SCC
- Provides staffing and technical assistance as part of the Technology Coordination Teams, regarding Payments, Wayfinding, Eligibility, Mapping systems. This could include supporting
  - Training sessions
  - Research
  - Outreach to agencies and vendors
  - Data and software team

### 2.2.19 Task 2-M-6: Technical advice contingency (Phase 2)

Additional budget has been set aside to account for the potential need for more technical advice services than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Task 2-M-5. If this budget is not used, it may be reallocated towards other tasks.

### 2.2.20 Task 2-M-7: Data and Software Manager (Phase 2)

The Data and Software Manager will be Melody Reeb, an employee of CALACT. This individual has been identified and terms of an employment agreement have been determined, and they will become an employee of CALACT upon the initiation of Phase 2. The responsibilities for this task include the following.

- Reports to Project Manager
- Owns the Data APIs development, hosting, and support
- Owns the Directory/Analysis Frontend development, hosting, and support
- Owns the 1<sup>st</sup> Tier Support Desk development, hosting, and support
- Manages the Data Junior Staff, and accepts deliverables from that task
- Manages the senior developer and all contract developers, and accepts deliverables from those tasks
- Confirms quality of Official Lists from DOTs and provides support for those lists

- Owns incorporating identified system requirements into Data and Procurement Best Practices
- Provides technical architecture support to state DOTs, deployment sites, and other project teams

### **2.2.21 Task 2-M-8: Data Junior Staff (Phase 2)**

The Data Junior Staff will be provided by Trillium. Responsibilities of the Data Junior Staff include the following.

- Reports to Data and Software Manager
- Develops and publishes GTFS data sets including data encoded with the following extensions
  - Flex
  - Pathways
  - Text-to-speech
  - Translation
  - Vehicles

### **2.2.22 Task 2-M-9: Data quality reviews and support (Phase 2)**

Data quality reviews and data quality support will be provided by three organizations in collaboration: Trillium, MobilityData, and California PATH. Additional tooling and specialist advice regarding data quality will be provided by Transit. The responsibilities of the data quality team include the following.

- Reports to the Data and Software Manager
- Designs and develops the data quality review process
- Performs data quality reviews and identifies specific needs within datasets provided by transit agencies/vendors to enable them to meet guidelines
- Answers GTFS-related questions raised by project staff or stakeholders
- Provides first-tier GTFS and related support for agencies and DOTs

### **2.2.23 Task 2-M-10: Senior Developer (Phase 2)**

The senior developer is an individual staff member provided by MobilityData who will provide software development services for the project team, for all software applications being developed. This position is specifically tasked with ensuring that the project team maintains internal institutional knowledge regarding the software being developed, so as to maximize the ability of the SCC to successfully assign the long-term management of software applications to a succeeding organization. The responsibilities of the senior developer include the following.

- Reports to Data and Software Manager
- Primary developer on Data APIs, Directory/Analysis Frontend and 1<sup>st</sup> Tier Support Desk,
- Responsible for supporting software applications deployed by the project across all project deployments
- Makes technical architecture decisions regarding Data APIs, Directory/Analysis Frontend, and 1<sup>st</sup> Tier Support Desk
- Coordinates with contract development teams
- Offers technical advice regarding software development decision making



### **2.2.24 Task 2-M-11: Design Data APIs (Phase 2)**

A contract software development team including a collaboration between Compiler LA and MobilityData will provide consulting services to support the software design of the Data APIs, supplementing the Agile team on this work during the first three to six months of Phase 2. The responsibilities of the design Data APIs contractor include the following.

- Reports to Data and Software Manager
- Provides specialist software design consulting to support the specification of the Data API design
- Participates within the Agile process during the initial sprints related to the Data APIs
- Offers technical advice regarding software development decision making

### **2.2.25 Task 2-M-12: Develop Data APIs (Phase 2)**

A contract software development team will provide consulting services to support the software development of the Data APIs, supplementing the Agile team on this work during Phase 2 beginning after three months of the project. The contractor for this task has not been determined. After initial design work has been done on the Data APIs, approximately one or two months into Phase 2, the SCC will determine either to extend the contract of Compiler LA, or MobilityData, or both of those organizations, or to procure the services of another organization through a federally compliant procurement process, or some combination of those actions. The responsibilities of the develop Data APIs contractor include the following.

- Reports to Data and Software Manager
- Performs specialist development/open-source contributions/development tasks that aide the Senior Developer or are distinct and separable from Senior developer role related to the Data APIs
- Offers technical advice regarding software development decision making

### **2.2.26 Task 2-M-13: API Hosting (Phase 2)**

The APIs hosting task relates only to direct expenses for hosting and other cloud expenses related specifically to the ongoing operation of the Data APIs, including prior to deployment.

### **2.2.27 Task 2-M-14: Develop Directory/Analysis Frontend (Phase 2)**

A contract software development team will provide consulting services to support the software development of the Directory/Analysis Frontend, supplementing the Agile team on this work during Phase 2 beginning after twelve months of the project. The contractor for this task has not been determined. After initial design work has been done on the Directory/Analysis Frontend by the Data and Software Manager and Senior Developer, approximately nine months into Phase 2, the SCC will determine either to extend the contract of Compiler LA, or MobilityData, or both of those organizations, or to procure the services of another organization through a federally compliant procurement process, or some combination of those actions. The responsibilities of the develop Directory/Analysis Frontend contractor include the following.

- Reports to Data and Software Manager

- Performs specialist development/open-source contributions/development tasks that aide senior developer or are distinct and separable from Senior Developer role related to the Directory/Analysis Frontend
- Offers technical advice regarding software development decision making

### **2.2.28 Task 2-M-15: Develop 1<sup>st</sup> Tier Support Desk (Phase 2)**

A contract software development team will provide consulting services to support the software development of the 1<sup>st</sup> Tier Support Desk, supplementing the Agile team on this work during Phase 2 beginning after twelve months of the project. The contractor for this task has not been determined. After initial design work has been done on the 1<sup>st</sup> Tier Support Desk by the Data and Software Manager and Senior Developer, approximately nine months into Phase 2, the SCC will determine either to extend the contract of Compiler LA, or Garnet Consulting, or both of those organizations, or to procure the services of another organization through a federally compliant procurement process, or some combination of those actions. The responsibilities of the develop 1<sup>st</sup> Tier Support Desk contractor include the following.

- Reports to Data and Software Manager
- Performs specialist development/open-source contributions/development tasks that aide senior developer or are distinct and separable from Senior Developer role related to the 1<sup>st</sup> Tier Support Desk
- Offers technical advice regarding software development decision making

### **2.2.29 Task 2-M-16: 1<sup>st</sup> Tier Support Desk Direct Expenses (Phase 2)**

The 1<sup>st</sup> Tier Support Desk hosting task relates only to direct expenses for hosting and other cloud expenses related specifically to the ongoing operation of the 1<sup>st</sup> Tier Support Desk, including prior to deployment.

### **2.2.30 Task 2-M-17: Software Contingency (Phase 2)**

Additional budget has been set aside to account for the potential need for more software design and development contracting services or expenses than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Tasks 2-M-11 through 2-M-16. If this budget is not used, it may be reallocated towards other tasks.

### **2.2.31 Task 2-M-18: Deployments Manager (Phase 2)**

The Deployments Manager will be Elle Ogden from CALACT. This individual has been identified and terms of an agreement have been determined. Elle Ogden will become a contractor of CALACT upon the initiation of Phase 2. The responsibilities for this task include the following.

- Reports to Project Manager
- Owns all deployment site communication and coordination, across Deployment Sites 2 through 4
- Project manages activities relevant to deployment sites
- Coordinates with and provides guidance to Evaluation contractor
- May travel on occasion to deployment sites

### **2.2.32 Task 2-M-19: Outreach Support (Phase 2)**

Outreach support services will be provided by a contractor (or contractors) that has not yet been determined. The exact nature of these services depends on the exact specifications of the refined outreach actions planned in collaboration with deployment site agencies during Phase 2 of the project. After those plans have been detailed by the Deployments Manager and incorporated into the Phase 2 Outreach Plan, the SCC and PM will assign this task to appropriate project partners through contract extensions or to contractors selected by agencies within deployment sites, through federally compliant procurement processes.

### **2.2.33 Task 2-M-20: Digital Signage at Deployment Site 4 (Phase 2)**

At Deployment Site 4 there will be a large demonstration of GTFS data extensions integrated with a digital signage system to be deployed by project partner Navilens. The digital signage will provide a physical sign that can be read by the optical device on a smartphone reader, and provide APIs to rider-facing websites and apps regarding the exact location of the user device and relevant walking paths.

### **2.2.34 Task 2-M-21: Digital signage printing costs (Phase 2)**

This task accounts for the printing of the physical signs related to Task 2-M-20.

### **2.2.35 Task 2-M-22: Demand-responsive scheduling software at Deployment Site 3 (Phase 2)**

At Deployment Site 3 there will be a demonstration of a demand-responsive scheduling application integrated into a rider frontend application (see Task 2-M-23), through a standardized booking data format (GTFS-OnDemand). No specific vendor has been selected for this task. A contractor will be selected by the SCC or a deployment site agency through a federally compliant procurement process approximately 12 months after the beginning of Phase 2.

### **2.2.36 Task 2-M-23: Frontend rider application including demand responsive service (Phase 2)**

At Deployment Sites 2, 3, and 4 a frontend rider application will display certain deployment site features, as well as provide a vehicle to gather survey responses. This service will be provided by Transit. In each deployment site, Transit will ingest the data being provided by the project, including demand-responsive service in Deployment Site 3, and provide a rider interface including support for agency questions about the app and rider questions regarding agency services provided through their in-app text interface.

### **2.2.37 Task 2-M-24: Evaluation contract support (Phase 2)**

The performance measurement plan will be enacted by the evaluation support contractor, which will be a collaboration between California PATH, and Transit. California PATH will provide management of the evaluation support contract, and coordinate with the Deployment Manager and Project Manager as required. Transit will lead the development and implementation of rider

surveys in Deployment Sites 2 and 4. Responsibilities of the evaluation support contractor include the following.

- Team reports to Deployments Manager
- Defines and communicates performance measurement data needs to software manager and deployments manager
- Manages and deploys surveys at deployment sites
- Confirms validity of performance measurement data flows
- Prepares performance measurement reporting documents, with assistance of admin support team

### **2.2.38 Task 2-M-25: Evaluation contingency (Phase 2)**

Additional budget has been set aside to account for the potential need for more performance measurement and evaluation services or expenses than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Task 2-M-24. If this budget is not used, it may be reallocated towards other tasks.

### **2.2.39 Task 2-M-26: Admin Support Team (Phase 2)**

The Admin Support Team will be provided by a collaboration between Garnet Consulting and Trillium. This team will support the Project Manager in fulfilling the administrative requirements of the contract. Responsibilities of the admin support team include the following.

- Support for writing reports due to USDOT
- Tracking requests from and deliverables to USDOT
- General stakeholder coordination support

## **2.3 Phase 3 Technical Approach**

### **2.3.1 Task 3-A: Project Management**

Phase 3 project management processes will continue as the structure active during Phase 3. An updated PMP and additional revisions throughout the Phase will provide up-to-date documentation on the processes that ensure project deliverables remain on time and within budget. The Project Manager will prepare all project management documents and attend all required meetings, with the engagement as necessary of VVTA staff or additional project staff.

Task 3-A will include the following deliverables:

- Phase 3 Kick-off Meeting
- Project Management Plan (PMP)
- Revised PMP (as required)
- Monthly Progress Report Part I: Technical Progress and Status Summary
  - Includes: Project Milestone Schedule, Updated Task Schedules, Project and Task Detailed Risk Register, and Lessons Learned Logbook (LLL).
- Monthly Progress Report Part II: Detailed Financial Summary
- Participation in site-specific bi-weekly coordination teleconferences

- Participation in monthly all-site coordination teleconferences
- Participation in periodic roundtable teleconferences

### 2.3.2 Task 3-B: System Operations and Maintenance

Systems Operations and Maintenance will proceed according to the CMOP, as incorporated into an Initial System Operations and Maintenance Schedule (SOMS). The SOMS will be updated monthly along with a Progress/Risk Summary in the monthly report.

Task 3-B will include the following deliverables:

- Initial System Operations and Maintenance Schedule (SOMS)
- Updated SOMS with Progress/Risk Summary (monthly)
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting

### 2.3.3 Task 3-C: Stakeholder Outreach

Phase 3 will continue the outreach activities of the project described within the updated Outreach Plan. Beyond the site-specific outreach activities, which will be accounted for in Task 3-G-19 below, this will include a draft and final Operational Capability Showcase Plan (OCSP) and, subsequent to the Operational Capability Showcase, an Operational Capability Showcase Summary (OCSS).

Task 3-C will include the following deliverables:

- Initial Outreach Implementation Schedule (OIS)
- Outreach Materials (as specified in the Outreach Plan and OIS)
- Updated OIS with Progress/Risk Summary (monthly)
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- Draft Operational Capability Showcase Plan (OCSP)
- Revised OCSP with Comment Resolution Report
- Final Operational Capability Showcase Plan (OCSP)
- Operational Capability Showcase
- Draft Operational Capability Showcase Summary (OCSS)
- Revised OCSS with Comment Resolution Report
- Final Operational Capability Showcase Summary

### 2.3.4 Task 3-D: Performance Measurement and Independent Evaluation Support

The collection of performance measurement data in line with the PMESP will begin during Phase 2 and continue into Phase 3. These processes will continue along with updates to the PMESP and DMP, along with the development of the Site Performance Measurement Dashboard.

Task 3-D will include the following deliverables:

- Updated Performance Measurement and Evaluation Support Schedule (PMESS), (monthly):
  - Element of Monthly Progress Report Part I: Technical Progress and Status Summary, see Section F.3 Monthly Progress Reporting
- Updated PMESP (minimum one update)
- Updated DMP (minimum one update)
- Performance Measurement Materials identified in the PMESP and PMESS (e.g., Post-Deployment Performance Data, System Performance Reports, Performance Measurement Results) and other supporting information
- Site Performance Measurement Dashboard
- Public-facing Data (Regular updates as documented in the DMP and PMESS)

### **2.3.5 Task 3-E: Post-Deployment Transition Planning.**

The governance structure for Phase 2 will continue into Phase 3. Changes may be required based on extenuating circumstances, but are not planned. Identified risks and mitigation strategies are detailed in Section 4. Phase 2 and 3 agreements include financial and in-kind contributions from public agencies and private organizations, as well as outreach and partnering efforts to ensure local agencies and advocacy groups are on-board with the continuation of project efforts. These agreements provide funding for developing key resources and working relationships, which accomplish the goals of the project during Phases 2 and 3 and are sustainable after Phase 3.

The project team will develop a draft and final Comprehensive Transition Plan (CTP) to guide the activities of the system post deployment. The proposed changes in Phases 2 and 3 will split the responsibilities of system maintenance across operators, vendors, and regulators, coordinating currently inefficient activities, and these roles will be. It also creates a framework which can be very easily adopted by other states and organizations, with minimal additional cost (other than the work of that organization of adopting resources), and new organizations participating would be able to contribute to system maintenance. If successful, the result would be enhanced information for users, specifically the groups of underserved users identified by this project and institutional users such as the DOTs in their analysis role and rider advocacy groups, without significant long-term increased costs. This ensures that the project is sustainable after program funding ends.

Task 3-E will include the following deliverables:

- Draft Comprehensive Transition Plan (CTP)
- Revised CTP with Comment Resolution Report
- Final Comprehensive Transition Plan (CTP)

### **2.3.6 Task 3-F: Participation in Standards Development**

Standards development through participatory governance systems is at the heart of the VVTA/CALACT ITS4US project, and will be done through a number of tasks identified over Phases 2 and 3. As discussed with and required by the USDOT and outlined in the SAD, the Project Manager or Data and Software Manager will submit specific Technical Memoranda, generally in the form of communications to standards organizations through their desired format. This work will begin in Phase 2 and continue into Phase 3.

Task 3-F will include the following deliverables:

- SDO-specific Technical Memoranda (as defined in the Standards Plan within the SAD)
- Participation in SDO working group or committee meetings/activities (as required)

### **2.3.7 Task 3-G-X: Phase 3 Deployment-specific tasks**

This project is accounting for its scope and budget by interpreting the tasks listed in the NOFO as related to only work on the deliverables specifically listed in the NOFO. These additional tasks, identified as 3-G-1, 3-G-2, etc., are the tasks associated with delivering specific system components, or staffing functionalities that support system operations. These are work tasks assigned to specific contractors or groups of contractors (or that will be procured) during Phase 3.

### **2.3.8 Task 3-G-1: System Coordination Committee (Phase 3)**

The SCC will continue work on the same terms as Phase 2 upon the initiation of Phase 3. The staff provided by each organization to attend and administer SCC meetings constitutes work on Task 3-G-1. After deployment, work by the SCC will focus especially on the finalization of an Intergovernmental Agreement to manage the operations and maintenance of the system after the duration of Phase 3.

### **2.3.9 Task 3-G-2: Project Manager (Phase 3)**

The Project Manager in Phase 3 will continue to be Thomas Craig, employee of WSDOT. The following are the responsibilities of the Project Manager.

- Reports to SCC
  - Enacts all specific direction from SCC
  - Provides updates to SCC
  - Seeks authorization from SCC for any adjustment to planned scope
- Owns the operations and maintenance of the SCC
- Owns the operations and maintenance of the Technology Coordination Teams
  - Manages the lists of wayfinding, eligibility, payments, and accessibility projects
- Supervises activity of the
  - Data and Software Manager
  - Deployments Manager
  - Training Support staff
  - Technical Advice team
  - Admin support staff
  - PMO staff support

### **2.3.10 Task 3-G-3: PMO Staff Support (Phase 3)**

This task accounts for work by the PMO (CALACT) to support the Project Manager with accounting, contracting, and facilities services during Phase 3. Most PMO services will be directed by the Project Manager, who will make requests of specific support staff. The PMO will hold all subcontracts related to Phase 3.

### **2.3.11 Task 3-G-4: Training support (Phase 3)**

The training support contract for Phase 3 has not been assigned to a particular contractor. The contractor selected by the SCC for Phase 2 work on Task 2-M-4 will most likely be selected to continue work into Phase 3 through a contract extension. The responsibilities for this task include the following.

- Reports to Project Manager
- Provides as needed support to Project Manager and other staff for activities related to training DOTs, MPOs, associations, or agencies
- Provides staffing and technical assistance to the Technology Coordination Teams

### **2.3.12 Task 3-G-5: Technical advice (Phase 3)**

The Technical advice contract will be distributed across six different specialist contractors including Compiler LA, Garnet Consulting, Transit, Trillium, California PATH, and MobilityData. The responsibilities for this task include the following.

- Reports to Project Manager
- Provides as needed technical advice to Project Manager and other staff, or the SCC
- Provides staffing and technical assistance as part of the Technology Coordination Teams, regarding Payments, Wayfinding, Eligibility, Mapping systems. This could include supporting
  - Training sessions
  - Research
  - Outreach to agencies and vendors
  - Data and software team

### **2.3.13 Task 3-G-6: Technical advice contingency (Phase 3)**

Additional budget has been set aside to account for the potential need for more technical advice services than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Task 3-G-5. If this budget is not used, it may be reallocated towards other tasks.

### **2.3.14 Task 3-G-7: Data and Software Manager (Phase 3)**

The Data and Software Manager will be Melody Reeb, employee of CALACT. The responsibilities for this task include the following.

- Reports to Project Manager
- Owns the Data APIs operations and maintenance
- Owns the Directory/Analysis Frontend operations and maintenance
- Owns the 1<sup>st</sup> Tier Support Desk operations and maintenance
- Manages the Data Junior Staff, and accepts deliverables from that task
- Manages the senior developer and all contract developers, and accepts deliverables from those tasks
- Confirms quality of Official Lists from DOTs and provides support for those lists
- Owns incorporating identified system requirements into Data and Procurement Best Practices



- Provides technical architecture support to state DOTs, deployment sites, other project teams

### **2.3.15 Task 3-G-8: Data Junior Staff (Phase 3)**

The Data Junior Staff will be provided by Trillium. Responsibilities of the Data Junior Staff include the following.

- Reports to Data and Software Manager
- Maintains GTFS data sets including data encoded with the following extensions
  - Flex
  - Pathways
  - Text-to-speech
  - Translation
  - Vehicles

### **2.3.16 Task 3-G-9: Data quality reviews and support (Phase 3)**

Data quality reviews and data quality support will be provided by three organizations in collaboration: Trillium, MobilityData, and California PATH. Additional tooling and specialist advice regarding data quality will be provided by Transit. The responsibilities of the data quality team include the following.

- Reports to the Data and Software Manager
- Maintains the data quality review process
- Performs data quality reviews and identifies specific needs within datasets provided by transit agencies/vendors to enable them to meet guidelines
- Answers GTFS-related questions raised by project staff or stakeholders
- Provides first-tier GTFS and related support for agencies and DOTs

### **2.3.17 Task 3-G-10: Senior Developer (Phase 3)**

The Senior Developer is an individual staff member provided by MobilityData who will provide software development services for the project team, for all software applications being developed. This position is specifically tasked with ensuring that the project team maintains internal institutional knowledge regarding the software being developed, so as to maximize the ability of the SCC to successfully assign the long-term management of software applications to a succeeding organization. This position will extend through the first year of Phase 3. The responsibilities of the senior developer include the following.

- Reports to Data and Software Manager
- Primary developer on Data APIs, Directory/Analysis Frontend and 1<sup>st</sup> Tier Support Desk,
- Responsible for supporting software applications deployed by the project across all project deployments
- Makes technical architecture decisions regarding Data APIs, Directory/Analysis Frontend, and 1<sup>st</sup> Tier Support Desk
- Coordinates with contract development teams
- Offers technical advice regarding software development decision making

### **2.3.18 Task 3-G-12: Develop Data APIs (Phase 3)**

A contract software development team will provide consulting services to support the software maintenance of the Data APIs, supplementing the Agile team on this work during Phase 3. The contractor for this task has not been determined. Before the end of Phase 2, the SCC will determine either to extend the contract of Compiler LA, or MobilityData, or both of those organizations, or to procure the services of another organization through a federally compliant procurement process, or some combination of those actions. The responsibilities of the develop Data APIs contractor include the following.

- Reports to Data and Software Manager
- Performs specialist development/open-source contributions/development tasks that aide senior developer or are distinct and separable from Senior Developer role related to the Data APIs
- Offers technical advice regarding software development decision making

### **2.3.19 Task 3-G-13: API Hosting (Phase 3)**

The APIs hosting task relates only to direct expenses for hosting and other cloud expenses related specifically to the ongoing operation of the Data APIs after deployment.

### **2.3.20 Task 3-G-15: Develop 1<sup>st</sup> Tier Support Desk (Phase 3)**

A contract software development team will provide consulting services to support the software maintenance of the 1<sup>st</sup> Tier Support Desk, supplementing the Agile team on this work during Phase 3. The contractor for this task has not been determined. Before the end of Phase 2, the SCC will determine either to extend the contract of Compiler LA, or Garnet Consulting, or both of those organizations, or to procure the services of another organization through a federally compliant procurement process, or some combination of those actions. The responsibilities of the develop 1<sup>st</sup> Tier Support Desk contractor include the following.

- Reports to Data and Software Manager
- Performs specialist development/open-source contributions/development tasks that aide senior developer or are distinct and separable from Senior Developer role related to the 1<sup>st</sup> Tier Support Desk
- Offers technical advice regarding software development decision making

### **2.3.21 Task 3-G-16: 1<sup>st</sup> Tier Support Desk Direct Expenses (Phase 3)**

The 1<sup>st</sup> Tier Support Desk hosting task relates only to direct expenses for hosting and other cloud expenses related specifically to the ongoing operation of the 1<sup>st</sup> Tier Support Desk after deployment.

### **2.3.22 Task 3-G-17: Software Contingency (Phase 3)**

Additional budget has been set aside to account for the potential need for more software design and development contracting services or expenses than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Tasks 3-G-11 through 3-G-16. If this budget is not used, it may be reallocated towards other tasks.

### **2.3.23 Task 3-G-18: Deployments Manager (Phase 3)**

The deployments manager will be Elle Ogden from CALACT. The responsibilities for this task include the following.

- Reports to Project Manager
- Owns all deployment site communication and coordination, across Deployment Sites 2 through 4
- Project manages activities relevant to deployment sites
- Coordinates with and provides guidance to Evaluation contractor
- May travel on occasion to deployment sites

### **2.3.24 Task 3-G-19: Outreach Support (Phase 3)**

Outreach support services will be provided by a contractor or contractors which have not yet been determined. The exact nature of these services depends on the exact specifications of the refined outreach actions planned in collaboration with deployment site agencies during Phase of the project. After those plans have been detailed by the Deployments Manager in the Phase 2 Outreach Plan and updated in Phase 3, the SCC will assign this task to appropriate project partners through contract extensions or to contractors selected by agencies within deployment sites, through federally compliant procurement processes.

### **2.3.25 Task 3-G-20: Digital Signage at Deployment Site 4 (Phase 3)**

At Deployment Site 4 there will be a large demonstration of GTFS data extensions integrated with a digital signage system to be deployed by project partner Navilens. The digital signage will provide a physical sign that can be read by the optical device on a smartphone reader, and provide APIs to rider-facing websites and apps regarding the exact location of the user device and relevant walking paths. The license for this existing system will be maintained through Phase 3.

### **2.3.26 Task 3-G-22: Demand-responsive scheduling software at Deployment Site 3 (Phase 3)**

At Deployment Site 3 there will be a demonstration of a demand-responsive scheduling application integrated into a rider frontend application (see Task 3-G-23), through a standardized booking data format (GTFS-OnDemand). No specific vendor has been selected for this task. A contractor will be selected by the SCC or a deployment site agency through a federally compliant procurement process approximately 12 months after the beginning of Phase 2, pursuant to Task 2-M-22. The license for this existing system will be maintained through Phase 3.

### **2.3.27 Task 3-G-23: Frontend rider application including demand responsive service (Phase 3)**

At Deployment Sites 2, 3, and 4 a frontend rider application will display certain deployment site features, as well as provide a vehicle to gather survey responses. This service will be provided by Transit. In each deployment site, transit will ingest the data being provided by the project, including demand-responsive service in Deployment Site 3, and provide a rider interface including

full support for agency and rider questions. The license for this existing system will be maintained through Phase 3.

### **2.3.28 Task 3-G-24: Evaluation contract support (Phase 3)**

The performance measurement plan will be enacted by the evaluation support contractor, which will be a collaboration between California PATH, and Transit. California PATH will provide management of the evaluation support contract, and coordinate with the Deployment Manager and Project Manager as required. Transit will lead the development and implementation of rider surveys in Deployment Sites 2 and 4. Responsibilities of the evaluation support contractor include the following.

- Team reports to Deployments Manager
- Defines and communicates performance measurement data needs to Software Manager and Deployments Manager
- Manages and deploys surveys at deployment sites
- Confirms validity of performance measurement data flows
- Prepares performance measurement reporting documents, with assistance of Admin Support Team

### **2.3.29 Task 3-G-25: Evaluation contingency (Phase 3)**

Additional budget has been set aside to account for the potential need for more performance measurement and evaluation services or expenses than expected. This task will not be contracted unless it is needed to provide extensions to the contracts related to Task 3-G-24. If this budget is not used, it may be reallocated towards other tasks.

### **2.3.30 Task 3-G-26: Admin Support Team (Phase 3)**

The Admin Support Team will be provided by a collaboration between Garnet Consulting and Trillium. This team will support the Project Manager in fulfilling the administrative requirements of the contract. Responsibilities of the admin support team include the following.

- Support for writing reports due to USDOT
- Tracking requests from and deliverables to USDOT
- General stakeholder coordination support

# 3 Phase 2 and 3 Deployment Schedule

This section provides a high-level deployment schedule, including additional information regarding the capability of the project to acquire, configure, install, and test key elements of the proposed system.

## 3.1 Schedule Summary

The proposed deliverable schedule in Table 4 assumes that project kick off happens in mid-May 2022. This schedule can be adjusted based on USDOT requests and the actual initiation of Phase 2 work.

**Table 4. Phase 2 Deployment Schedule**

Task	Deliverable	Due Date	Notes
2-A	Phase 2 Kick-off Meeting	TBD - June 2022	N/A
2-A	Draft Project Management Plan (PMP)	June 1, 2023 (or same day as Phase 2 kick off)	N/A
2-A	Revised PMP	as required	N/A
2-A	Monthly Reports and All Required Components	Monthly	N/A
2-A	Participation in site-specific bi-weekly coordination teleconferences	TBD - biweekly attendance	N/A
2-A	Participation monthly all-site coordination teleconferences	TBD - monthly attendance	N/A
2-A	Participation in periodic roundtable teleconferences	TBD - attendance as needed	N/A

Task	Deliverable	Due Date	Notes
2-B	Draft Systems Architecture Document (SAD)	October 15, 2023	N/A
2-B	Systems Architecture Walkthrough and Workbook	November 15, 2023	Approximate date of final 'miniature walkthrough' per scope in Section 2.
2-B	Revised SAD with Comment Resolution Report	February 1, 2024	N/A
2-B	Final Systems Architecture Document	February 15, 2024	N/A
2-B	Draft Systems Design Document (SDD)	November 15, 2023	N/A
2-B	Systems Design Walkthrough and Workbook	December 15, 2023	Approximate date of final 'miniature walkthrough' per scope in Section 2.
2-B	Revised SDD with Comment Resolution Report	February 10, 2024	N/A
2-B	Final Systems Design Document	March 1, 2024	N/A
2-B	Revised Concept of Operations	November 15, 2023	N/A
2-B	Revised Systems Requirements	November 15, 2023	N/A
2-B	Revised Integrated Complete Trip Deployment Plan	November 15, 2023	N/A
2-C	Draft Data Privacy Plan (DPP)	December 15, 2023	N/A
2-C	Revised DPP with Comment Resolution Report	January 15, 2024	N/A
2-C	Final Data Privacy Plan (DPP)	February 15, 2024	N/A
2-C	Notice of Privacy Management Consistency	December 15, 2023	N/A

Task	Deliverable	Due Date	Notes
2-C	Draft Phase 2 Data Management Plan (DMP)	December 15, 2023	N/A
2-C	Revised Phase 2 DMP with Comment Resolution Report	January 15, 2024	N/A
2-C	Final Phase 2 Data Management Plan (DMP)	February 15, 2024	N/A
2-D	Draft Comprehensive Acquisition Plan (CAP)	January 15, 2024	N/A
2-D	Revised CAP with Comment Resolution Report	February 15, 2024	N/A
2-D	Final Comprehensive Acquisition Plan	March 15, 2024	N/A
2-D	Draft Comprehensive Installation Plan (CIP)	January 15, 2024	N/A
2-D	Revised CIP with Comment Resolution Report	February 15, 2024	N/A
2-D	Final Comprehensive Installation Plan	March 15, 2024	N/A
2-E	Initial Software Development Schedule (SDS)	February 1, 2024	N/A
2-E	SDS Update with Progress/Risk Summary	Monthly/as needed	N/A
2-E	Open Source Software and Supporting Documentation	As specified by the SDS	N/A
2-F	Initial Training Implementation Schedule (TIS)	TBD - per PTSEP	N/A
2-F	TIS Update with Progress/Risk Summary	Monthly/as needed	N/A
2-F	Training Materials	TBD - per PTSEP and TIS	N/A

Task	Deliverable	Due Date	Notes
2-F	Human Use Approval Confirmation Materials	TBD - per HUAS and as needed by IRB	N/A
2-G	Draft System Test Plan	March 1, 2024	N/A
2-G	Revised System Test Plan with Comment Resolution Report	April 1, 2024	N/A
2-G	Final System Test Plan	April 15, 2024	N/A
2-G	Operational Readiness Concept Briefing	March 1, 2024	Held remotely due to size and diversity of deployment area, lack of need for travel.
2-G	Draft Operational Readiness Plan (ORP)	March 1, 2024	N/A
2-G	ORP Walkthrough and Workbook	April 1, 2024	Held remotely due to size and diversity of deployment area, lack of need for travel.
2-G	Revised ORP with Comment Resolution Report	April 1, 2024	N/A
2-G	Final Operational Readiness Plan (ORP)	April 15, 2024	N/A
2-H	Installation and Operational Readiness Testing Schedule (IORS)	April 1, 2024	N/A
2-H	IORS Updated with Progress/Risk Summary	Monthly/as needed	N/A
2-H	System Test Results Summary (STRS)	TBD - per IORS	N/A
2-H	Test Results Summary Documentation (per the ORP)	TBD - per ORP	N/A
2-H	Operational Readiness Demonstrations (per the ORP)	TBD - per ORP	N/A



Task	Deliverable	Due Date	Notes
2-I	Draft Comprehensive Maintenance and Operations Plan (CMOP)	April 15, 2024	N/A
2-I	Revised CMOP with Comment Resolution Report	May 1, 2024	N/A
2-I	Final CMOP	May 15, 2024	N/A
2-J	Draft Phase 2 Outreach Plan	February 29, 2024	N/A
2-J	Revised Phase 2 Outreach Plan with Comment Resolution Report	March 31, 2024	N/A
2-J	Final Phase 2 Outreach Plan	April 30, 2024	N/A
2-J	Initial Outreach Implementation Schedule (OIS)	February 29, 2024	N/A
2-J	OIS Updated with Progress/Risk Summary	Monthly/as needed	N/A
2-J	Outreach Materials (as specified in the Phase 2 Outreach Plan and OIS)	TBD - per Outreach Plan and OIS	N/A
2-K	Initial Performance Measurement and Evaluation Support Schedule (PMESS)	February 1, 2024	N/A
2-K	PMESS Updated with Progress/Risk Summary	Monthly/as needed	N/A
2-K	Updated PMESP	TBD	Minimum of 1 update
2-K	Revised Human Use Approval Summary	As needed per IRB	N/A
2-K	Performance Measurement Materials identified in the PMESP and PMESS (e.g., Pre-Deployment Performance Data, System Performance Reports) and other supporting information.	TBD - per PMESS and PMESP	N/A

Task	Deliverable	Due Date	Notes
2-L	SDO-specific Technical Memoranda	TBD - per SAD	N/A
2-L	Participation in SDO working group or committee meetings/activities	TBD - as required	N/A

**Table 5. Phase 3 Deployment Schedule**

Task	Deliverable	Due Date	Notes
N/A	20% Deployment Milestone	March 1, 2024	Deployment begins prior to initiation of Phase 3 for some components per Phase 2 scope.  20% defined as Data and Procurement Best Practices and Data APIs deployed with at least 10% of agencies in region meeting Best Practices.
N/A	50% Deployment Milestone	July 1, 2024	Assumed to align with decision gate for Phase 3.  50% defined as all system components deployed, and 20% of agencies in region meeting Best Practices.
N/A	80% Deployment Milestone	November 1, 2024	80% defined as all system components deployed, and 50% of agencies in region meeting Best Practices.
N/A	100% Deployment Milestone	June 1, 2025	100% defined as all system components deployed, and 80% of agencies in region meeting Best Practices. Note that 80% of agencies aligns with the target defined in Performance Metric 1.2.
3--A	Phase 3 Kick-off Meeting	TBD	N/A

Task	Deliverable	Due Date	Notes
3-A	Project Management Plan (PMP)	June 1, 2025 (or same day as Phase 2 kick off)	N/A
3-A	Revised PMP (as required)	TBD- as required	N/A
3-A	Monthly Reports and All Required Components	Monthly	N/A
3-A	Participation in site-specific bi-weekly coordination teleconferences	TBD - biweekly attendance	N/A
3-A	Participation in monthly all-site coordination teleconferences	TBD - monthly attendance	N/A
3-A	Participation in periodic roundtable teleconferences	TBD - attendance as needed	N/A
3-B	Initial System Operations and Maintenance Schedule (SOMS)	October 1, 2025	N/A
3-B	Updated SOMS with Progress/Risk Summary	Monthly/as needed	N/A
3-C	Initial Outreach Implementation Schedule (OIS)	November 1, 2025	N/A
3-C	Outreach Materials (as specified in the Outreach Plan and OIS)	TBD - per Outreach Plan and OIS	N/A
3-C	Updated OIS with Progress/Risk Summary	Monthly/as needed	N/A
3-C	Draft Operational Capability Showcase Plan (OCSP)	November 15, 2025	N/A
3-C	Revised OCSP with Comment Resolution Report	December 15, 2025	N/A

Task	Deliverable	Due Date	Notes
3-C	Final Operational Capability Showcase Plan (OCSP)	January 15, 2026	N/A
3-C	Operational Capability Showcase	November 15, 2025	N/A
3-C	Draft Operational Capability Showcase Summary (OCSS)	November 15, 2025	N/A
3-C	Revised OCSS with Comment Resolution Report	December 15, 2025	N/A
3-C	Final Operational Capability Showcase Summary	January 15, 2026	N/A
3-D	Updated Performance Measurement and Evaluation Support Schedule (PMESS)	Monthly/as needed	N/A
3-D	Updated PMESP (minimum one update)	TBD- as required	Minimum of 1 update
3-D	Updated DMP (minimum one update)	TBD- as required	Minimum of 1 update
3-D	Performance Measurement Materials	TBD - per PMESS	N/A
3-D	Site Performance Measurement Dashboard	TBD - per PMESS	N/A
3-D	Public-facing Data (Regular updates as documented in the DMP and PMESS)	TBD - per DMP and PMESS	N/A
3-E	Draft Comprehensive Transition Plan (CTP)	January 15, 2026	N/A
3-E	Revised CTP with Comment Resolution Report	February 15, 2026	N/A

Task	Deliverable	Due Date	Notes
3-E	Final Comprehensive Transition Plan (CTP)	March 15, 2026	N/A
3-F	SDO-specific Technical Memoranda	TBD - per SAD	N/A
3-F	Participation in SDO working group or committee meetings/activities	TBD- as required	N/A

## 3.2 Schedule Risks

Risk Title	Description
<b>COVID-19 Pandemic</b>	The COVID-19 pandemic has impacted the way transit operates, how riders interact with transit, and how project partners work and interact with each other. COVID-19 is an ongoing risk to this project in that it may make it difficult to meet and coordinate with project partners, travel to deployment sites, and collect feedback from riders.
<b>Prolonged software development</b>	The exact timeframe required for complex software development is notoriously difficult to predict. While ample time has been budgeted, it is feasible more time is required than expected. This will be managed in part through eliminating development of desired or optional features in order to provide required features on schedule.



# 4 Phase 2 and 3 Deployment Cost Estimate

## 4.1 Cost Summary

The VVTA ITS4US Project seeks a federal contribution of \$4,061,000.00 towards a project value of \$5,276,000.00 during Phases 2 and 3 of the proposed project. This budget would be allocated primarily towards Phase 2 (\$3,073,400.00) with additional funding for Phase 3 (\$2,202,600.00), supported by a local match of \$1,215,000.00.

The budget aligns with the tasks identified in this response to the NOFO Volume 1 Part 1, including both the tasks identified in the NOFO as well as the additional tasks organized by technical services required by the project plan. Tracking budget by these added tasks allows direct traceability between contractors and technical functionalities performed on system design, development, testing, operations, etc. Budget line items from the NOFO (2-A through 2-L and 3-A through 3-F) should be understood to relate to work directly on deliverable reports listed in the NOFO, as opposed to work on system deliverables.

Only a small part of the budget reflects work by the Prime Contractor, VVTA, which is represented as \$7,500 per phase within tasks 2-A and 3-A for contract management and participation in key meetings with the USDOT. All budget items were developed in collaboration with partners through an internal competitive process that encouraged collaborative team bids for some items and consistent staffing for others where appropriate.

Two of the tasks listed in each Phase, regarding the Project Manager and Admin Support (the two positions responsible for most direct reporting to the USDOT AOR), have had the majority of their budget assigned to the tasks within the NOFO, instead of their own line items. Thus, budget assigned to the NOFO-originating tasks should be understood to account for most of the hours spent by the Project Manager and all those spent by the Admin Support team. The SCC does not have a specific budget assigned, but will require some staff time. This is because the amount of staffing provided to the SCC could change over time and will be performed by staff members as coordination work not exclusively related to the ITS4US effort.

Most expenses related to the project are labor services. There are additionally smaller amounts of licensed software, printing, and hosting expenses. Table 6 below provides a high-level overview of major areas of expenditure during each phase.

**Table 6. Major areas of expenditure by Phase**

Area of expenditure	Phase 2 % of funding	Phase 3 % of funding
<b>Labor</b>	90.0%	84.0%
<b>Software Hosting</b>	0.4%	1.0%
<b>Software licenses</b>	5.0%	9.1%
<b>Printing</b>	0.3%	0%
<b>Outreach expenses (labor)^</b>	3.0%	4.4%
<b>Outreach expenses (travel)^</b>	0.2%	0.3%
<b>Outreach expenses (compensation for stakeholders)^</b>	0.4%	0.3%
<b>Outreach expenses (materials for events and marketing)^</b>	0.6%	0.9%

The Outreach Support budget line item, described in the scope above in Sections 2.2.32 and 2.3.24, accounts for various outreach expenses which could end up fitting into multiple categories. The exact types of expenses are unknown because they are dependent on the drafting of the Phase 2 Outreach Plan. The lines in Table 6 above with an “^” after the area of expenditure name are estimates of how the Outreach Support expenses will be broken down.

#### 4.1.1 Local and State Match Funding

Table 7 below details the partners to the project that are contributing funding as match for the project. Each of these partners has provided a letter of intent specifying the identified match.

**Table 7. Local match funding type and role by partner**

Partner	Match Amount	Cash or In Kind	Specific Roles Assigned
<b>VVTA</b>	\$15,000	In Kind	Prime Contract Management
<b>CALACT</b>	\$255,000	In Kind	Data and Software Manager and PMO support



Partner	Match Amount	Cash or In Kind	Specific Roles Assigned
<b>WSDOT</b>	\$415,000	In Kind	Project Manager and other assigned staffing
<b>ODOT</b>	\$250,000	Cash	N/A
<b>Caltrans</b>	\$100,000	Cash	N/A
<b>CCJPA/Cal-ITP (Partner of Caltrans)</b>	\$60,000	In Kind	Report drafting
<b>SBCTA</b>	\$65,000	Cash	N/A
<b>Navilens</b>	\$55,000	In Kind	Discount off Digital Signage licensing

## 4.2 Cost Risks

The critical cost risks to this project have been identified as follows:

**Table 8. Cost Risks**

Risk Title	Description
<b>COVID-19 Pandemic</b>	The COVID-19 pandemic has impacted the way transit operates, how riders interact with transit, and how project partners work and interact with each other. COVID-19 is an ongoing risk to this project in that it may make it difficult to meet and coordinate with project partners, travel to deployment sites, and collect feedback from riders.
<b>Exact Budgets of Software Components Unknown</b>	The project has set aside a software contingency line item because the exact budget required to build the Data APIs, Directory/Analysis Frontend, and 1 <sup>st</sup> Tier Support Desk is unknown. These budgets may remain undefined until up to 14 months into Phase 2. A software contingency budget has been set aside to account for these unknown potential costs.
<b>Exact Cost of Performance Measurement Unknown</b>	Some details of the performance measurement approach are not yet defined, and the scale of evaluation efforts may need to be adjusted based on lessons learned in Phase 2. A performance measurement contingency budget has been set aside to account for these unknown potential costs.
<b>Insufficient Funding</b>	This is a large project and funding is limited, so running out of funding before finishing goals or before the end of the project deadline is a possibility.
<b>System components requiring contingency funding</b>	Some particular project elements are difficult to estimate the precise costs of designing and developing. For that reason, some budget line items have been allocated for specific contingency funds related to the particular system components which are most likely to be over budget. Besides the specific contingency funds listed in risks above, this also includes the Technical Advice budget item.

### 4.3 Estimated Phase 2-3 Costs

In Table 9 below some budget items marked with a \* indicating that the number does not account for all budget related to the performance of that task. An explanation of these budget items can be found in section 4.1 above.

**Table 9. Estimated Phase 2-3 Costs**

Task ID	Task Name	Total Budget	Total Cost to Date	Total Remaining	Cost Share Budget	Cost Share to Date	Cost Share Remaining	Federal Budget	Federal Cost to Date	Federal Remaining
2-A	Program Management	\$31,667			\$31,667			\$0		
2-B	System Architecture and Design	\$24,167			\$24,167			\$0		
2-C	Data Management Planning	\$24,167			\$24,167			\$0		

Task ID	Task Name	Total Budget	Total Cost to Date	Total Remaining	Cost Share Budget	Cost Share to Date	Cost Share Remaining	Federal Budget	Federal Cost to Date	Federal Remaining
2-D	Acquisition and Installation Planning	\$24,167			\$24,167			\$0		
2-E	Software Development and Integration	\$24,167			\$11,667			\$12,500		
2-F	Participant and Staff Training	\$24,167			\$11,667			\$12,500		
2-G	System Test Planning	\$24,167			\$11,667			\$12,500		
2-H	Installation and Operational Readiness Testing	\$24,167			\$11,667			\$12,500		
2-I	Maintenance and Operations Planning	\$24,167			\$11,667			\$12,500		
2-J	Stakeholder Outreach	\$24,167			\$11,667			\$12,500		
2-K	Performance Measurement and Independent Evaluation Support	\$24,167			\$11,667			\$12,500		
2-L	Participation in Standards Development	\$24,167			\$11,667			\$12,500		
2-M-1	SCC Members (DOTs)*	\$0*			\$0			\$0		
2-M-2	Project Manager*	\$20,000*			\$20,000			\$0		
2-M-3	Staff Support	\$40,010			\$0			\$40,010		
2-M-4	Training Support	\$80,000			\$25,000			\$55,000		
2-M-5	Technical Advice	\$110,000			\$0			\$110,000		
2-M-6	Technical Advice contingency	\$30,000			\$0			\$30,000		
2-M-7	Data and Software Manager	\$380,000			\$140,000			\$240,000		
2-M-8	Data Junior Staff	\$200,000			\$20,000			\$180,000		
2-M-9	Data quality reviews and agency support	\$100,000			\$0			\$100,000		
2-M-10	Senior Developer	\$462,000			\$102,500			\$359,500		
2-M-11	Design Data APIs	\$60,000			\$0			\$60,000		
2-M-12	Develop APIs	\$300,000			\$0			\$300,000		
2-M-13	APIs Hosting	\$8,000			\$0			\$8,000		
2-M-14	Develop Directory Frontend	\$25,000			\$0			\$25,000		
2-M-15	Develop 1 <sup>st</sup> Tier Support Desk	\$150,000			\$0			\$150,000		
2-M-16	1 <sup>st</sup> Tier Support Desk hosting/direct expenses	\$2,800			\$0			\$2,800		
2-M-17	Software Contingency	\$80,000			\$0			\$80,000		
2-M-18	Deployments Manager	\$280,000			\$70,000			\$210,000		
2-M-19	Outreach support	\$130,090			\$27,500			\$102,590		
2-M-20	Digital Signage @ DS4	\$100,000			\$40,000			\$60,000		

4. Phase 2 and 3 Deployment Cost Estimate

Task ID	Task Name	Total Budget	Total Cost to Date	Total Remaining	Cost Share Budget	Cost Share to Date	Cost Share Remaining	Federal Budget	Federal Cost to Date	Federal Remaining
2-M-21	Signage printing costs	\$10,000			\$10,000			\$0		
2-M-22	DR software @ DS3	\$25,000			\$0			\$25,000		
2-M-23	Frontend rider app	\$30,000			\$0			\$30,000		
2-M-24	Evaluation Contract support	\$128,000			\$0			\$128,000		
2-M-25	Evaluation contingency	\$25,000			\$0			\$25,000		
2-M-26	Admin support*	\$0*			\$0			\$0		
<b>2-All</b>	<b>Phase 2 Subtotal</b>	<b>\$3,073,400</b>			<b>\$652,500</b>			<b>\$2,420,900</b>		
3-A	Program Management	\$45,833			\$25,833			\$20,000		
3-B	System Operations and Maintenance	\$38,333			\$18,333			\$20,000		
3-C	Stakeholder Outreach	\$38,333			\$18,333			\$20,000		
3-D	Performance Measurement and Independent Evaluation Support	\$38,333			\$18,333			\$20,000		
3-E	Post-Deployment Transition Planning	\$38,333			\$18,333			\$20,000		
3-F	Participation in Standards Development	\$38,333			\$18,333			\$20,000		
3-G-1	SCC Members (DOTs)	\$0*			\$0			\$0		
3-G-2	Project Manager	\$40,000*			\$40,000			\$0		
3-G-3	Staff Support	\$40,010			\$0			\$40,010		
3-G-4	Training Support	\$80,000			\$25,000			\$55,000		
3-G-5	Technical Advice	\$110,000			\$0			\$110,000		
3-G-6	Technical Advice contingency	\$70,000			\$0			\$70,000		
3-G-7	Data and Software Manager	\$380,000			\$140,000			\$240,000		
3-G-8	Data Junior Staff	\$50,000			\$10,000			\$40,000		
3-G-9	Data quality reviews and agency support	\$100,000			\$0			\$100,000		
3-G-10	Senior Developer	\$42,000			\$42,500			-\$500		
3-G-12	Develop APIs	\$50,000			\$0			\$50,000		
3-G-13	APIs Hosting	\$17,000			\$0			\$17,000		
3-G-15	Develop 1 <sup>st</sup> Tier Support Desk	\$50,000			\$0			\$50,000		
3-G-16	1 <sup>st</sup> Tier Support Desk hosting/direct expenses	\$6,000			\$0			\$6,000		
3-G-17	Software Contingency	\$80,000			\$0			\$80,000		
3-G-18	Deployments Manager	\$280,000			\$110,000			\$170,000		
3-G-19	Outreach support	\$130,090			\$17,500			\$112,590		

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Office of the Assistant Secretary for Research and Technology  
Intelligent Transportation System Joint Program Office

4. Phase 2 and 3 Deployment Cost Estimate

Task ID	Task Name	Total Budget	Total Cost to Date	Total Remaining	Cost Share Budget	Cost Share to Date	Cost Share Remaining	Federal Budget	Federal Cost to Date	Federal Remaining
3-G-20	Digital Signage @ DS4	\$150,000			\$60,000			\$90,000		
3-G-22	DR software @ DS3	\$20,000			\$0			\$20,000		
3-G-23	Frontend rider app	\$30,000			\$0			\$30,000		
3-G-24	Evaluation Contract support	\$200,000			\$0			\$200,000		
3-G-25	Evaluation contingency	\$40,000			\$0			\$40,000		
3-G-26	Admin support*	\$0*			\$0			\$0		
<b>3-All</b>	<b>Phase 3 Subtotal</b>	<b>\$2,202,600</b>			<b>\$562,500</b>			<b>\$1,640,100</b>		
<b>All</b>	<b>Total</b>	<b>\$5,276,000</b>			<b>\$1,215,000</b>			<b>\$4,061,000</b>		



# Appendix A. Acronyms and Glossary

**Accessibility** – Accessibility is used in this document to indicate the ability all riders—especially people with disabilities, Limited English Proficiency, or who faces other barriers to access transit—to use transit and transit technologies in a way that best supports those users’ individual experiences with transit. A service or technology may be “accessible” as defined by the ADA, but may also present “accessibility barriers” which this project seeks to help riders manage, in order to make the service or technology “more accessible”.

ADA - Americans with Disabilities Act

API - Application Programming Interface

CA - State of California

CAD/AVL – Computer-Aided Dispatch/Automatic Vehicle Location

CALACT - California Association for Coordinated Transportation

Caltrans - California Department of Transportation

CDL - Concept Development Lead

CMMI – Capability Maturity Model Integration

ConOps - Concept of Operations

**Demand-responsive transit** – Transit services which provide trips at a location and/or time that is requested by a rider. Generally, any transit service that is not Fixed-route is considered a type of Demand-responsive transit for the purposes of this document, including general public DAR, ADA paratransit, and other transit models.

DOT - Department of Transportation

**Fixed-route transit** – Transit services that provide service to the general public through vehicles which stop at designated locations (stops and stations) at designated times.

GPS – Global Positioning System

GOFS – General Ondemand Feed Specification

GTFS - General Transit Feed Specification

IEC – International Electrotechnical Commission

IEEE - Institute of Electrical and Electronics Engineers

INCOSE - International Council on Systems Engineering

ISO – International Organization for Standardization

MPO – Metropolitan Planning Organization

NOFO – Notice of Funding Opportunity

ODOT - Oregon Department of Transportation

OR - State of Oregon

OS - Operating System

PII – Personally Identifiable Information

PLC - Project Leadership Committee

PML - Project Management Lead

PMO - Project Management Organization

PMP - Project Management Plan

PMT - Project Management Team

SCC - System Coordination Committee

SDL - System Development Lead

SEMP - Systems Engineering Management Plan

SyRS - System Requirements Specification Document

TBD - To Be Determined

TNC - Transportation Network Company

UI - User Interface

WA - State of Washington

WBS - Work Breakdown Structure

WSDOT - Washington State Department of Transportation

WSTA - Washington State Transportation Association



# Appendix B. References

CALACT Phase 1 Concept of Operations (ConOps), USDOT (2021), FHWA-JPO-21-858.

CALACT User Needs Identification and Requirements Planning report, USDOT (2021), FHWA-JPO-21-853.

CALACT Phase 1 Data Management Plan (DMP), USDOT (2021), FHWA-JPO-21-866.

CALACT Phase 1 Safety Management Plan, USDOT (2021), FHWA-JPO-21-871.

CALACT Phase 1 Performance Measurement and Evaluation Support Plan (PMESP), USDOT (2021), FHWA-JPO-21-876.

CALACT Phase 1 System Requirements Specification (SyRS), USDOT (2021), FHWA-JPO-21-881.

CALACT Phase 1 Enabling Technology Readiness Assessment (ETRA), USDOT (2021), FHWA-JPO-21-886.

CALACT Phase 1 Human Use Approval Summary (HUAS), USDOT (2021), FHWA-JPO-21-896.

CALACT Phase 1 Participant Training and Stakeholder Education Plan (PTSEP), USDOT (2021), FHWA-JPO-21-901.

CALACT Phase 1 Institutional, Partnership, and Financial Plan (IPFP), USDOT (2022), FHWA-JPO-21-906.

CALACT Phase 1 Outreach Plan, USDOT (2022), FHWA-JPO-21-911.

CALACT Phase 1 Systems Engineering Management Plan (SEMP), USDOT (2022), FHWA-JPO-21-916.

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