Final High-Level System Design

The San Luis Obispo County Travel Management Coordination Center (TMCC) Project

Prepared for:

Federal Transit Administration (FTA)
United States Department of Transportation

Prepared by:

United Cerebral Palsy of San Luis Obispo County/ Ride-On Transportation

Date:
March 12, 2018

Table of Contents

List of Figures

List of Tables

LIST OF ABBREVIATIONS

Acronym	Description
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act (federal law)
API	Application Program Interface
APP	Mobile Application
AVL	Automatic Vehicle Location (satellite navigation)
CAD	Computer Aided Dispatching (FR system)
CalTrans	California Department of Transportation
CASD	Computer Aided Scheduling and Dispatching (DRT system)
CHC	Community Health Centers
ConOps	Concept of Operations
CSR	Customer Service Representative
CTSA	Consolidated Transportation Services Agency (California)
DRT	Demand Response Transportation
FHWA	Federal Highway Administration
FR	Fixed Route
FTA	Federal Transit Administration
GPS	Geographic Positioning Systems
HLSD	High-Level System Design
ITS	Intelligent Transportation Systems
IVR	Interactive Voice Response
JPO	USDOT's ITS Joint Program Office
MSAA	Mobility Services for All Americans
PMT	TMCC Project Management Team
Ride-On	Ride-On Transportation
RTA	San Luis Obispo Regional Transit Authority
SCT	South County Transit (administered by RTA)
SLO	San Luis Obispo
SLOCOG	San Luis Obispo Council of Governments
TA	Technical Assistance
TMCC	Travel Management Coordination Center
TMCCAC	Travel Management Coordination Center Advisory Committee
TTT	TMCC Technology Tool (TMCC's technology components)
USDOT	United States Department of Transportation
USDHHS	United States Department of Health and Human Services

1 Executive Summary

In 2015, the United States Department of Transportation's (USDOT) Federal Transit Administration (FTA) awarded the Mobility Services for All Americans (MSAA) Intelligent Transportation Systems (ITS) technology research grant to Ride-On Transportation and the San Luis Obispo Regional Transit Authority (RTA) to plan and design an innovative Travel Management Coordination Center (TMCC). In designing the TMCC, the San Luis Obispo (SLO) County MSAA project leveraged the ITS Systems Engineering process to document the process of seeking and addressing stakeholder mobility needs in developing a TMCC. This High-Level System Design document seeks to document how the TMCC is proposed to operate in meeting stakeholder interests.

TMCC Project Overview

The SLO County TMCC project is a collaboration effort between Ride-On Transportation, RTA, and multiple diverse stakeholder groups to plan and design of a replicable and scalable TMCC for the community. The TMCC's customer-focused vision is "To enhance personal mobility across San Luis Obispo County" with project goals and objectives including:

- **Goal 1: Make available real-time DRT Provider information and services to the public.**
  - Objectives: Provide real-time DRT Provider service information to the public; Provide 90% of all demand response trips requested through the TMCC; and Provide access to the TMCC through in-person, telephone, website, and mobile Application (APP).
- **Goal 2: Coordinate public and human service DRT.**
  - Objective: Coordinate services between three or more DRT Providers; Create operational agreements between DRT Providers; and Determine a standard technology interface that could be used to coordinate TMCC scheduling functions.

The TMCC has experienced many committed community stakeholders participating in the TMCC design process, including the general public, private, non-profit, public, private, human service, and other community organizations. A TMCC Advisory Committee (TMCCAC), comprised of stakeholders, provides invaluable feedback into the TMCC's design, development, and recommended implementation.

TMCC High-Level System Design

The purpose of the HLSD is to determine "how" the TMCC will operate and by whom. The HLSD was prepared through a process of researching current and growing innovative industry practices as shared by FTA, stakeholders, national organizations,

3rd party vendor contacts, conference attendance, trade associations, and many others. It was determined the proposed TMCC's involvement of Demand Response Transportation (DRT) Providers and human service agencies in the community's complete mobility picture is innovative for its time and is not currently nationally available as stated in its recommended form.

Alternatives for access to TMCC information and services provided through the TMCC Technology Tool's (TTT) Customer, Staff, and Provider Portals were created and evaluated based on available industry information. Design constraints and customer needs addressed in the project's System Requirements documentation were also reviewed. Through this process, the TMCCAC and Project Management Team (PMT) evaluated each alternative and recommended the following TMCC access methods and TTT design.

Recommended TMCC Access Methods

- (1) *In-Person access* at stakeholder locations; (2) *Telephone access* through Demand Response Transportation (DRT) Providers and stakeholders; (3) *Website* access through the SLO Council of Governments' (SLOCOG) 511 website with link to TTT; and (4) *Mobile Application (APP)* availability through a TTT vendor inclusive service.

Recommended TTT Customer, Staff, and Provider Portals

- *Customer and Staff Portals.* Similar in services provided, these portals enable direct TMCC information and services to the customer (and supported by staff through in-person and telephone). Both portals are recommended to be provided through a TTT vendor inclusive service linked to website and APP developed for the community, including an integrated fare payment service. Additional technology will be secure to enable agencies without advanced technology to enable participation in the TMCC process.
- *Provider Portal.* This portal provides DRT Providers the capability to communicate with one another and is recommended to be provided through vendor technology (to be determined) and locally developed applications.

The following HLSD is written for all members of the SLO County community, project sponsors, and other interested persons in providing a TMCC overview and introduction; design approach, considerations, alternatives, and recommendations; system requirements analysis and allocation; operational scenarios; resources; and other supporting information.

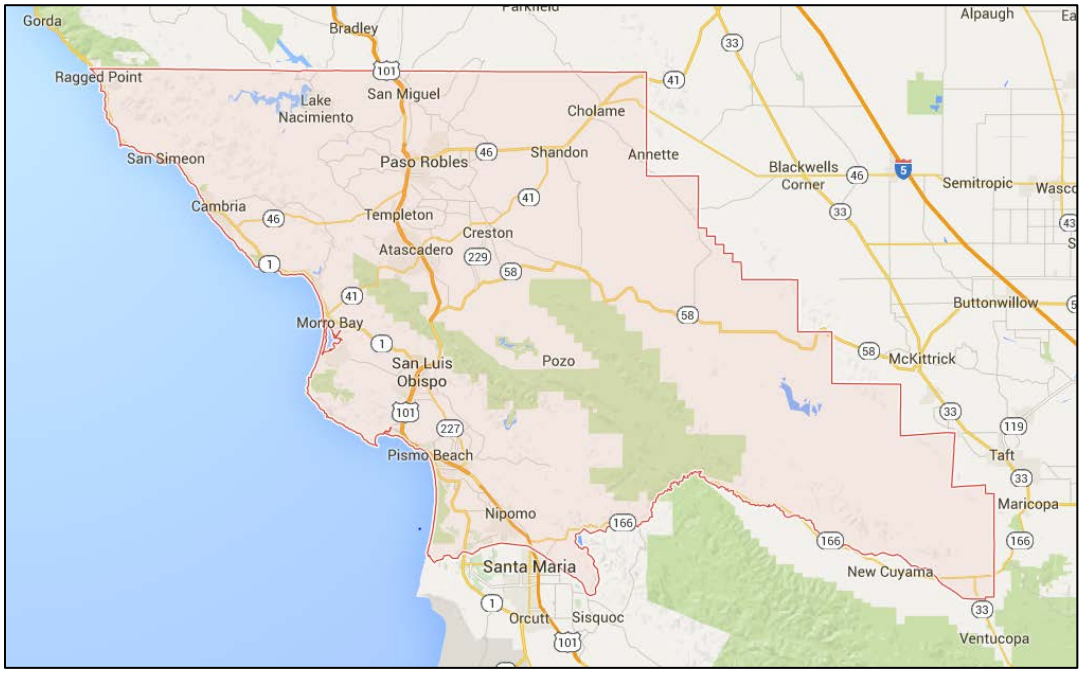
2 Introduction

2.1 Project Overview

The San Luis Obispo County TMCC

In July 2015, Ride-On Transportation was awarded a Federal Transit Administration (FTA) Mobility Services for All Americans (MSAA) Intelligent Transportation Systems (ITS) research grant to design an interoperable, replicable, and scalable Travel Management Coordination Center (TMCC) for San Luis Obispo (SLO) County, CA. See Figure 1 for a map of the TMCC coverage area. The vision of the community-focused TMCC is "To enhance personal mobility across San Luis Obispo County." The goals of the TMCC project are to use technology in (1) providing real-time transportation information and trip scheduling choices for the general public (all persons) through (2) the coordination of public and human service Demand Response Transportation (DRT) providers.

Figure 1. Map of San Luis Obispo County, CA



Courtesy: Google Maps

Since award, the MSAA project has enabled Ride-On, SLO Regional Transit Authority (RTA), SLO Council of Governments (SLOCOG), and other stakeholder partners to leverage the Intelligent Transportation Systems (ITS) Systems Engineering process to further explore coordinating the community's DRT services while providing real-time information and services to the public.

Through this process, Ride-On and local partners have engaged multiple stakeholders to plan and design the TMCC with the community's input and interest at heart. This process has included multiple in-person meetings, discussion, research, shared information, and the utilization of the ITS Systems Engineering process to facilitate and document the project. Since project inception, the MSAA grant has facilitated the creation of a Project Management Plan, Concept of Operations, and System Requirements deliverables to fully document the TMCC.

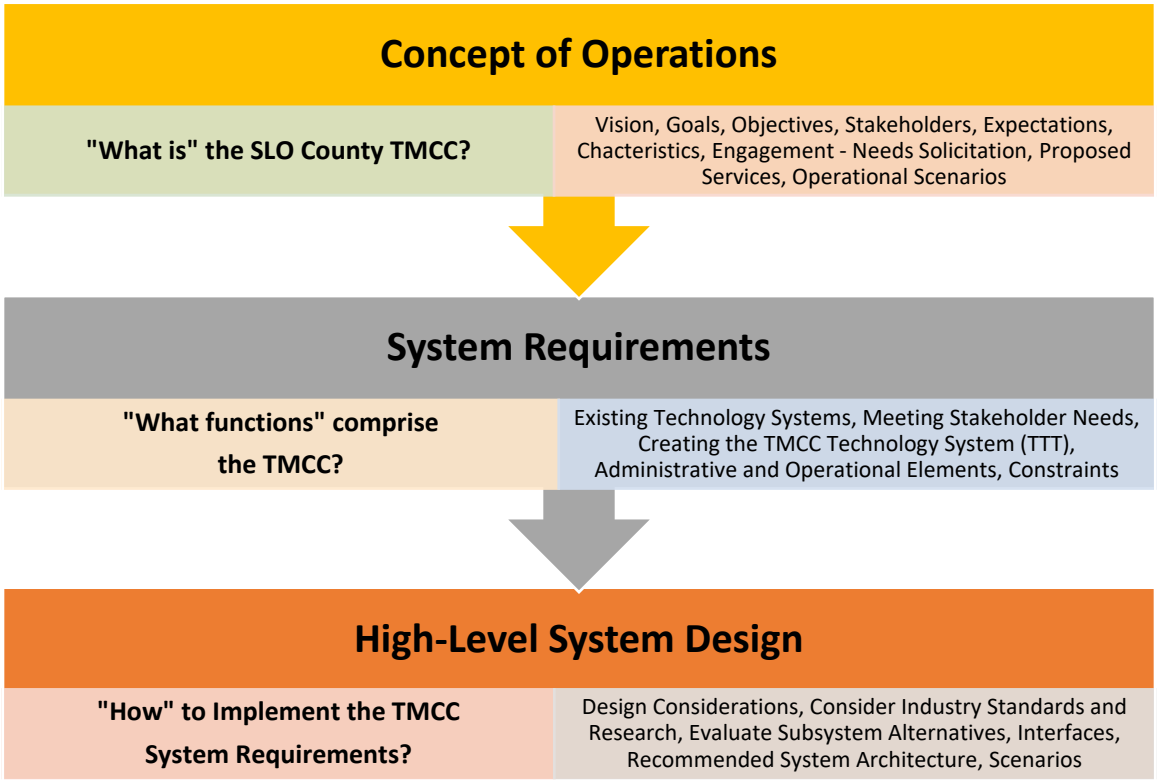
2.2 Purpose of Document

As part of the ITS Systems Engineering process and a required MSAA grant deliverable, the High-Level System Design (HLSD) documents **how** the San Luis Obispo County TMCC's technologies will be implemented to meet the project's system requirements from a high-level perspective. The HLSD is best explained as a "process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of a computer system."[1] Traditionally, Intelligent Transportation Systems (ITS) projects consist of multiple computer systems, communication capabilities, geographic location, and staffing interests. The high-level system design serves as a framework to determine and link these project components.

To document the San Luis Obispo County TMCC High-Level System Design, this text is written for all project stakeholders to enable transparent review and comprehension. The HLSD utilizes information from the Concept of Operations and System Requirements documents to ensure the design is sound. See Figure 2 for an illustration of the HLSD inputs.

(1) Systems Engineering Process for ITS: An Introduction for Transportation Professionals, USDOT/FHWA/FTA, January 2007

Figure 2. High-Level System Design Inputs



Source: Ride-On Transportation/Routematch

The High-Level System Design Document

This High-Level System Design document features the following sections.

- *Section 3.0 - TMCC Overview*
- *Section 4.0 - Design Approach and Considerations*
- *Section 5.0 - TMCC Design Alternatives*
- *Section 6.0 - Recommended TMCC Design*
- *Section 7.0 - Recommended System Architecture*
- *Section 8.0 - Requirements: Analysis & Allocation*
- *Section 9.0 - Operational Scenarios*
- *Section 10.0 - References*
- *Appendices*

3 TMCC Overview

This section provides an overview of the TMCC, including project background, access methods, TMCC Technology Tool (TTT), statement of need, and stakeholder roles and responsibilities.

3.1 Project Background

The San Luis Obispo County MSAA TMCC project focuses on the goals of (1) providing real-time transportation information and trip scheduling choices for the general public (all persons) through (2) the coordination of public and human service Demand Response Transportation (DRT) providers. To meet these goals, Ride-On and the RTA have partnered with DRT providers and stakeholders from across the county and surrounding region to identify needs, create a vision, develop a concept, create requirements, and seek options in developing the TMCC. Through this process, Table 1 illustrates the stakeholders that participated in developing the TMCC.

Table 1. TMCC Stakeholder Groups and Participants

Stakeholder Group (project relationship)	Participant
General Public (customer)	• Individuals • Sponsors (person or organization sponsoring an individual) • Caretakers (person who serves as caretaker for an individual
Human Service Agencies and Community Organizations (customer, information provider, service provider)	• Community Health Centers • CenCal Health (Medi-Cal Program) • SLO County Department of Social Services (DSS) • CapSLO • Tri-Counties Regional Center • SLO County Adult Services Policy Council
DRT Providers (customer, information provider, service provider)	• Ride-On Transportation • RTA (Runabout, Nipomo Dial-A-Ride, Shandon/Templete Dial-A-Ride, and Paso Express Dial-A-Ride) • SLO Safe Ride • Yellow Taxi • Smart Shuttle • Atascadero Dial-A-Ride (DAR) Continued

	• Morro Bay Call-A-Ride • Amdal Transport Services
Fixed Route Transit Providers (customer, information provider, service provider)	• RTA • City of San Luis Obispo Transit (SLO Transit) • City of Morro Bay Transit • South County Transit - SCT (administered by RTA) • Paso Express (directly operated by RTA)
Transportation Information Resource Providers (customer and information provider)	• San Luis Obispo (SLO) Regional Rideshare/511 • 211 – United Way of San Luis Obispo

Transportation Funding Partners
(customer and information provider)
	• San Luis Obispo Council of Governments (SLOCOG)
	• United States Department of Transportation:
	  o Federal Transit Administration (FTA) and MSAA Technical Assistance (TA) Team
	  o Federal Highway Administration (FHWA) – California Division
	• California State Government:
	  o California State Transportation Agency: California Department of Transportation (CalTrans)
	  o California Health and Human Services Agency - affiliated departments

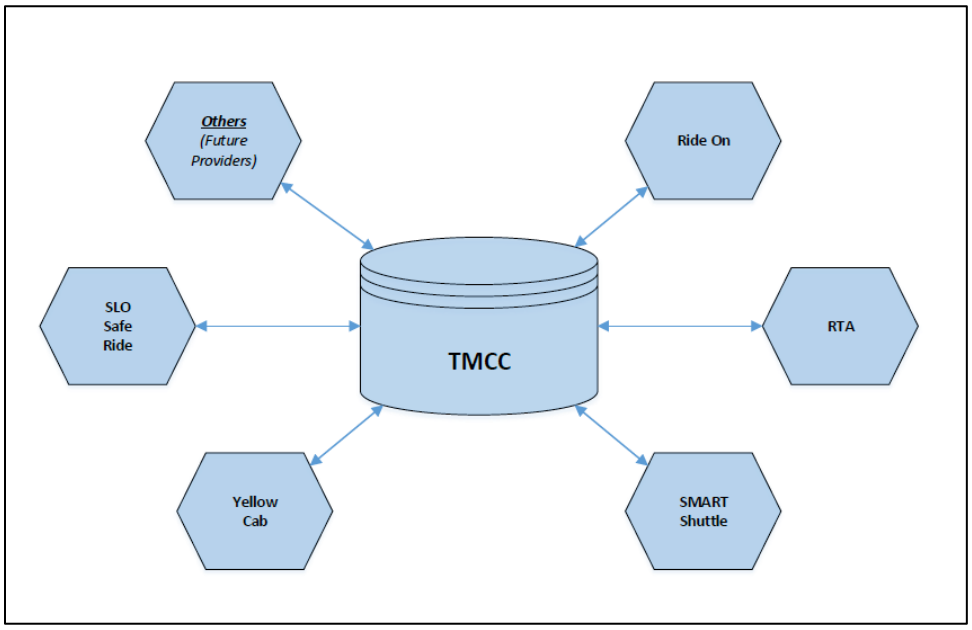
Technology Partners	• Routematch • Bishop Peak Technology • Justin Bradshaw

In developing the TMCC, stakeholders contributed to the Advisory Committee and three subcommittees, including Provider, Technology, and User/Rider, providing valuable feedback into the entire process. The creation of the Concept of Operations and System Requirements deliverables facilitated the necessary steps to engage stakeholders in the creation and design of the TMCC.

As stated in the project's Concept of Operations, stakeholder input and user needs elicitation played a critical role in the development of the community-focused TMCC's core services of providing transportation information and DRT Provider services, while developing detailed methods to access and facilitate these amenities. Additional discussions were also held by the DRT Providers and subcommittees to identify and document the institutional or business requirements necessary to support the TMCC's development. Five initial primary DRT Providers have illustrated their initial interest to participate in the scalable TMCC, including Ride-On, RTA, Yellow Cab, Smart Shuttle, and SLO Safe Ride. Figure 3 illustrates these agencies relationship to the TMCC.

The System Requirements deliverable further illustrated the DRT Providers' existing technology systems and defined the necessary TMCC technology and non-technology requirements to address user needs. Through this process, the TMCC's Access Methods subsystem components were specified in detail as in-person, telephone, website, and mobile application (APP). The TMCC's technology elements were detailed through the newly named TMCC Technology Tool (TTT) subsystem, comprised of three portals, Customer, Staff, and Provider, that facilitate TTT core services, including transportation information, customer entrance, trip reservations and scheduling, trip management, and fare management.

Figure 3. Proposed TMCC DRT Service Providers



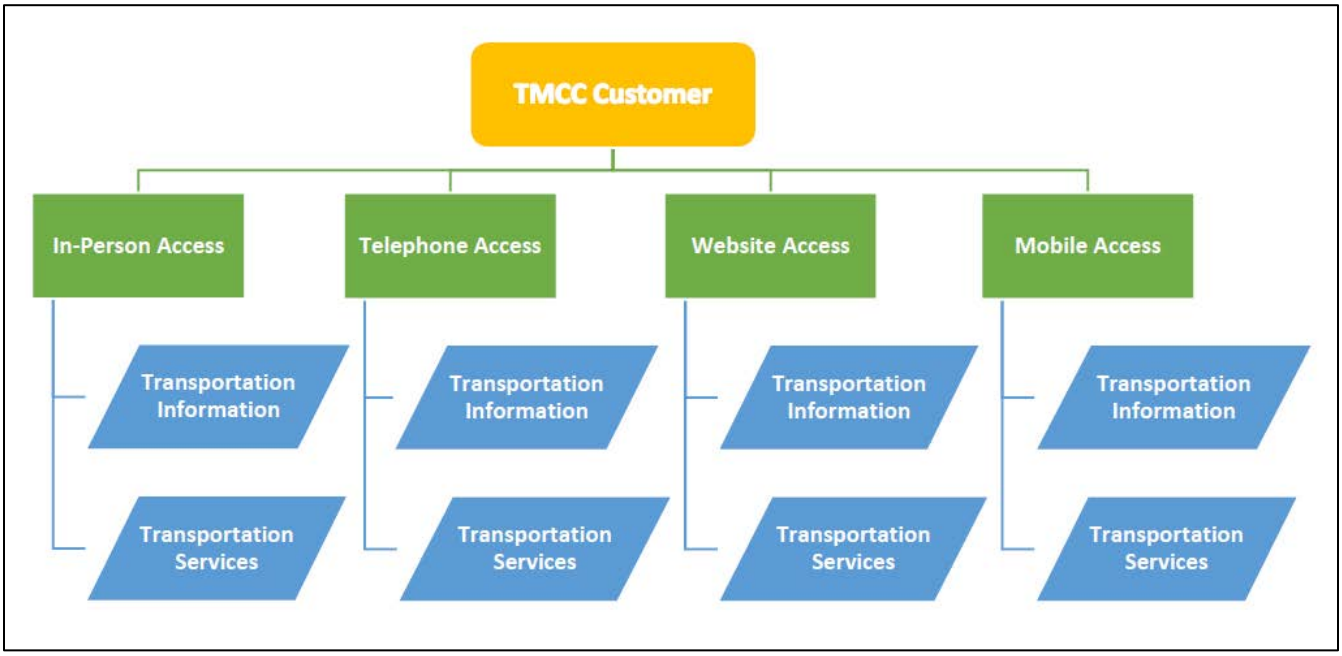
Source: Ride-On Transportation/Routematch

The System Requirements further illustrate DRT Provider's existing technology systems and defined the necessary technology and non-technology requirements to address user needs. Through this process, the TMCC's Access Methods subsystem components were further confirmed as in-person, telephone, website, and mobile application (APP). The TMCC's TTT subsystem components were clarified as the Customer, Staff, and Provider Portals.

3.2 TMCC Access Methods Subsystem

In conducting stakeholder outreach, user needs elicited a clear interest for TMCC customer access to transportation information and services through multiple means. As illustrated in Figure 4, customer access to the TMCC is recommended to be provided through in-person, telephone, website, and mobile APP. The chosen access methods shall also feature the capability for customer communication with staff by text and accessible formats such as TDD/TTY and California Relay at Ride-On and RTA as well. Multiple access methods will ensure that all members of the community receive mobility information and access to services through the most comfortable and convenient means.

Figure 4. Proposed TMCC Customer Access



Source: Ride-On Transportation/Routematch

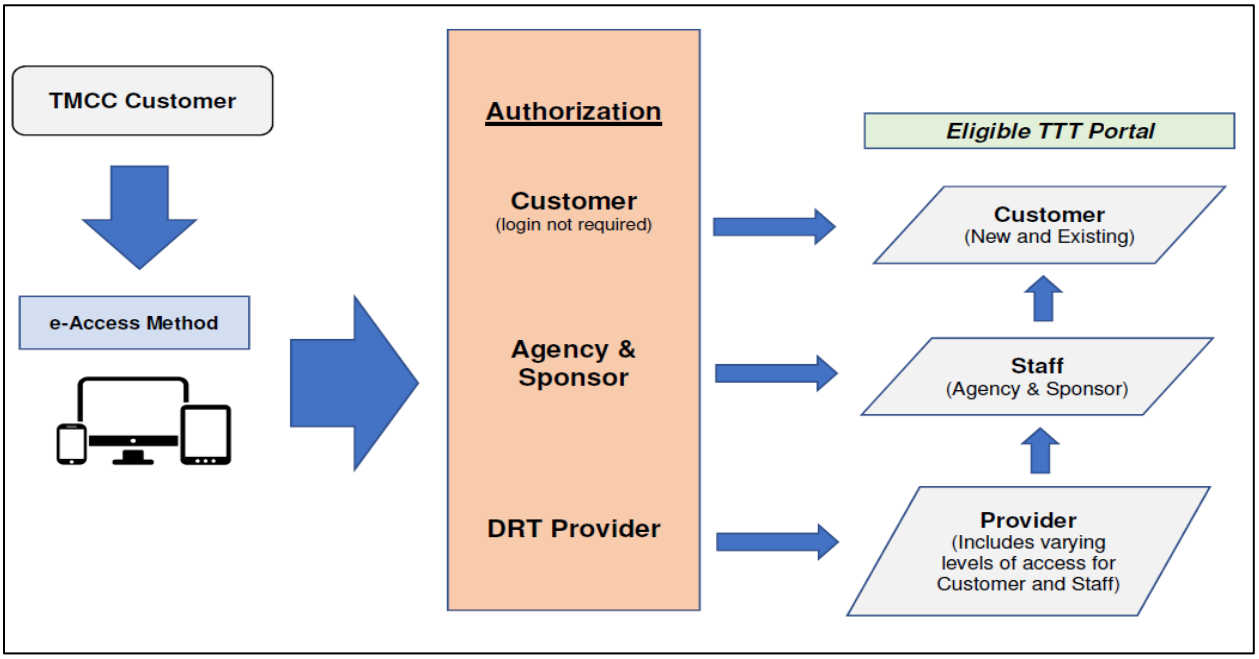
3.3 TMCC Technology Tool (TTT) Subsystem

From fall 2016 through July 2017, the MSAA PMT and Advisory Committee members developed the project's System Requirements document that further specifies the TTT's electronic services provided through three (3) portals, including Customer, Staff, and Provider via website and mobile APP. Access to the portals is based on the following eligibility and user login/authorization credentials (if provided). Figure 5 illustrates the proposed TTT subsystem's portals authorized stakeholder access.

TTT Subsystem Portals – Authorized Stakeholder Access

- Customer Portal: General Public;
- Staff Portal: Stakeholder Agency, Caretaker, Sponsor; and
- Provider Portal: DRT Provider (management and staff)

Figure 5. TTT Subsystem Portals – Authorized Stakeholder Access



Source: Ride-On Transportation/Routematch

Customer and Staff Portals

The TTT subsystem's Customer and Staff Portals components feature many of the same services and technology requirements (listed below) that are based on level of user authorized access. The System Requirements details specific functional input and output conditions that must be met to enable each the Portals' components to operate. Figure 6 provides a high-level illustration of the TTT subsystem's portals' inputs and outputs.

TTT Subsystem: Customer and Staff Portals Components - Overview

- **Transportation Information.** Provides the customer with a link to transportation and other community information.
- **Customer Entrance.** Enables customers with secure TTT user login, user name, password, and profile creation/management and address eligibility with DRT Providers. This component is linked with the Trip Reservations and Scheduling, Trip Management, and Fare Management components.
- **Trip Reservations and Scheduling.** Allows the customer (no login required) to seek fixed route and paratransit trip options by date, time, provider, and cost. The customer must login to select and request a paratransit trip from a participating DRT Provider. Once a trip is requested, the chosen DRT Provider shall confirm the trip specific details with the customer. This component is linked with the Customer Entrance, Trip Management, and Fare Management component.
- **Trip Management**. Provides the customer with the capability to manage their scheduled trips and monitor "day-of" service provision (time of arrival, view spatial map, monitor while enroute). This component is linked with the Customer Entrance, Trip Reservations and Scheduling, and Fare Management component.
- **Fare Management Subsystem**. Affords scalable options in trip payment, including account management services, direct provider payment, integrated payment (select trip and pay for ride in advance), provide payment to provider, reporting, and existing local fare payment system integration capability. This component is linked with the Customer Entrance, Trip Reservations and Scheduling, and Trip Management component.

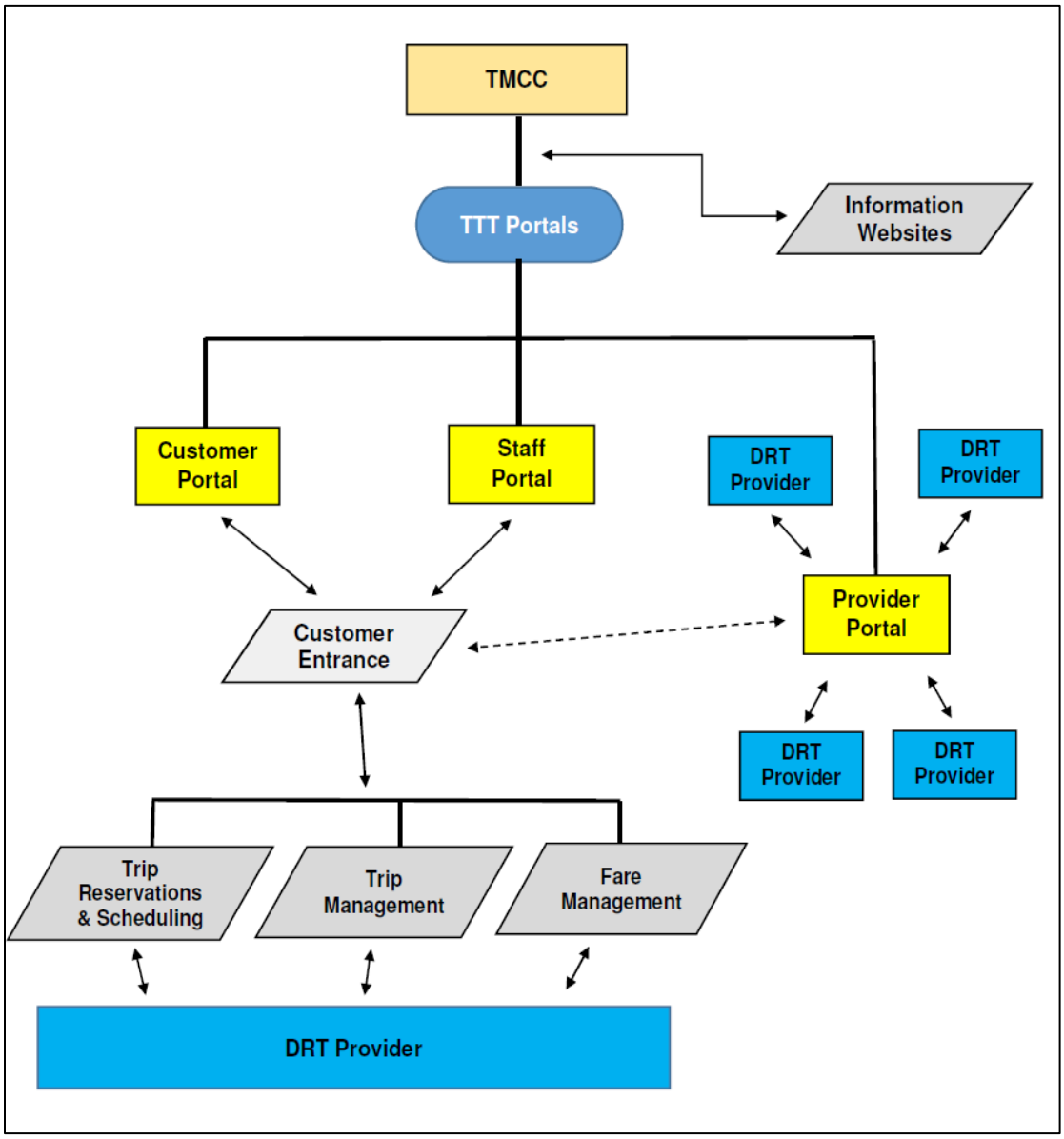
Provider Portal

The Provider Portal serves as a true "business to business" online and mobile tool allowing the TMCC's participating DRT Providers to communicate electronically with one another enabling the following services. Eligible Provider Portal users are also proposed to access Staff Portal components as well. For additional information, the project's System Requirements details the specific input and output conditions that must be met to enable these subsystems to operate. Figure 6 provides a high-level illustration of the TTT portals' relationship to subsystem inputs and outputs.

TTT Subsystem: Provider Portal Component Services - Overview

- **Electronic Chat.** Enables DRT Provider staff with the capability to communicate with other DRT Provider partners.
- **Driver Section**. This component enables DRT Provider drivers receiving TTT trips to have "read-only" access to view the customer's trip information.
- **Schedulers Section**. Schedule and manage customer trip requests made through the TTT and direct to the DRT Provider, monitor/view customer trips made through the TTT, coordinate inter-agency trips between participating DRT Providers, and seek "day-of" service customer ride information.
- **Management Section**. Use of all Driver and Schedulers Sections along with billing and reporting components for management review and oversight of the DRT Provider's services.
- **Trip Verification and Reporting**. Addresses DRT Providers having the capability to insert limited post-trip information (manual/electronic) into the Provider Portal for any necessary invoicing or reporting purposes.

Figure 6. TTT Portals - Subsystem Component Functional Input/Outputs



Source: Ride-On Transportation/Routematch

3.4 Statement of Need

As discussed and documented in the project's Concept of Operations, the proposed SLO County TMCC and TTT services have been developed based on stakeholder feedback since project commencement in December 2015 and public outreach/needs elicitation in spring 2016. To meet stakeholder needs received in 2016, the TMCC's Access Methods and TTT Subsystems were discussed in detail by the project's PMT and Advisory Committee, including three subcommittees, and documented in the project's System Requirements.

3.5 Stakeholders – Roles and Responsibilities

The SLO County MSAA project has benefitted from many committed stakeholder partners who have contributed a tremendous amount of time, resources, and input into designing the TMCC, including the general public, human service & community organizations, DRT Providers, fixed route transit providers, transportation information resource provider, technology partner, and transportation funding partners. For a detailed list of stakeholder groups participating in the project, see Table 1. The following section provides a brief overview of proposed stakeholder group roles, responsibilities, and concerns related to the development of the TMCC and TTT.

3.5.1 Roles and Proposed Responsibilities

3.5.1.1 General Public Group.

This group comprises the end user, individual, or customer of all TMCC services. The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods**. The general public shall be able to access the TMCC for information and services through In-person, Telephone, Website, and Mobile APP either directly or through staff.

3.5.1.2 Human Service Agencies/Community Organizations Group.

This group is comprised of organizations and individuals serving either a human service client or an individual (as a sponsor or group caretaker). The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** Due to their client focus, human service agencies and community organizations have the capability of serving as partnering TMCC In-Person and Telephone locations to provide information and services to persons who seek personal assistance during regular business hours.

- **TTT Connectivity.**
  - Information. Human service agency and community organization websites are proposed to be linked to the

TTT as information resources and provide customer services.

- Staff Portal. All interested agencies/organizations are proposed to be trained on the use of the TTT's Staff Portal to manage a client and/or sponsored person's transportation.

3.5.1.3 DRT Provider Group.

The DRT Provider is a critical component to ensure TMCC transportation service provision is available and met. Five (5) DRT Providers have shown initial interest in becoming a TMCC DRT Provider, including Ride-On, RTA, SLO Safe Ride, Yellow Cab, and Smart Shuttle. Atascadero Dial-A-Ride, Morro Bay Dial-A-Ride, and Amdal Transport Services also expressed interest in becoming potential DRT Providers for the TMCC. Detailed information on each provider is available in the System Requirements. The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** Ride-On and RTA currently provide TMCC In-Person services to customers during regular business hours. Each existing DRT Provider has the capability to provide TMCC Telephone services through a live Customer Service Representative (CSR) during regular business hours. Ride-On and RTA also provide TDD/TTY, California Relay, and Spanish language assistance. These services are proposed to be maintained with call transfer capability between DRT Providers. After business hours TMCC Telephone access through a "live" CSR is potentially available through Yellow Cab. Prior to implementation, additional DRT Provider Partner discussion on the topic is necessary.

- **TTT Connectivity.** The TMCC and its technology component, TTT, are being developed with scalability in mind. The TTT is being designed to enable existing and new DRT Providers to participate in the system. DRT Providers utilizing ITS, including CASD and mobile technologies for real-time vehicle information, shall be capable of direct connection to the TTT from their CASD system through an Application Programming Interface (API). DRT Providers that are interested in participating

in the TTT and do not use CASD/mobile technologies shall be capable of working through an existing direct TMCC DRT Provider Partner (similar to a subcontractor) to participate.

3.5.1.4 Fixed Route Transit Provider Group.

SLO County's fixed route transit agencies include RTA and SLO Transit. These organizations provide valuable transit services in the City of San Luis Obispo, regionally, and to other urban and rural areas of the county. The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** Given their current public facilities, RTA has the capability of providing TMCC In-Person and Telephone customer information and services during regular business hours.

- **TTT Connectivity.** The RTA and SLO Transit have invested in ITS to manage their services, including providing passengers with fixed route trip planning services and real-time bus arrival information. As a component of the TTT's Reservations and Scheduling subsystem's input and output requirements, the System Requirements recommends providing fixed route and paratransit travel options to the customer.

3.5.1.5 Transportation Information Resource Provider Group.

The region's transportation information resource provider group includes SLOCOG/Regional Rideshare's 511 program and the United Way of San Luis Obispo's 211 program.

As the county's mobility management agency, Regional Rideshare provides transportation information and referral services to individuals through the 511 telephone and online (https://rideshare.org/511-trip-planning/) trip planning systems. Regional Rideshare also provides senior transportation options through their "Know How to Go!" program. (https://rideshare.org/program/knowhowtogo/)

The United Way of SLO County provides 211 human service information and referral services through "live" 24 hour/day CSR's located in Ventura, CA, (serving multiple counties) and

a supporting website to provide community information, including transportation services, for persons in San Luis Obispo County. (http://www.unitedwayslo.org/search-2-1-1-slo-county) The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** As a current provider of staffed in-person and telephone transportation information, Regional Rideshare has the capability of serving as a partnering TMCC In-Person and Telephone location during regular business hours. Through its 511 telephone service, Regional Rideshare currently makes available recorded telephone information via automated telephone system when staff is either unavailable or after business hours. Goal is to increase access to live CSR for personal assistance.

  In addition, as a 24 hour/day "live" staffed call center, 211 currently provides human service information and referral services. 211 has the capability of serving as TMCC Telephone resource for calls during the business day and afterhours.

- **TTT Connectivity.**
  - **Information.** Transportation information resource provider websites are proposed to be linked to the TTT as information resources. The TMCC Advisory Committee has suggested the 511 website be leveraged for the TMCC. Additional discussion to be provided in later sections of this document.

  - **Staff Portal.** Regional Rideshare, 211, and other stakeholder agency staff are proposed to be trained on the use of the TTT's Staff Portal in providing customer assistance for TMCC transportation information and services. Stakeholder agency staff will be able to login to the customer's profile with authorized access from the customer to assist in scheduling trips, managing existing reservations, and payment methods.

3.5.1.6 Technology Partner Group.

The technology partner group comprises either DRT Provider CASD and mobile technology solutions or other partners engaged the TMCC process, including Routematch, Bishop Peak Technology, ShiftPlanning, IT Curves, and LimoAnywhere. Ride-On and RTA utilize Routematch, SLO Safe Ride uses ShiftPlanning, Yellow Cab utilizes IT Curves, and Smart Shuttle uses LimoAnywhere. Bishop Peak Technology is a local passenger information partner with SLO Transit. The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** The technology partner group is envisioned to supply the DRT Providers' CASD and mobile system data to the TTT, serving as the system's backbone.
- **TTT Connectivity.**

  Customers and staff shall access the technology partners systems as managed by DRT Provider staff through the TTT's website and mobile APP interfaces. In the background, API's between the TTT and DRT Provider technologies will need to be created to allow both to share data or "speak the same language."

3.5.1.7 Transportation Funding Partner Group.

The transportation funding group consists of the TMCC project's key funding partners, including the United States Department of Transportation/Federal Transit Administration and Federal Highway Administration, California Department of Transportation (CalTrans), California Health and Human Services Agency and affiliated departments (i.e. Medi-Cal), SLOCOG, and other partners. The transportation funding partners provide vital financial resources in support of the region's public and human service transportation. The following are proposed TMCC Access Methods and TTT Subsystems connectivity responsibilities.

Proposed Responsibilities

- **TMCC Access Methods.** Depending on the agency, such as SLOCOG's Regional Rideshare, transportation funding partners may have the capability of serving as TMCC In-Person and Telephone locations to provide information and services.

- **TTT Connectivity.**
  - Information. Agency websites are proposed to be linked to the TTT as information resources.
  - Staff Portal. Interested agencies are proposed to be trained on the use of the TTT's Staff Portal to manage a client and/or sponsored person's transportation.

4 Design Approach and Considerations

This section provides an overview of the TMCC and TTT's high-level system design approach, including goals and guidelines, design process, design assumptions, constraints and risks, and alignment with the National and Regional ITS Architecture.

4.1 Goals and Guidelines

Building on the work completed during the project's Concept of Operations and System Requirements, the Project Management Team (PMT) sought to ensure the TMCC's following overall goals and objectives were met through the High-Level System Design (HLSD). As a guide to the design process, all HLSD subtasks outlined in the Project Management Plan were reviewed prior to commencement to ensure the PMT addressed all elements of the deliverable.

TMCC Goals and Objectives

- **Goal 1: Make available real-time DRT Provider information and services to the public.**
  - Objective: Provide real-time DRT Provider service information to the public.
  - Objective: Provide 90% of all demand response trips requested through the TMCC.
  - Objective: Provide access to the TMCC through in-person, telephone, website, and mobile Application (APP).

- **Goal 2: Coordinate public and human service DRT.**
  - Objective: Coordinate services between three or more DRT Providers.
  - Objective: Create operational agreements between DRT Providers.
  - Objective: Determine a standard technology interface that could be used to coordinate TMCC scheduling functions.

4.2 Design Process

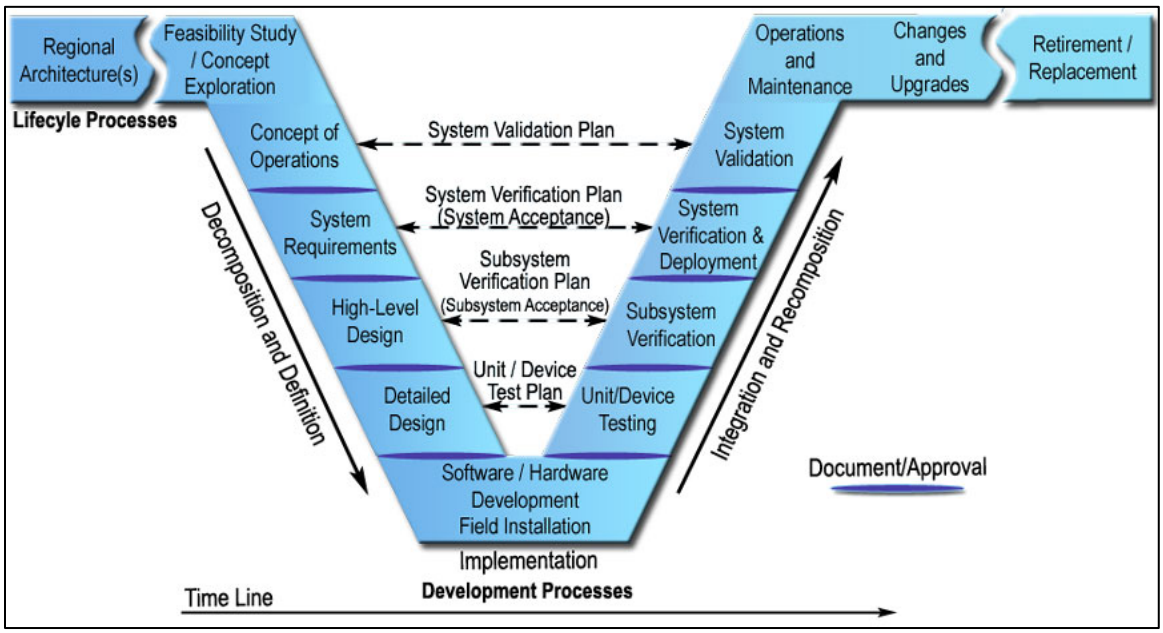
The TTT design process sought to incorporate all Project Management Plan tasks, identify all related industry research, and evaluate current in-field technology to conduct a thorough analysis and assessment for decisions related to the TMCC. Through this design process, the existing TMCC project deliverables enabled systems research, engaging stakeholders in the process, and conducting public outreach. The following steps were taken in designing the TTT.

4.2.1 MSAA Deliverables Resources

The TMCC project has been developed based on the ITS Systems Engineering process. Figure 7 provides an illustration of this process.

Through project's progression, the creation of the HLSD is predicated on prior tasks and information collected in the project's Concept of Operations and System Requirements. These documents provide a foundation of information for the project to build on, including goals/objectives/vision, customer needs elicitation and analysis, existing local technology conditions, potential constraints, assumptions, TTT Portals, methods to access, and project requirements.

Figure 7. USDOT/FHWA ITS Systems Engineering "V" Diagram



Source: USDOT/FHWA

4.2.2 Systems Research

In determining the best path forward to design the TMCC, the PMT started with a process of researching existing and new information on TMCC-related projects. This extensive outreach process included the thorough collection of all related national research, a review of existing and planned technology projects, conducting extensive market research, continued critical stakeholder engagement, and conducting public outreach.

4.2.2.1 National Documentation

Extensive research was conducted by the PMT to identify useful practices and documentation in the design of the

TMCC and TTT. The following is a sample of resources leveraged in conducting this research. For a full list of references, see Section 10.

- USDOT:
  - FTA - MSAA Project Team resources
  - FHWA - ITS Knowledge Resources and
  - FTA MSAA Projects - Monthly Project Management Meetings
  - FTA MSAA Projects
  - FTA Mobility on Demand Initiative
- Noblis Corporation
- Transit Cooperative Research Program
- Transportation Research Board
- CalTrans
- American Public Transit Association
- Community Transportation Association of America
  - 2017 Expo Project Presentation, Detroit, MI – June 13-15
- California Association for Coordinated Transportation
  - 2017 Spring Conference, Expo, and Project Presentation – April 26-27
  - 2017 Fall Conference and Expo – November 1-3
- Local Stakeholder Resources
- Vendor Documentation
- Ride Connection (Portland) – Kevin Chambers
- Online Research (Google, YouTube, etc.)
- Other

4.2.2.2 Existing/Planned Technology Systems

To better understand the technology landscape in which the TMCC was being designed, extensive outreach was conducted by the PMT to many local, federal, state, and industry partners to identify information to benefit the development of the HLSD. The following is an overview of outreach conducted from June through December 2017.

4.2.2.2.1 Local Stakeholder Research

4.2.2.2.1.1 SLOCOG

- Rideshare/511. Discussed vision for 511 system and future development.
- Regional ITS Architecture. See Section 4.4.

4.2.2.2.1.2 DRT Providers. No new ITS changes were reported outside existing systems previously reported.

4.2.2.2.1.3 Technology Subcommittee. Met on August 31 and discussed different technology systems available on the market today, including interfaces and programming language.

4.2.2.2.2 Government-Sponsored Research

4.2.2.2.2.1 FTA ITS Research Projects

- MSAA. Project information has been shared with and between the FTA and three (3) peer local MSAA sites across the US (Boulder, CO; Madison, WI; and Atlanta, GA) sites to benefit from each other's experiences. The Via Mobility/Northwest Denver MSAA Project is utilizing "Clearinghouse" open source code to serve as an interface between two vendors' CASD systems to share trip data between Via and the Denver Regional Transit District.
- Mobility on Demand (MOD) Sandbox Initiative. In 2016, FTA awarded eleven (11) projects across the United States (US) with innovative MOD Sandbox initiative projects. The projects were diverse in scope with the Valley Metro, Phoenix, AZ, seeking to provide community mobility alternatives through a single mobile APP. MOD Sandbox projects are expected to be complete in 2018.

4.2.2.2.2.2 CalTrans. Shared a PMT request for information with members of the American Association of State Highway Transportation Officials' (AASHTO) Multi-State Technical Assistance Program (MTAP). The MTAP alert was sent to state Departments of Transportation (DOT) across the United States.

4.2.2.2.2.3 TCRP Research. Multiple TCRP reports were reviewed in development of the HLSD. TCRP Report G-16, Development of Transactional Data Specifications for Demand-Responsive Transportation, expected in 2018, is anticipated to develop a sample paratransit CASD API and consider data transaction security measures among its research. The PMT will review the release of this report for potential use in future TMCC implementation.

4.2.2.2.3 Market/Industry Research

4.2.2.2.3.1 Ride Connection. Kevin Chambers, IT Director, Ride Connection, provided the Technology Subcommittee with information on their "Clearinghouse" open source system and its use in the Portland area for paratransit data transmission.

4.2.2.2.3.2 Trade Associations. As referenced in Section 4.2.2.1, the PMT sought available industry information and research through APTA, CTAA, and CalACT. Presentations on the MSAA project were provided at the 2017 CalACT Spring Conference, 2017 CTAA Conference and Expo, and 2017 CTAA Fall Conference and Expo. Session attendees were invited to share experiences and referrals. The PMT also attended the vendor expos at these events and the 2017 CalACT Fall Conference to research current industry practice. Abbreviated copies of the TTT's System Requirements were provided for feedback.

4.2.2.2.3.3 Industry Outreach. From June through December 2017, Ride-On Transportation contacted many industry members across the country to determine the state of the practice – related to TMCC similar technologies. Respondents were provided copies of the abbreviated TTT System Requirements and invited to present their technologies before the TMCC Advisory Committee (TMCCAC). Routematch and Cambridge Systematics provided on-site and online presentations. Appendix B provides a full listing of industry members contacted in preparing this deliverable.

4.2.3 Stakeholder Engagement

A core component of the TMCC project was maintaining communication with project stakeholders and sharing research learned in developing the TMCC. Through this process, the TMCCAC met in June, August, and October receiving status updates, research collected to date, and industry presentations from interested vendors. The project's Technology Advisory Committee has also maintained an active advisory role in the project meeting in August 2017 to discuss industry technology and relation to the TTT's System Requirements.

4.2.4 Public Outreach

As a follow-up to initial public outreach held in spring 2016, members of the PMT met with various local community stakeholders throughout the HLSD development to discuss the status of the project and review the conceptual System Requirements. Ride-On staff also presented on the project at the September 1, 2017, meeting of the SLO County Adult Services Policy Council (see the Concept of Operations for list of members), met with members of stakeholder human service agencies, maintained project updates on the TMCC website, and created a podcast on the topic.

4.3 Design Assumptions

The SLO County MSAA project design is based on the following assumptions.

4.3.1 TMCC Access Methods

- **In-Person**.
  - TMCC DRT Providers and other stakeholders will provide in-person service access during business hours.
- **Telephone**.
  - TMCC DRT Providers and other stakeholders will host online telephone (including live CSR) access.
  - An after-hours telephone service shall be provided.
- **Website**.
  - Hosting. The TMCC website will be hosted at an existing stakeholder location or on through the cloud.
  - Design/Administration/Support. The TMCC website will be managed by an existing stakeholder (i.e. Rideshare/511 website).
- **Mobile APP**.
  - Hosting. The TMCC mobile APP will be hosted either through a vendor or a stakeholder cloud location.
  - Design/Administration/Support. The TMCC mobile APP will be designed and supported either through vendor APP or new, locally developed APP. Administrative oversight will remain with the TMCC lead agency (administrator).

4.3.2 TMCC Services – TTT

- **Information.**
  - Source. Project stakeholders, such as 511/SLOCOG, DRT Provider, or other stakeholders will serve as the project's information resources.

- Linkages. Information will be made available to the TMCC website and mobile APP by linking participating stakeholder websites.

- **Customer, Staff and Provider Portals.**
  - TTT Operation. The TTT shall operate in centralized and decentralized manners enabling multiple providers to participate in the system.
  - Administrator/Lead Agency. A current stakeholder shall serve as TMCC administrator and lead agency.
  - TTT Services Provision. Two or more DRT Providers shall provide services for the TMCC.
  - DRT Provider Technology. Current DRT Provider CASD and GPS-enabled mobile technologies are necessary to support TMCC/TTT services and operation.
  - DRP Providers – No CASD or Mobile Technology. DRT Providers interested in participating in the TMCC without CASD and mobile technologies may serve as a subcontractor to DRT Provider with supporting technology to connect one another.
  - DRT Provider Real-Time Service Information. For service accuracy, the TTT system is dependent on real-time (i.e. 30 seconds) DRT Provider vehicle location information through their CASD system.
  - DRT Provider Technology Compatibility. DRT Providers shall maintain CASD technology compatible with TTT requirements to ensure interface communication.
  - DRT Providers will institute inter-agency agreements along with policies and procedures as referenced in System Requirements, Section 4.

4.3.3 Constraints and Risks.

The TMCC's Concept of Operations documented stakeholder (customer) constraint comments that were received as part of the needs assessment process from March through May 2016. Through the Systems Requirements process, the stakeholder constraints were refined to address potential impacts on TMCC and TTT's design. Table 2 highlights potential administrative, operational, and technology constraints and risks.

Table 2. Potential TMCC-TTT Design Constraints and Risks

Potential Constraint	Potential Risk
• Inter-agency agreement process, including cost-sharing arrangements for the operation of the TMCC, marketing plan, and training.	• Incomplete agreements between DRT Providers. • Lack of core TMCC business components.
• Development of cost/benefits for all proposed TMCC High-Level Design alternatives.	• Inconclusive assessment of potential TMCC alternatives.
• TMCC implementation funding and sustainability.	• Inability to fully fund and/or sustain TMCC components.
• DRT Provider service funding and sustainability.	• Inability to sustain DRT provider operations as core to TMCC service provision.
• Stakeholder continued engagement and participation.	• Lack of stakeholder interest in project.
• Community awareness of the TMCC.	• TMCC not fully marketed to entire community.
• Lack of adequate staff training on the TMCC system.	• Lack of full use and adoption by staff. • Poor customer service.
• Approval from DRT Provider Boards (if applicable).	• Inability to implement project and DRT Provider participation.
• Labor rules.	• DRT Provider participation in TMCC.
• DRT Provider service/vehicle availability.	• DRT Provider capacity and TMCC customer reliability.
• Decentralized dispatching and call centers	• DRT Provider staff miscommunication. • Poor customer service.
• County geography - access to services in all portions of the county.	• Complete countywide geographic coverage.
• DRT Provider staffing.	• Lack of training on TMCC system and processes.
• Technology System complexity.	• Lack of stakeholder acceptance and adoption.
• Technology System accessibility and availability.	• Technology developed for those with access to the Internet and Smart Phones.
• Chosen technology system design.	• Does not meet stakeholder needs. • Cost sustainability.

Potential Constraint	Potential Risk
	• Technology feasibility. • Ongoing staffing support needs.
• Technical support/upgrades.	• Cost sustainability. • Lack of support and ongoing upgrades. • Staff support needs.

4.4 Alignment with National/Regional ITS Architectures

As discussed in the Concept of Operations, the regional ITS architecture comprises local transportation technology projects for all modes and "provides region-level information that can be used and expanded in project development."[2] As the designated urban Metropolitan Planning Organization (MPO), SLOCOG oversees the development, management, and maintenance of the region's ITS architecture plan. The MSAA PMT has maintained ongoing communication with SLOCOG planning staff since initial discussion in March 2016. In speaking with SLOCOG in summer 2017, the PMT understands the region is soon due for an update to the ITS Architecture. SLOCOG staff indicated there are no other paratransit ITS deployments in the county that are not already addressed in the TMCC documentation and there are no competing designs to the TMCC. SLOCOG also indicated that when the TMCC design is finalized, it will be incorporated into the next revision of the ITS Architecture.

(2) Systems Engineering Process for ITS: An Introduction for Transportation Professionals, USDOT/FHWA/FTA, January 2007

5 TMCC Design Alternatives

This section considers the design alternatives for the TMCC's Access Methods and TTT Subsystems.

5.1 Overview

As discussed in Section 4, the PMT and TMCC Advisory Committee & Subcommittees were actively engaged in market research, evaluation, review of private sector product demonstration, literary search, and receipt of peer knowledge transfer in developing the TMCC Access Methods and TTT Portals Subsystems' alternatives for evaluation. This section outlines the alternatives and considerations made in developing each subsystem and corresponding component.

5.2 TMCC Access Methods Subsystem - Components

5.2.1 In-Person

Since the Concept of Operations phase of the project, stakeholders including DRT Providers, Fixed Route Providers, 511/Rideshare, and human service agencies, have continued to envision their serving as in-person access resources for the TMCC and TTT. Authorized stakeholder agency staff are proposed to provide information and TTT services. Therefore, with this preference, there were no alternatives developed and analyzed for this subsystem component.

5.2.2 Telephone

Similar to the in-person access subsystem component, the TMCC's telephone access methods propose to leverage existing community telephone service resources, including DRT Providers, 511, 211 CA Relay, TDD/TTY connections to Ride-On and RTA, and human service stakeholders. The Advisory Committee has also proposed a future TMCC toll-free number contacting the lead agency be discussed and after business hours live CSR call services be made available by call forward to existing resources. Therefore, with this preference, no alternatives were evaluated for this subsystem component.

5.2.3 Website

The TMCC's proposed website is considered a gateway to the project's information and services. The PMT and TMCCAC discussed, evaluated, and considered several ideas over the course of the project. The following are alternatives considered and evaluated for the website component.

5.2.3.1 Alternative 1: 511/Rideshare Website for TMCC

This alternative seeks to address the Advisory Committee's interest to leverage SLOCOG's 511/Rideshare website for the TMCC's information and services. As a developed community resource, the 511 website features many travel services, including transit journey planning and CalTrans highway cameras, along with the "Know How to Go!" online guide for community transportation information and resources.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** TMCC stakeholder agency, existing community resource, travel options listed on website and "Know How to Go!" resource, branded and marketed throughout the community, experienced and committed staff support, counterpart to 511 telephone system, capability to link to TMCC stakeholder information and TTT Subsystem services, and seeks to meet elicited TMCC customer needs.
- **Challenges:** Sustainable funding to update, host, and maintain the 511 website to meet recommended TTT Subsystem requirements.
- **Cost:** The estimated cost to modify the 511 website to accommodate the recommended TMCC components is $500-$1,000.

5.2.3.2 Alternative 2: Create a New TMCC Website

This alternative seeks to address the development, hosting, branding, domain name, and all other elements associated with creating a new website for the TMCC and associated TTT services – consistent with the System Requirements. This alternative was developed with the lack of a current partner website being available for use with the TMCC.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** New TMCC website created consistent with System Requirements, capability to link to TMCC stakeholder information and TTT Subsystem services, and seeks to meet elicited TMCC customer needs.
- **Challenges:** Lack of unknown brand, new marketing needs, and sustainable funding to update and host.
- **Cost:** Based on market feedback, the estimated cost to create and maintain a new TMCC website is $1,000 - $15,000 with an annual hosting and maintenance cost of $50 - $500 per year. Cost estimates vary based on website creation and annual management either by stakeholder staff or consulting services.

5.2.3.3 Alternative 3: Utilize Open Source Vendor Website

This alternative addresses the use of an OS vendor's created website as the TMCC and associated TTT services – consistent with the System Requirements. This alternative serves as an extension of a TTT Subsystem - Customer and Staff Portals alternative leveraging the use of OS software by a private sector vendor to develop these components of the TTT. Through industry research, the OS vendor's website for the TMCC may either be linked from an existing community stakeholder website or a serve as a standalone service.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Flexibility to be linked from an existing website, branded as an existing website (i.e. 511), or serve as a new website, created consistent with System Requirements, maintained by either local stakeholder or vendor staff, capability to link to TMCC stakeholder information and TTT Subsystem services, and seeks to meet elicited TMCC customer needs.
- **Challenges:** Potential for standalone website's lack of unknown brand, new marketing needs, and sustainable funding to update and host.
- **Cost:** Based on market feedback, the estimated cost is incorporated into the expense for Alternative 2 in Section 5.3.2.

5.2.4 Mobile APP

The TMCC's Mobile APP is proposed to serve as convenient, portable access to the project's TTT information and services. In evaluating alternatives for the mobile APP, the PMT and TMCCAC discussed, evaluated, and considered several ideas throughout the project. The following are alternatives considered and evaluated for the mobile APP component of this project.

5.2.4.1 Alternative 1: Utilize COTS Vendor Mobile APP

In researching TTT service alternatives, the availability of COTS technology consistent with the TMCC's System Requirements was an area of focus for the PMT. Through exploration, Ride-On and the PMT identified COTS solutions for the TTT's Customer and Staff Portals that also leverage an existing true mobile APP for its services provided and branded under the local transportation service provider's name. Research has shown there are mobile APP's in development and near implementation.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Built on a true mobile platform, branded under the local entity's name (i.e. TMCC, etc.), inclusive service incorporating TTT System Requirements for Customer & Staff Portals, Fare Management, and reporting, maintained by vendor staff, capability to link to TMCC stakeholder information, COTS application, and seeks to meet elicited TMCC customer needs.
- **Challenges:** New marketing of mobile APP required, sustainable funding for initial procurement, and ongoing support and maintenance.
- **Cost:** Based on market feedback, the estimated cost for this alternative is incorporated into the expense for Alternative 1 in Section 5.3.2.

5.2.4.2 Alternative 2: Create a new Mobile APP

This alternative seeks to address the development, hosting, branding, and all other elements associated with developing a new mobile APP for the TMCC and associated TTT services – consistent with the System Requirements. Based on research, the true mobile APP may be developed either by

local stakeholder or consultant staff and has the capability to interface with recommended TTT services.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Individually built with the TMCC brand and System Requirements, capability to link to TMCC stakeholder information and TTT Subsystem services, and seeks to meet elicited TMCC customer needs.
- **Challenges:** Local development and ongoing maintenance for mobile APP, staff time vs. consultant development, new marketing needs, ongoing support, and sustainable funding to update and host.
- **Cost:** The estimated cost to create and maintain a new TMCC website is $2,000 - $15,000 with an annual hosting and maintenance cost of $50 - $2,000 per year. Cost estimates vary based on APP creation and annual support either from stakeholder staff or consulting services.

5.2.4.3 Alternative 3: Develop an OS/Vendor Mobile APP

This alternative considers the cost to develop a mobile APP through the TTT Subsystem's OS vendor alternative. Based on research, this alternative proposes the TMCC mobile APP be facilitated through the OS vendor as part of an overall OS project.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Individually built with the TMCC brand and System Requirements, capability to link to TMCC stakeholder information and TTT Subsystem services, and seeks to meet elicited TMCC customer needs.
- **Challenges:** Local development and ongoing maintenance for mobile APP, staff time vs. consultant development, new marketing needs, ongoing support, and sustainable funding to update and host.
- **Cost:** Based on market feedback, the estimated initial cost for this alternative is $75,000 - $100,000 with an annual minimum hosting and maintenance cost of $14,000 per year.

5.3 TTT Subsystem - Components

The following are alternatives developed for the TTT Subsystem's components, including Information and Customer, Staff, and Provider Portals, which are proposed to be accessed through the TMCC website and mobile APP.

5.3.1 Transportation Information

Customer interest to access centralized community transportation information has been a known stakeholder need since elicited in the Concept of Operations. As further defined in the System Requirements, transportation information, including DRT provider, fixed route provider, human service agency, other transportation & mobility organizations, safety & security, 511, 211, and multimodal trip planning information shall be provided by electronic links from the TMCC. To facilitate this process, the TMCCAC has long envisioned the TMCC's website and mobile APP's being proposed to facilitate these online resource links. Therefore, with this preference, there were no alternatives developed and analyzed for this subsystem component.

5.3.2 Customer and Staff Portals

The Customer Portal components provide user authorized "front-end" or direct stakeholder access via website or mobile APP to the TTT's services, including Customer Entrance (profile), Trip Reservations and Scheduling, Trip Management, and Fare Management.

The Staff Portal provides authorized stakeholder staff and customer caretakers with direct access to specific elements of the Customer Portal's web and mobile APP-based functions to provide direct customer service (via In-Person and Telephone Access Methods) and allow customer caretakers the ability to manage services for their loved ones.

As addressed in Section 4, the Customer and Provider Portals' input and out requirements are very similarly addressed in the System Requirements, with a primary exception being based on user authentication and capability of access. In considering both Portals requirements together, the PMT, TMCCAC, and Technology Subcommittee developed and evaluated the following alternatives based on the extensive market research (discussed in Section 4) from June through November 2017 by Ride-On Transportation.

5.3.2.1 Alternative 1: Commercial Off-The-Shelf (COTS) – Vendor Inclusive

This alternative features the use of COTS technologies developed by private sector vendors who have either created and are developing similar technologies to as illustrated in the Customer and Staff Portals requirements. This alternative also features the COTS Vendor Inclusive concept in which the proposed technology features the components of both portals' requirements in a single package. The featured technology is owned, licensed, supported, maintained, and hosted by the vendor. For additional detail, Table 3 further investigates the technical, support & maintenance, access methods, cost implications, and capabilities to meet the System Requirements.

5.3.2.2 Alternative 2: Open Source (OS) - OS/Vendor Managed

Alternative two features the use of vendor managed OS technologies in meeting the Customer and Staff Portals requirements. In general, OS software is developed and updated by a "community" of developers and shared in a central online location for use by anyone. In this alternative, the OS software is licensed by the OS community and supported, maintained, and hosted by the vendor. A separate fare management component would need to be interfaced with the OS technologies and the vendor's website could be branded as an existing website (i.e. 511), For additional detail, Table 3 further investigates the technical, support & maintenance, access methods, cost implications, and capabilities to meet the System Requirements.

5.3.2.3 Alternative 3: Open Source (OS) – Coalition of Transportation Providers Managed/Hosted

Alternative three features the concept of a coalition of transportation providers utilizing OS technologies in meeting the Customer and Staff Portals requirements. In this alternative, transportation providers are proposed to utilize the OS technology under license from the OS community and locally support, maintained, and host the technology. A separate fare management component would need to be interfaced with the OS technologies. For additional detail, Table 3 further investigates the technical, support & maintenance, access methods, cost implications, and capabilities to meet the System Requirements.

Table 3. TTT Customer and Staff Portals Alternatives

Item	Alternative 1: Commercial Off-The-Shelf (COTS) – Vendor Inclusive	Alternative 2: Open Source (OS) – Vendor Managed	Alternative 3: Open Source (OS) – Coalition of Transportation Providers Managed / Hosted
Overview	Developed, supported, and maintained by private sector vendor. Incorporates primary requirements into one solution. Requires local staff administrator oversight and management along with support from DRT Providers.	Open Source software developed and shared publicly by "community" with support and maintenance by vendor. Integration with Fare Management system required. Requires local staff administrator oversight and management along with support from DRT Providers.	Open Source software utilized by a coalition of transportation providers (in development) with TTT System development, support, and maintenance by coalition staff. Integration with Fare Management system required. Requires local staff administrator oversight and management along with support from DRT Providers.
Software Platform	Varies by vendor	Ruby/Rails	Ruby/Rails
Hardware Required	None – software and database is Cloud Hosted.	None – software and database is Cloud Hosted.	Software and database may be hosted on Local Server or Cloud.
Interfaces	Individually built (where needed) between COTS technology and DRT Partner.	Select interfaces built by vendor with DRT systems. Individually built (as needed) between TTT and DRT Partner.	Individually built (as needed) between TTT and DRT Partner.
Support	Provided by vendor with support from lead local staff.	Options – (1) may be provided by vendor with lead Local staff support. (2) Provided solely by Local staff.	Provided by Coalition staff or alternate.
Maintenance	Provided by vendor with support from lead local staff.	Options – (1) may be provided by Vendor with lead Local staff support. (2) Provided solely by Local staff.	Provided by Coalition staff or alternate.
Licensing Requirements	Varies by vendor.	Varies by OS developer and vendor.	Varies by OS developer.
Website Access	Capable to meet. Links from TMCC website and serves as backbone of system.	Capable to meet. Provides optional branded website and serves as backbone of system.	Capable to meet. May either develop new website or link to TTT System from another website.

Item	Alternative 1: Commercial Off-The-Shelf (COTS) – Vendor Inclusive	Alternative 2: Open Source (OS) – Vendor Managed	Alternative 3: Open Source (OS) – Coalition of Transportation Providers Managed / Hosted
Mobile APP Access	Capable to meet. Vendor branded, serves as the TMCC APP and backend for TTT system.	Capable to meet. Must be developed.	Capable to meet. Must be developed.
Three-Year Total Cost Elements Considered	(1) Capital: Technology – Licensing; configuration; hosting; integration with DRT Provider CASD technology; integrated fare payment system; mobile app; link for website; branding; implementation services; hosting; annual support & maintenance; and technology to connect DRT providers without ITS. (2) Administrative: TMCC Administrator cost; DRT Provider Staff support cost.	((1) Capital: OS Vendor configuration; hosting; integration with DRT Provider CASD and fare payment systems; link or direct website; branding; implementation services; hosting; and annual support & maintenance. Separate fare management vendor. Separate Technology to connect DRT providers without ITS. Develop mobile APP. (2) Other - TMCC Administrator cost; DRT Provider Staff support cost.	(1) Technology – Local OS software configuration; hosting; integration with DRT Provider CASD and fare payment systems; link or direct website; branding; implementation services; hosting; and annual support & maintenance. Separate fare management vendor. Separate Technology to connect DRT providers without ITS. Develop mobile APP. (2) Other - TMCC Administrator cost; DRT Provider Staff support cost.
Three-Year Total Cost (estimate)	$214,560 - $354,560 (estimate)	$397,560 - $417,560 (estimate)	Unknown
TTT Subsystems System Requirement Components – Capability to Meet			
Information	Linked via TMCC Website or Mobile APP (with links to local partner sites).	Linked via TMCC Website or Mobile APP (with links to local partner sites).	Linked via TMCC Website or Mobile APP (with links to local partner sites).
Customer Entrance (profile)	Capable to meet.	Capable to meet.	Capable to meet.
Trip Reservations & Scheduling	Capable to meet.	Capable to meet.	Capable to meet.
Trip Management	Capable to meet.	Capable to meet.	Capable to meet.
Fare Management	Integration and non-integration capability currently available.	Integration not currently on market. Requires separate fare system and integration.	Integration not currently available. Requires separate fare system and integration.
Reporting	Capable to meet.	Capable to meet.	Capable to meet.

Source: Ride-On Transportation - Market research conducted from July - December 2017.

5.3.3 Provider Portal

The Provider Portal components propose enabling a secured business to business (B2B) communication tool that allows the partnering DRT Provider staff to manage the "back-end" business functions of the TMCC between one another, such as customer trip communication, driver schedule views, inter-agency trip coordination, trip confirmation and status, emergencies, and reporting. The Provider Portal envisions staff access via website or mobile APP to this TTT Subsystem components for the Driver, Scheduler, Manager, and administrator.

In researching possible alternatives to evaluate and consider in meeting the Provider Portal's requirements, the PMT consulted research collected, market information, and sought peer knowledge transfer from FTA and Ride Connection, Portland, OR. In review of this information, it was determined there was not an existing technology solution on the market that met the Provider Portal's requirements. The Provider Portal will also require TMCC administrator and DRT Provider staff oversight to ensure daily operational success. Therefore, the PMT considered the following alternatives.

5.3.3.1 Alternative 1: Locally Developed (OS) and COTS Hybrid

This alternative addresses the concept of utilizing existing COTS technologies and creating a locally developed solution as the Provider Portal. This alternative proposes utilization of COTS technology to communicate customer trips between DRT Providers, leveraging existing market technology for staff instant messaging, and use of Clearinghouse technology for local development use in creating the Provider Portal.

The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Utilize existing COTS technology to commence DRT Provider customer trip sharing, capability to leverage and expand existing Clearinghouse technology for local development of the Provider Portal, build consistent with System Requirements, and seeks to meet elicited TMCC stakeholder needs.
- **Challenges:** Local development, hosting, support, and ongoing maintenance, status of base OS technology, and sustainable funding to offset cost.

- **Cost:** Based on market feedback, the estimated initial cost for this alternative ranges from $18,800 - $74,560 per year depending on chosen technology solutions implemented. The cost factors include the use of COTS technology ($18,800) and estimated local TMCC administrator development time ($56,160) using OS software to create the Provider Portal consistent with the System Requirements.

5.3.3.2 Alternative 2: Prepare Request for Information (RFI)

This alternative addresses the concept of creating an RFI to formally investigate market interests and anticipated costs in developing the Provider Portal. The following are potential benefits, challenges, and estimated cost for this alternative.

- **Benefits:** Formally understand the existing technology marketspace, seek industry feedback on how to develop the Provider Portal, receive potential cost estimates, and seeks to meet elicited TMCC stakeholder needs.
- **Challenges:** RFI process, market information review, time for process, and identify sustainable funding to offset estimated cost feedback.
- **Cost:** Staff time to prepare and review RFI/responses along with developing potential action plan post review.

6 Recommended TMCC Design

This section provides the recommended TMCC design for administration and Access and TTT Subsystems components.

6.1 Overview

Through many diverse stakeholder involvement meetings, the SLO County TMCC has been created with the customer in mind. Through the system development process, multiple stakeholder meetings were held to create a system that was designed to address all customer needs in the system's overall design. The TMCCAC and subcommittees have provided engaged stakeholder involvement to ensure the customer's interests were met. The PMT provided core project management and development in working with all interested stakeholders and the TMCCAC to design the overall system.

The evaluation of the TMCC's Access and TTT Subsystems components included PMT staff and TMCCAC review of each alternative to determine the current best course of action for the MSAA project from the administrative, operations, technology, and financial perspectives. Stakeholder needs were reviewed to ensure the alternatives met needs elicited in seeking to make the best selection for a TMCC. The following is the recommended TMCC High-Level System Design.

6.2 TMCC Administration

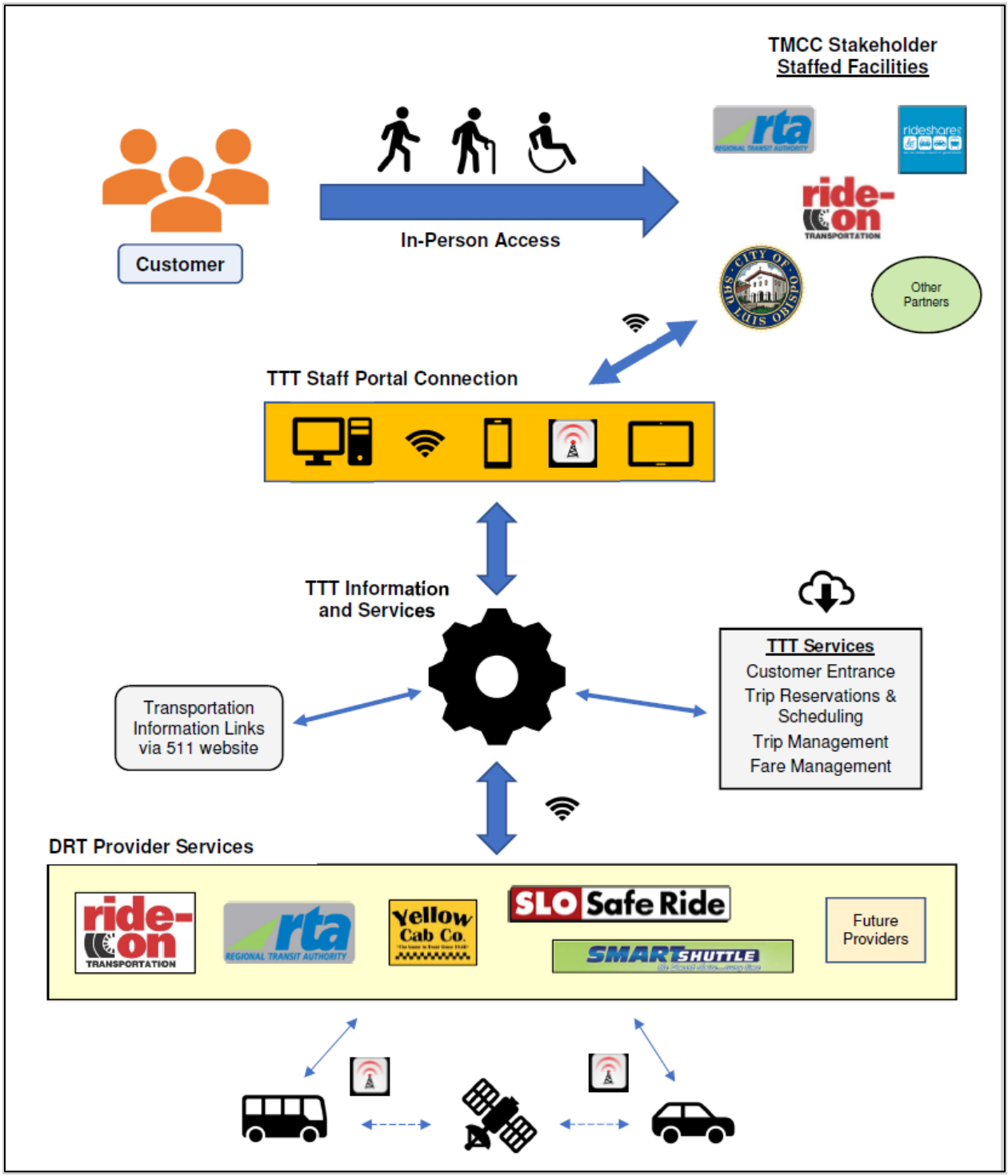
It is recommended the TMCC lead agency employ a part-time administrator to manage the TTT Subsystems in partnership with existing lead staff contacts located at each DRT Provider (5 agencies). The estimated new administrator total cost is estimated $15,600 per year (or $46,800 for three years) and existing DRT Provider staff time total cost associated with TMCC functions is estimated at $3,120 per year (or $9,360 for three years).

6.3 Access Methods Subsystem - Components

6.3.1 In-Person

TMCC stakeholders including DRT Providers, Fixed Route Providers, 511/Rideshare, and human service agencies are recommended to serve as in-person access resources for the TMCC and TTT. During regular business hours, authorized stakeholder agency staff are proposed to provide customers with community transportation information and TTT services utilizing the TTT Staff Portal. Additional in-person service provision protocols shall be developed by the partners consistent with those addressed in System Requirements, Section 4. Figure 8 illustrates the recommended TMCC In-Person Access Method Subsystem.

Figure 8. Recommended TMCC In-Person Access Method Subsystem



Source: Ride-On Transportation/Routematch

6.3.2 Telephone

The TMCC's recommended telephone access methods leverage existing community telephone service resources, including DRT Providers, 511, 211 CA Relay, TDD/TTY (connections to Ride-On and RTA), and human service stakeholders. Additional TMCC contact is encouraged through a new toll-free number that is proposed to contact CSR's at the project's lead agency. For after-hours customer calls seeking to reach a live CSR, call forwarding services are encouraged to be made available using stakeholder call-forwarding technology to an accepting DRT Provider partner.

Additional telephone service protocols shall be developed by the stakeholder partners consistent with those addressed in System Requirements, Section 4. Figure 9 illustrates the recommended TMCC Telephone Access Method Subsystem.

6.3.3 Website

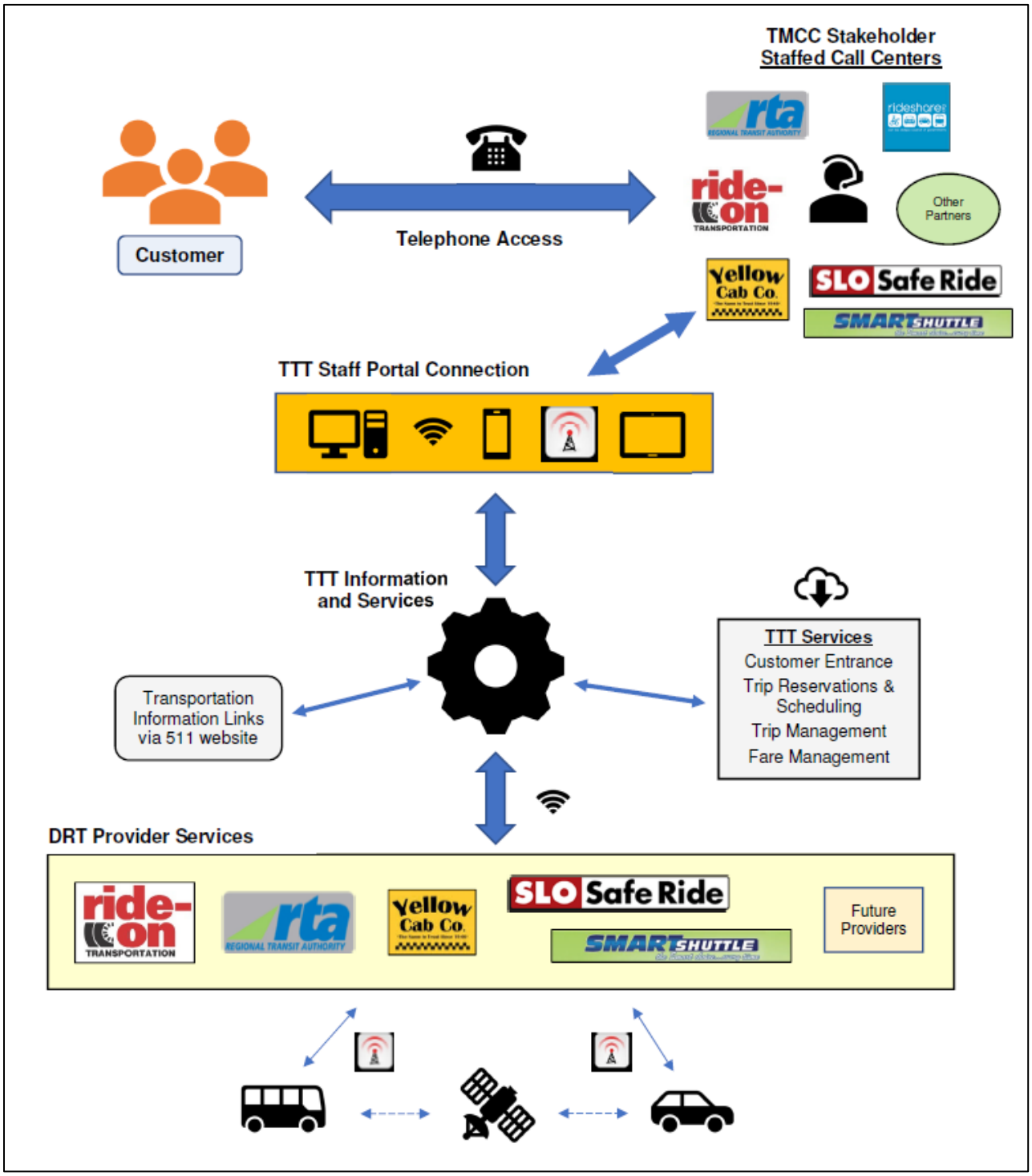
6.3.3.1 Recommended Alternative: 511/Rideshare Website for TMCC

As an existing and developed community resource, the 511/Rideshare website features many travel services, including transit journey planning and CalTrans highway cameras, along with the Know How to Go! guide for community transportation information and resources.

With this level of community experience and engagement, it is recommended the 511/Rideshare website be leveraged as the TMCC's website while incorporating community transportation information and TTT Subsystem components as illustrated in the System Requirements. Figure 10 illustrates the recommended TMCC Website Access Method Subsystem.

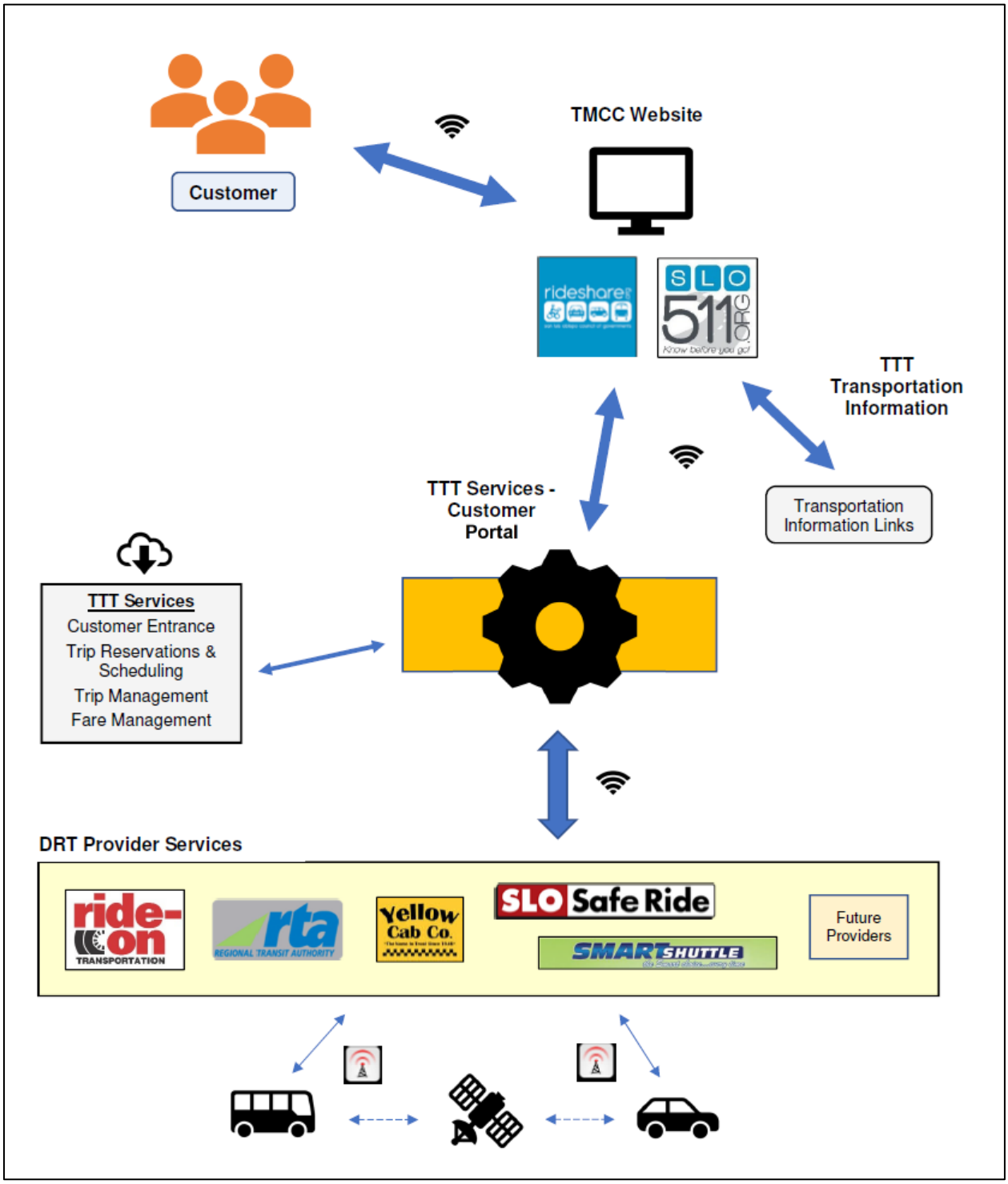
The estimated cost to modify the 511 website to accommodate the recommended TMCC components is $500-$1,000.

Figure 9. Recommended TMCC Telephone Access Method Subsystem



Source: Ride-On Transportation/Routematch

Figure 10. Recommended TMCC Website Access Method Subsystem



Source: Ride-On Transportation/Routematch

6.3.4 Mobile APP

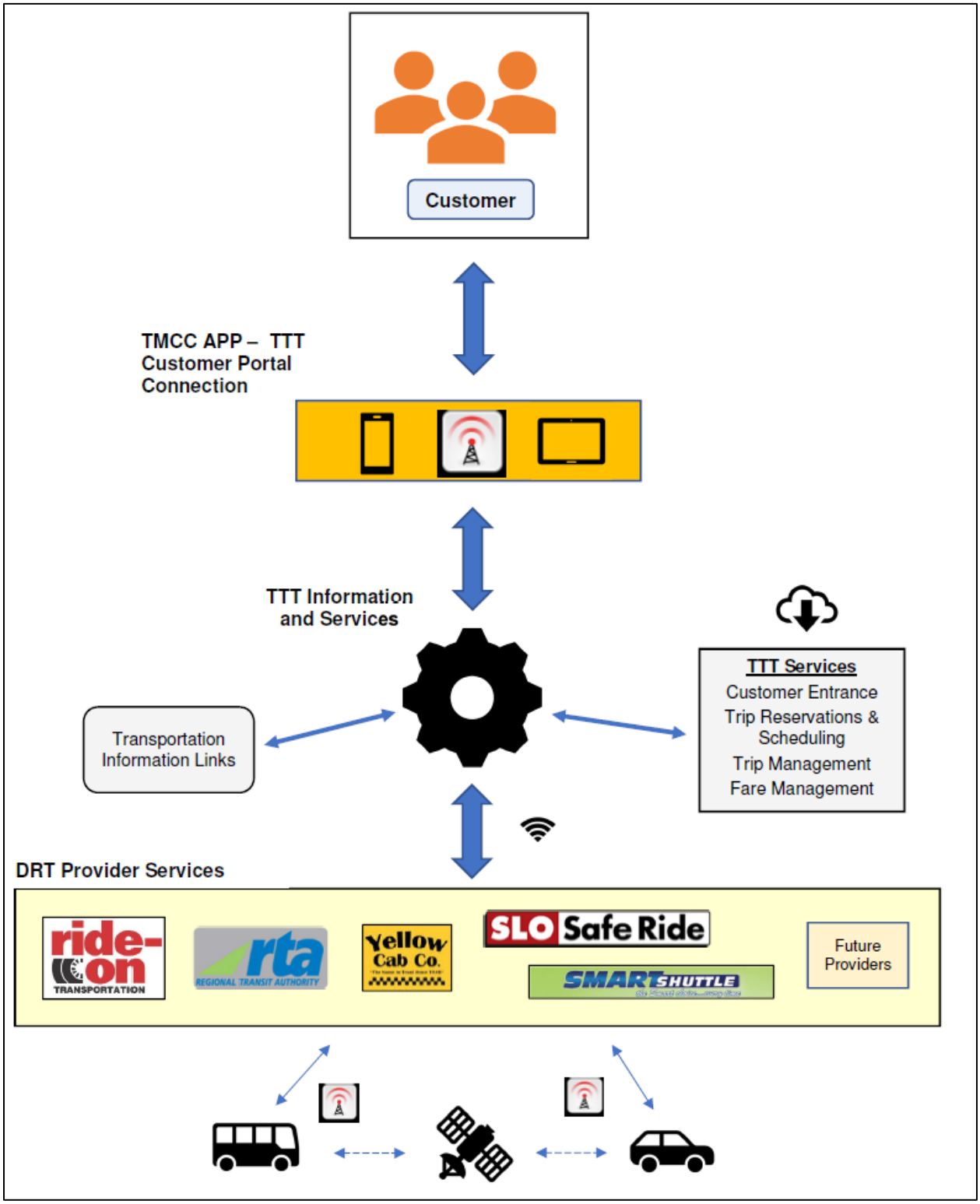
6.3.4.1 Recommended Alternative: Utilize COTS Vendor Mobile APP

As part of the TTT Subsystems components alternatives development process, COTS solutions were identified that also provide an existing true mobile APP for services while branded under the local transportation organization's name (see Section 6.3.2.1). In considering this alternative, the TMCCAC evaluated the solution with a COTS interest, the mobile APP being developed on a true mobile platform, local branding capability (i.e. TMCC, etc.), and its availability on the major "APP" stores.

In review of the recommended alternative's estimated costs, the TTT Subsystem components are proposed to be included into the total expense for Alternative 1, as referenced in Section 5.3.2. It is also recommended that a true 511 mobile APP be considered for creation in Phase 2 of the project's implementation at an estimated cost of $10,000. The TTT Subsystem mobile APP elements are proposed to be incorporated into the 511 mobile APP should it be developed in Phase 2.

Therefore, it is recommended the TMCC utilize a new 511 mobile APP (to be considered in Phase 2) that will also incorporate the TTT Subsystem's COTS vendor inclusive platform in Phase 3. Should the 511 mobile APP not be considered in Phase 2, it may either be considered in Phase 3 or the TTT Subsystem COTS vendor inclusive platform may be leveraged as the TMCC's mobile APP. Figure 11 illustrates the recommended TMCC Mobile APP Access Method Subsystem.

Figure 11. Recommended TMCC Mobile APP Access Method Subsystem



Source: Ride-On Transportation/Routematch

6.4 TTT Subsystem Components

The TTT Subsystem consists of components including Transportation Information and Customer, Staff and Provider Portals. Figure 12 provides an illustration of the recommended TTT Subsystem components and interactions. The following subsection provides an overview of the subsystem's recommended components configuration.

6.4.1 Transportation Information

As further defined in Section 3 of the System Requirements, transportation information, including DRT provider, fixed route provider, human service agency, other transportation & mobility organizations, safety & security, 511, 211, and multimodal trip planning information are recommended to be provided by electronic links. To facilitate this process, the TMCC's website and mobile APP's are recommended to facilitate online links to the community's transportation resources.

6.4.2 Customer and Staff Portals

6.4.2.1 Recommended Alternative: Commercial Off-The-Shelf (COTS) – Vendor Inclusive

The recommended alternative features the use of COTS Vendor Inclusive technologies as developed by private sector businesses that have either created or are developing similar technologies to those illustrated in the System Requirements. Alternative 1 was considered over Alternative 2 due to cost, technical elements, and its inclusive nature meeting the TTT's requirements; and Alternative 3, requiring committed local staff resources, was considered not feasible at this time.

This recommended alternative utilizes the COTS Vendor Inclusive technology concept which features existing elements of the Customer and Staff portals' requirements while incorporating fare management, reporting, and mobile APP technologies into a single package. A weblink between the COTS technology system and Rideshare/511 website shall facilitate customer access to TTT online services. The featured technology is proposed to be owned, licensed, supported, maintained, updated, and hosted by the vendor. Interfaces with four DRT Providers technologies are included with the proposed system. See Table 3, Alternative 1, for additional information.

The proposed three-year inclusive total cost is $158,400 - $298,400, which includes vendor COTS technology;

interfaces; annual hosting, support, and maintenance; and additional COTS technology to share trips with non-TMCC DRT Providers. See Figure 13 for an illustration of the recommended TTT Customer and Staff Portals Subsystems.

6.4.3 Provider Portal

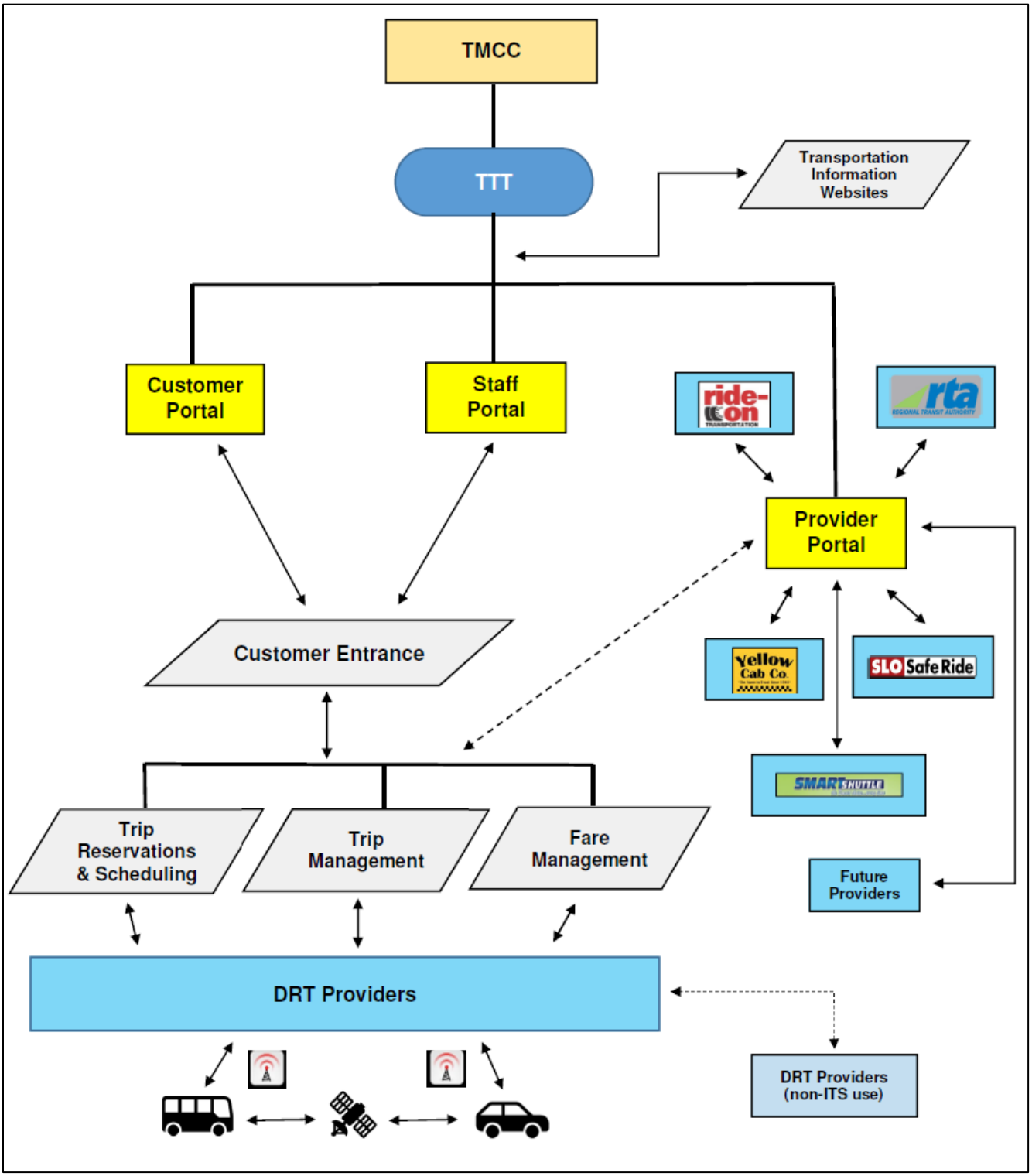
6.4.3.1 Recommended Alternative: Locally Developed (OS) and COTS Hybrid

The recommended Provider Portal alternative addresses a hybrid concept of utilizing existing COTS technologies and creating a locally developed solution. Due to the lack of existing COTS technology comprehensively meeting the Provider Portal's requirements, the recommended alternative proposes utilization of COTS technology to communicate customer trips between DRT Providers, leveraging existing market technology for DRT Provider staff instant messaging, and use of OS Clearinghouse technology for local development use in meeting the Provider Portal's requirements.

This preferred option does require local (or contracted) development, hosting, support, and ongoing maintenance of the Clearinghouse technologies. The Technology Subcommittee encouraged the Provider Portal be developed in the latest code and referenced use of OS technologies in Ruby/Rails code is considered dated (from a technology perspective).

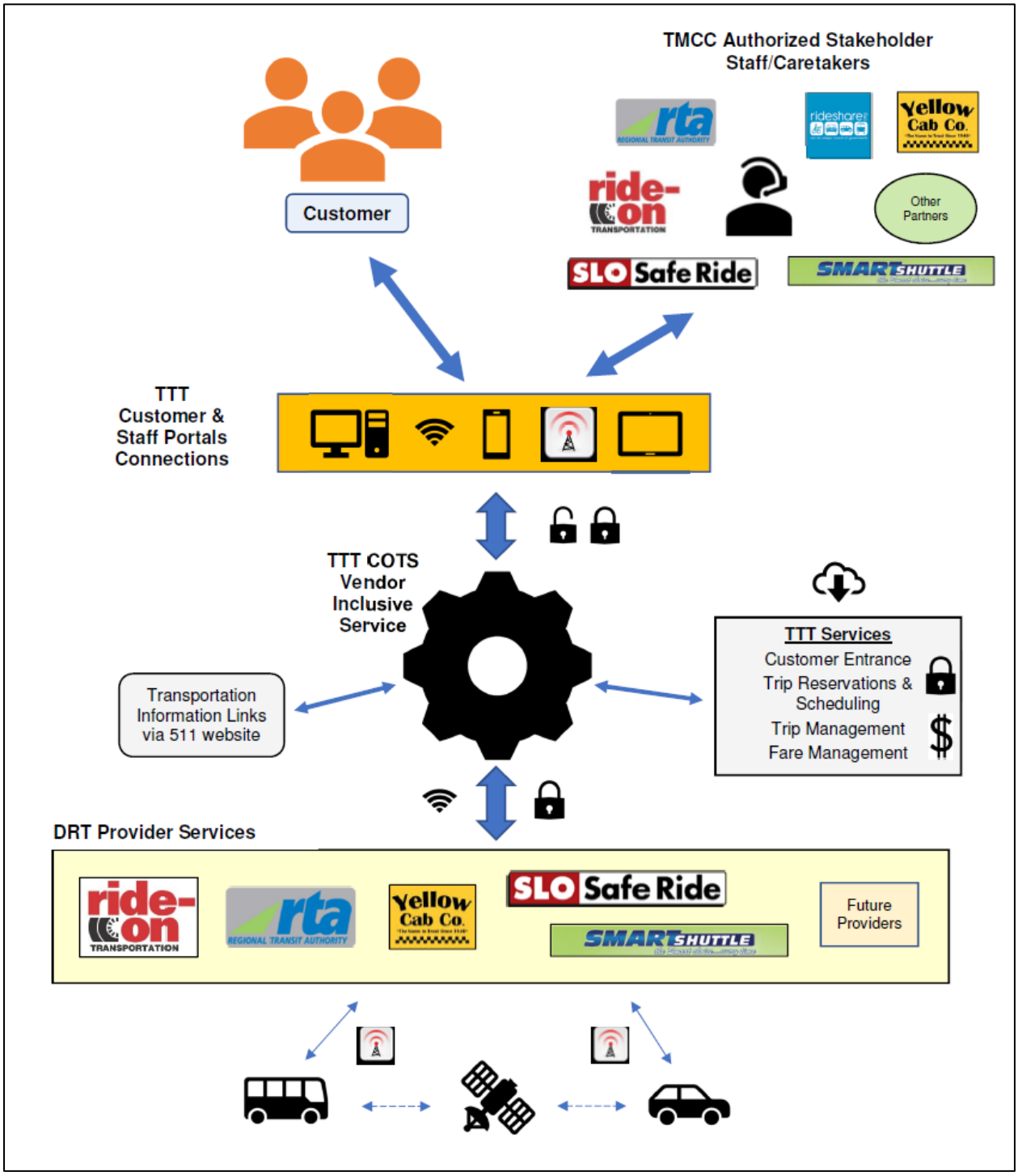
Based on market feedback, the estimated initial cost for the preferred option ranges from $18,800 - $74,560 per year depending on chosen technology solutions implemented. The cost factors include the use of COTS technology ($18,800) and estimated local TMCC administrator development time ($56,160) using OS software to create the Provider Portal consistent with the System Requirements. Given the unique and innovative nature of the project, the Provider Portal's staff development time is only an estimate. See Figure 12 for an illustration of the recommended TTT Customer and Staff Portals Subsystems.

Figure 12. Recommended TTT Subsystem Components



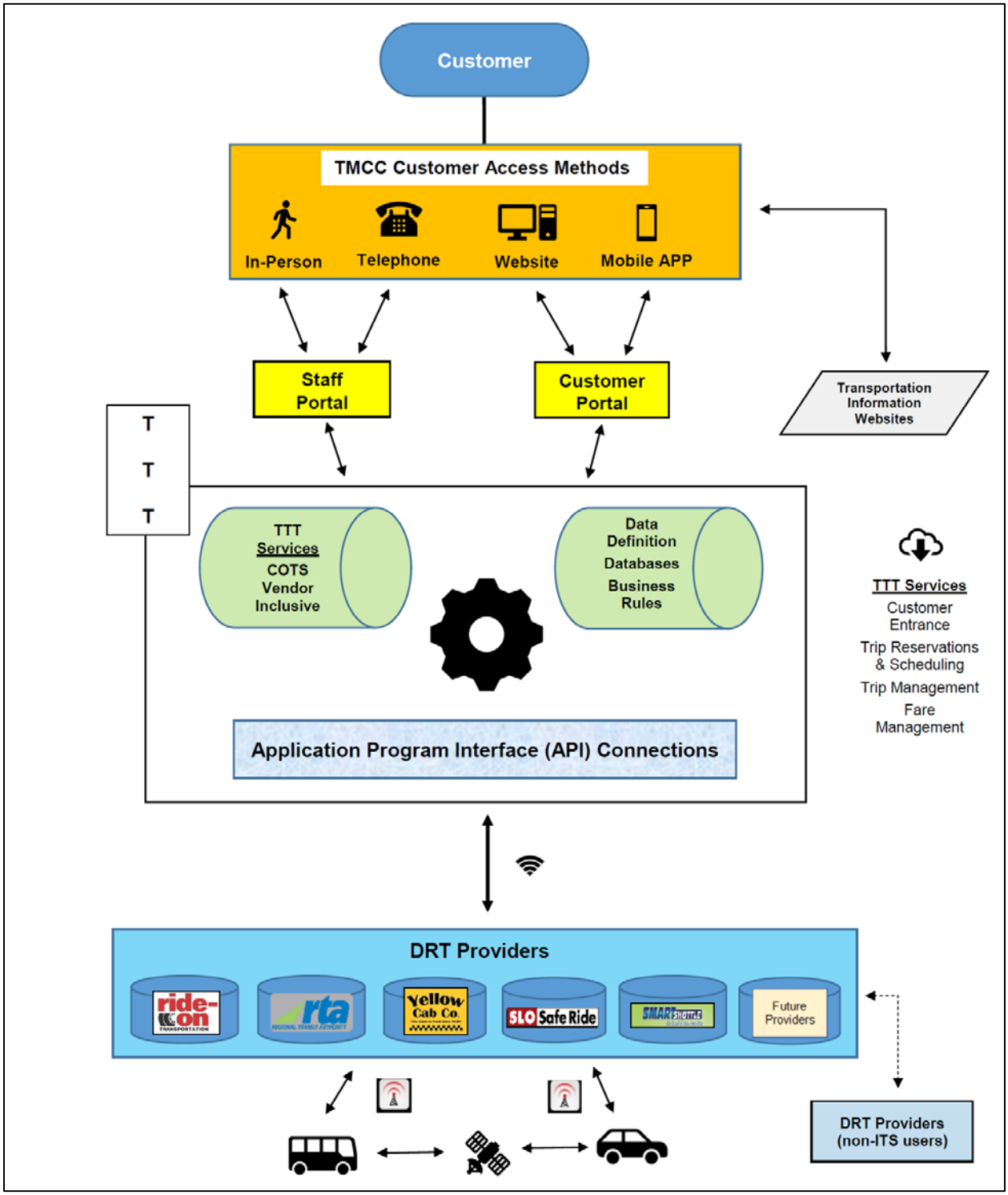
Source: Ride-On Transportation/Routematch

Figure 13. Recommended TTT Customer and Staff Portals Subsystems



Source: Ride-On Transportation/Routematch

Figure 14. Recommended TMCC High-Level System Architecture (Customer Access)



Source: Ride-On Transportation/Routematch

6.5 System Interfaces

The TTT's Subsystem's recommended COTS Vendor Inclusive solution for the Customer and Staff Portals will need to communicate through an "interface" with four DRT Provider CASD technologies. The interfaces will be developed between the chosen TTT Customer and Staff Portals vendor and DRT Providers Vendors. The cost to develop the recommended technology's interfaces was incorporated into the cost in Section 6.3.2.1.

Why Create an Interface?

The TMCC's DRT Partners each utilize their own CASD and mobile technologies to manage day to day services. These technologies form the basis of the TTT's trip scheduling and management services. To communicate currently with the recommended TTT Vendor Inclusive technology, interfaces must be written between each technology partner to enable communication between the systems, essentially passing data back and forth between the technologies. An important requirement for the interface is to ensure the technology providers are willing to partner in developing an interface. The TMCC's DRT Providers are open to doing so.

In addition, the TMCC's TTT is envisioned to be scalable, allowing DRT Providers that utilize CASD and mobile technologies across the county, region, or state to participate. Where open data is provided and made publicly available by the host (typically fixed route and rail systems), an interface is not necessarily required. The TTT is recommended to be capable of utilizing open data for trip planning purposes. Figure 14 illustrates the recommended TMCC system architecture.

6.6 System Support and Maintenance

To be efficient and effective in maintaining its recommended service requirements, the TTT is proposed to utilize support and maintenance resources from different perspectives, including vendor, system administrator, and DRT Provider staff.

6.6.1 TTT Customer and Staff Portals – Support and Maintenance

As addressed in Section 6.3.2.1, the TTT Customer and Staff Portal's and mobile APP technologies are recommended to be hosted, supported, and maintained under contract by the chosen vendor. TTT technical issues and staff support are expected to be provided by the vendor to ensure TTT service availability requirements are met.

6.6.2 TTT Provider Portal

As recommended in Section 6.3.3.1, the Provider Portal is recommended to comprise a hybrid of COTS trip sharing, market-

available instant messaging, and OS Clearinghouse code development in meeting the System Requirements. In supporting Provider Portal technologies, it is envisioned the COTS solutions will be supported and maintained by a vendor and the use of OS technologies will be supported either locally or under contract with a vendor.

6.6.3 Website

The recommended use of the 511/Rideshare website as the TMCC website will ensure that proper support and maintenance of this vital access method is provided.

6.6.4 System Administrator

To ensure TMCC and TTT services are available on a daily basis, a system administrator is recommended to provide oversight of the TMCC and systems. The administrator is currently considered to be employed by the project's lead agency and serve as a circuit rider managing the TTT subsystems while assisting customers, stakeholders, and those engaged with the service. The administrator is also envisioned to provide stakeholder training on TTT use and provide a variety of other functions deemed appropriate by the lead agency and project partners. It is recommended the TMCC administrator with lead contacts at each DRT Provider agency to address daily TMCC issues.

6.6.5 DRT Provider Staff/TMCC Support

To ensure DRT Provider agency technology systems and staff maintain connected with the TMCC, it is recommended that DRT Provider staff appoint a lead contact to work with the TMCC administrator. The DRT Provider's lead staff contact will ensure daily TMCC issues are addressed, staff needs are met, and the system is operating consistent with its requirements.

6.7 System Contingency

To maintain a consistent level of TMCC services and availability in the event of a local incident, it is critical the TMCC have system contingency plans as recommended in Section 4 of the System Requirements. The following are proposed technology systems contingencies.

6.7.1 TTT Subsystems Contingency

The recommended TTT subsystems are proposed to operate "in the cloud" or over the internet and maintained by the vendor. This process

essentially requires the selected vendor to support data storage at a secure off-site location while ensuring redundant back-ups in geographic locations separate of the primary data storage center.

6.7.2 DRT Provider Systems Contingency

To facilitate TMCC and TTT services, the development of a system contingency plan by the DRT Provider partners is critical to ensure customer access to transportation information and services in an emergency. Similar to the proposed TTT subsystems, the DRT Providers manage their agency's CASD and mobile technologies through their respective vendors "in the cloud" and across commercial wireless networks. RTA and Ride-On also have generator back-ups to provide electrical supply during a power outage as well.

6.8 Success Measurements and Economic Impacts

Critical to the success of the TMCC is to ensure the project's goals and objectives are met while the customers, partnering DRT Providers, and supporting stakeholders receive the greatest benefit for its cost. In doing so, the following subsection provides examples of potential TMCC Success Measurements and opportunities to evaluate Cost/Benefits.

6.8.1 Success Measurements

The TMCC's success measurements can either be quantifiable or qualitative to ensure the system's goals are met. The TMCC success measurements are recommended to be determined by the DRT Providers and TMCCAC prior to deployment. Baseline data collection and TMCC data collection and reporting considerations should be determined prior to implementation of the TMCC. The following are potential success measurements for services provided through the TMCC. Success measures will be further addressed in detail in the Phased Implementation Plan.

- Provide 90% of all demand response trips requested through the TMCC (TMCC Objective)
- Coordinate services between three or more DRT Providers (TMCC Objective)
- Access methods availability (i.e. percentage of availability)
- Number of individual customers served
- Number of telephone calls addressed
- Number of customer trips requested and scheduled
- Total customer trips provided per day
- Mobile APP use

- 511 Website use
- Staff Portal use
- Customer satisfaction
- Number of inter-agency trips coordinated (shared)

6.8.2 Economic and Customer Service Impacts

The mission of the TMCC is to provide "personal mobility across SLO County" enabling the customer with access to multiple communication methods to receive transportation information and services. The TMCC's proposed services provide the customer with the convenience of searching the community's mobility options, managing their confirmed trips, and providing an automated payment option for services. The TMCC's mission and proposed services provide the community and project stakeholders with an additional opportunity to expand mobility choices, while providing potential enhanced economic impacts to the county. The TMCC has the potential to benefit customers and DRT Providers through the following economic and customer service impact examples.

Economic Impacts - Possible Customer Examples

- Healthcare Access. Customer access to healthcare services, including same day, non-life threatening, at multiple facilities across the county. Transportation options as proposed to be provided through the TMCC also have the potential to reduce public emergency medical transport demand for non-life threatening medical needs.
- Employment Access. Access to transportation options that promote employment opportunities across the county. The TMCC is proposed to enable customers to evaluate mobility options and costs that benefit their budget, mobility, and access needs.
- Recreation Access. The TMCC proposes access to mobility options 24/7 enabling customers with connection to recreational opportunities.
- Aging in Place. As the county's senior population continues to grow, the TMCC is proposed to enable all persons to remain at home and leverage mobility options that best fit their mobility needs, including direct access to their preferred DRT Provider.

Economic Impacts - Possible DRT Provider Examples

- All DRT Providers.

  - Resource Utilization. The potential to further maximize resource utilization and service efficiency.
  - Customer Service. The potential to further enhance customer service through the support of other DRT Providers and Transportation Information in-person and telephone customer service resources.
  - Operational Support. The potential for DRT Providers to utilize other partners in support of daily operational conditions.
- Private DRT Providers.
  - Additional Revenue. The potential to gain additional customers, trips, and revenue through increased visibility and access to the community.
- Public DRT Providers.
  - Customer Service. The potential to offer customers with same day trip options through other DRT Providers.
- Non-Profit DRT Providers.
  - Operational Support. The capability to extend customer transportation services through other DRT Providers, including during peak customer capacity timeframes.
  - Additional Revenue. The potential to gain additional customers, trips, and revenue through increased visibility and access to the community.

Potential Customer Service Impacts

- Transportation Information. The TMCC will afford the customer with the ability to access additional community transportation options, such as DRT Provider, human service, and fixed route transit services.
- Access Methods. Customers will access TMCC services through all participating stakeholder locations, including in-person and by telephone, along with contacting existing service providers.
- Transportation Services Availability, Cost, & Access. The TTT shall provide customers with the ability to compare the availability and cost along with making selection of a chosen transportation option through website and mobile APP options.
- Service Hours. Customers will be able to make trip requests 24 hours a day, seven days per week, through the TTT.
- Trip Management. The TTT proposes to enable customers to manage their approved trips and day-of-service status needs, including trip changes and ride status updates.

7 Requirements: Analysis & Allocation

This section addresses the review, analysis, and allocation of the project's technology functional requirements as they relate to the design of the TMCC's technical system.

7.1 Functional Requirements - Review

The TMCC system is being designed based on the development of functional requirements that illustrate "what" the TMCC's technology components should comprise. As referenced in Section 3 of System Requirements, the project's primary technology system includes the TTT's Customer, Staff, and Provider Portals input and output systems. The functional requirements documented in the System Requirements deliverable include the high-level, customer access, input and output, electronic interface, and data management and reporting systems.

7.2 Functional Requirements - Analysis

Through analysis of the project's functional requirements listed in Section 3 of the System Requirements, the PMT separated each requirement to test or verify whether it meets the project system's needs. In review, all requirements were reverified and met the test. The following section addresses the requirements and their allocation to the high-level system design.

7.3 Functional Requirements - Design Allocation

In development of the TMCC's High-Level System Design, the project's functional inputs and outputs System Requirements were scrutinized by the PMT down to their primary origin and intent to determine their compatibility with the TTT Subsystem's components. The Traceability Matrix was also reviewed and revised to confirm elicited stakeholder needs were met through the design allocation process. See Appendix C for the Traceability Matrix. In review, the functional requirements passed the verification test and system allocation process for all TTT Subsystem components.

8 Operational Scenarios

This section illustrates a sample of potential TMCC and TTT normal and expanded (or unconventional) operational scenarios that could be experienced during the project based on the recommended High-Level System Design's TMCC Customer Access, TTT Customer and Staff Portals, and TTT Provider Portal subsystems.

8.1 Normal Operational Scenarios

The following are potential TMCC normal operational scenarios.

8.1.1 Scenario 1: Customer Lacks Access to Smart Phone and wishes to Search Travel Options (Customer Access Methods Subsystem)

The following normal operational scenario provides a sample process of a customer lacking a Smart Phone searching for travel options today and as proposed through the TMCC.

- **Today's Experience:**
  - Customers seeking travel options in SLO County either view websites or directly call organizations such as the DRT Providers, Rideshare/511, 211, Fixed providers, and other stakeholder organizations.

- **Proposed Experience:**
  - **Option 1 – In-Person Access**
    - The customer visits a TMCC stakeholder (i.e. DRT provider, Fixed provider, transportation information provider, human service agency) office during regular business hours and is greeted by staff where they assist the customer in seeking travel options.
    - The customer provides their travel interests to TMCC stakeholder staff who utilize the TTT's Staff Portal (website or mobile APP) to determine convenient travel options.
    - The customer selects their preferred travel option and TMCC stakeholder staff complete the requested action through the Staff Portal.

  - **Option 2 – Telephone Access**
    - During Business Hours.
      - Stakeholder Contact. The customer directly calls a TMCC stakeholder whose staff personally assists them to determine travel needs and provide trip

options as available through the Staff Portal. The customer selects their preferred option, TMCC stakeholder staff completes the request, receives a trip confirmation (date, time, DRT Provider, fare) from the Staff Portal, and shares it with the customer.

- TMCC Telephone Number. This sub-option is consistent with the Stakeholder Contact sub-option tasks, except for the customer initially calling the designated TMCC telephone number (i.e. 511) to commence their communication with DRT Provider or Transportation Information (i.e. 511) stakeholder staff.

- After Business Hours. The customer calls the TMCC designated telephone number and either receives an automated attendant or is transferred to an available DRT Provider partner with an available "live" CSR to personally address the customer's interests.

- **Option 3 – Website**
  - The customer may utilize the TMCC's designated website (i.e. 511) to seek trip options through the TTT.
  - When accessing the TTT online through 511, the customer may either create a "new" customer profile in the Customer Entrance selection or bypass this option to search travel options. Prior to DRT Provider trip selection, the "new" (non-registered) customer must register and become an "existing" (registered) customer to continue the trip process. Note, an "existing" customer may also login to the Customer Portal at any time utilizing approved login credentials.

8.1.2 Scenario 2: Customer Seeking Ride-On Veteran's Express Program Information (TTT Subsystem – Transportation Information Component).

The following normal operational scenario provides a sample process related to a customer seeking Ride-On Veterans Express program information today and in the future through the TMCC.

- **Today's Experience:**
  - The customer either directly calls or visits the Ride-On website for more information.

- **Proposed Experience:**
  - The customer will have expended transportation information options through the TMCC's website and mobile APP with electronic and direct telephone links to Ride-On. The customer may also directly call Ride-On and visit their website for Veterans Express information as well.

8.1.3 Scenario 3: Customer Seeks to Update Saved Personal Information (TTT Subsystem - Customer/Staff Portals, Customer Entrance Component).

The following normal operational scenario provides a sample process of how a customer potentially could update saved TTT personal information today and as proposed through the TMCC.

- **Today's Experience:**
  - Customer personal information is solely maintained by their stakeholder organization (i.e. DRT Provider, human service agency, etc.).

- **Proposed Experience:**
  - The TMCC's TTT Customer and Staff Portals propose to enable the "new" customer to either directly establish via website, mobile APP, and eligible stakeholder staff assistance a profile in the Customer Entrance component. The Customer Entrance will allow the customer to maintain profile information such as creating secure login credentials, name, favorite addresses, preferred communication method (i.e. e-mail, text, call), payment methods, and address many other non-HIPPA sensitive functions.
  - To update an "existing" customer's saved information, the "existing" customer may login to their profile in the TTT's Customer Entrance either by website or mobile APP and seek personal assistance through eligible stakeholder organization staff to make modification. After modifications are made, the customer will receive notification of the change(s) by preferred communication method.

8.1.4 Scenario 4: Human Service Agency Stakeholder Provides Customer Trip Planning Service (TTT Subsystem - Customer/Staff Portals, Trip Planning Component).

The following normal operational scenario provides a sample process of a human service agency stakeholder providing customer trip planning services today and in the future through the TMCC.

- **Today's Experience:**
  - To assist a customer with trip planning services, the human service agency stakeholder may utilize multiple options for assisting a customer with trip planning services, such as provide one-on-one customer trip planning, trip scheduling, and contact to DRT Providers. Current trip planning services do not provide cost information for all providers of specialized transportation services (i.e. senior shuttle).

- **Proposed Experience:**
  - Through use of either the TTT by website or mobile APP, human service agency stakeholders are proposed to use the Staff Portal to provide customer trip planning and access other TTT services.
  - The authorized human service agency shall provide customers with TMCC staff services such as travel planning, sharing transportation options, scheduling/requesting trips, assisting with profile and fare information, providing contact with DRT Providers, and other items to meet the support of the customer's interests.

8.1.5 Scenario 5: Customer Requests Trip from DRT Provider (TTT Subsystem - Customer/Staff Portals, Trip Reservations and Scheduling Component).

The following normal operational scenario provides a sample process for a customer requesting a trip from a DRT Provider today and proposed through the TMCC.

- **Today's Experience:**
  - To request a trip, customers contact the DRT Provider directly to receive services. Many DRT provider customers utilize a specific DRT provider based on their eligibility for sponsored services (i.e. RTA Runabout's ADA complimentary paratransit or Ride-On's MediCal-sponsored services). This process includes the customer contacting the DRT Provider either by telephone during regular business hours or using an online trip request form located on most DRT Provider websites.

- **Proposed Experience:**
  - Through the proposed TMCC, the customer will have the options of either continuing to directly contact the DRT Provider or use the TMCC's services. The TMCC's in-person, telephone, website, and mobile APP access methods have

been determined with the customer in mind; enabling multiple means for the customer to connect with DRT Providers to receive transportation services.

8.1.6 Scenario 6: Family Member Caretaker Seeks Customer's Trip Status Information (TTT Subsystem - Customer/Staff Portals, Trip Management Component).

The following normal operational scenario provides a sample process for a family member caretaker that seeks the customer's day-of-trip status information today and as proposed through the TMCC.

- **Today's Experience:**
  - To determine a customer's day-of-trip status, the family member caretaker contacts the appropriate DRT Provider by telephone seeking transportation status.
- **Proposed Experience:**
  - Through the proposed TMCC, the family member caretaker shall continue to make direct contact with the customer's DRT Provider by telephone or utilize the TMCC's website or mobile APP to monitor transportation services. The TMCC website or mobile APP shall feature the TTT's Customer Portal Trip Management components enabling the family member caretaker to monitor customer trip services such as trip information, arrival/departure, a visual/spatial map display of the DRT Provider vehicle's status, and in-travel updates.

8.1.7 Scenario 7: Customer Trip Sharing Between DRT Providers (TTT Subsystem - Provider Portal Component).

The following normal operational scenario provides a sample process illustrating how DRT Providers partner to share/coordinate trips between one another today and as proposed through the TMCC.

- **Today's Experience:**
  - In the event a DRT Provider is unable to transport a scheduled customer due to capacity or other constraint, on a limited basis, most DRT Providers contact a fellow DRT Provider by telephone to seek assistance in transporting the customer on their behalf.
- **Proposed Experience:**
  - Through the proposed TMCC, DRT Providers may contact one another to share/coordinate customer trips by telephone or the

TTT. By use of the TTT's Provider Port, the DRT Provider is proposed to communicate through electronic chat and send customer trip information (complying with all laws) to enable trip coordination and a high level of customer service. This feature is also proposed to enable DRT Providers to spatially see each other on a provider Portal map to facilitate enhanced resource utilization and service provision throughout the county.

8.1.8 Scenario 8: Customer Seeks to reload TMCC Fare via Mobile APP (TTT Subsystem - Customer/Staff Portals, Fare Management Component)

The following normal operational scenario provides a sample process for a customer reloading their TMCC fare via mobile APP.

- **Today's Experience:**
  - TMCC Mobile APP not available. Fare passes are available for Fixed services. No passes are available for DRT Provider services.
- **Proposed Experience:**
  - To reload a fare balance through the TMCC's mobile APP, the customer is proposed to access their account in the TTT Customer and Staff Portal's Customer Entrance (profile) section. The customer shall be capable of using an electronic payment process (i.e. credit/debit card, PayPal, etc.) to reload their account balance. The customer shall receive confirmation of the transaction's completion through the preferred communication method(s) located in their profile.
  - In the event a customer does not have access to a mobile APP, they may reload their fare account balance using the TMCC's in-person, telephone, and website access methods. Customers are proposed to pay with cash and by electronic means at TMCC in-person stakeholder locations and by electronic means through TMCC telephone and website access methods.

8.2 Expanded (Unconventional) Operational Scenarios

The normal operations of the proposed TMCC system will be impacted by potential expanded or unconventional operational scenarios. The following are potential expanded scenarios that may impact the proposed TMCC's operation.

8.2.1 Scenario 1: Emergency Road Closure – CA Highway 101 Closed in San Luis Obispo between Madonna Road and Santa Rosa Street.

The following expanded operational scenario provides a sample process for how the TMCC may respond to an emergency road closure of a primary artery in SLO County today and through the proposed TMCC.

- **Today's Experience:**
  - DRT Providers learn of Highway 101 closure through various potential sources, including drivers, other DRT Provider staff, 511, local news, emergency management, CalTrans, law enforcement, and other outlets. To address the road closure, DRT Providers typically seek to reroute and detour all resources away from the affected area to maintain schedule integrity. Subject to the closure's impact will have on current service and schedule, DRT Providers inform customers by telephone (as necessary) of any delays and/or discuss necessary schedule changes.

- **Proposed Experience:**

  The methods for DRT Provider's learning of a Highway 101 closure may not change. However, through the proposed TMCC, customers and DRT Providers are proposed to experience the following customer service and operational changes.

  - Customer Experience.
    - TMCC Website – DRT Provider Service Alerts. The proposed TMCC website is proposed to be hosted by 511 and maintain the ability for DRT Providers to share important service alert messages on the TMCC home page.
    - TTT Customer and Staff Portals - Trip Management Service Update Alerts.
      - Customers are proposed to receive day-of-trip electronic status update alerts from DRT Providers through the TMCC's website and mobile APP.
      - View schedule/trip status on the proposed TMCC website and APP.
      - Customers will also have the capability of managing their online booked trips and making day-of service changes within an acceptable timeframe per the policy of their service provider.
    - Telephone calls from DRT Providers. Customers are proposed to receive calls from DRT Providers (based on

their communications preferences) when schedule changes necessitate contact.

- DRT Provider Operations.
  - DRT Trip Sharing/Coordination. Through use of the TMCC TTT's Provider Portal, as illustrated in Section 3.3, DRT Providers are proposed to be capable of coordinating customer trips prior to and during day of service as needed. This higher level of customer service will ensure greater on-time performance, resource utilization, and enhanced customer mobility options.

8.2.2 Scenario 2: Power Outage at Ride-On During Daily Operations.

The following scenario addresses the current and proposed TMCC process in the event Ride-On loses power during daily operations.

- **Today's Experience:**
  - When the Ride-On office loses power, a portable generator activates after a brief period to return all powered systems to operational status. Ride-On's ITS systems also leverage "cloud-based" technology to ensure local power loss does not impact data back-up and security during the outage.

- **Proposed Experience:**
  - For the proposed TMCC, the current Ride-On experience during power outages is envisioned for all DRT Providers – leveraging portable generator power to return all powered systems to operational status. In the event of a sustained power outage and generator failure, DRT Providers may leverage one another to coordinate and share customer trips as needed. The TMCC TTT's proposed system is envisioned to be "cloud hosted" with off-site data storage and management services. TTT technology support services may be required by the DRT Providers to ensure all mission critical services are active and/or being performed.

8.2.3 Scenario 3: New DRT Provider Joins the TMCC.

The TMCC is proposed to be scalable, accommodating changes in participating DRT Providers, geography-neutral. In this scenario, a new DRT Provider is interested in becoming a TMCC project partner. The following is an overview of potential steps taken today and through the proposed TMCC.

- **Today's Experience:**
  - Ride-On meets with the new DRT Provider to better understand their services, existing technologies, and business interests.
  - New DRT Provider is invited and participates in the TMCC project, including TMCCAC and subcommittee meetings.

- **Proposed Experience:**
  - The TMCC lead agency meets with the new DRT Provider to better understand their services, existing technologies, and business interests.
  - The new DRT Provider is invited and participates in the TMCC project, including TMCCAC and subcommittee meetings.
  - Upon agreement and acceptance to participate, with DRT Provider CASD/mobile technology meeting the TMCC's requirements, the lead agency shall engage the TTT technology partner to determine the best method to connect the new DRT Provider (with mobile) technology system with the TMCC.
  - In the event the new DRT Provider does not have a CASD/mobile technology system meeting TTT requirements, the TMCC lead agency shall discuss other options for inclusion in the project, such as becoming a contractor to an existing DRT Provider.

8.2.4 Scenario 4: Earthquake - Wild Fire Emergency Response.

The following scenario illustrates the current and proposed TMCC's process in the event of a natural emergency, such as earthquake or wild fire.

- **Today's Experience:**
  - DRT Provider equipment and services continue to be leveraged and directed by SLO County Emergency Services as needed in the event of an emergency response situation.

- **Proposed Experience:**
  - Continue DRT Provider support of SLO County Emergency Services as needed.
  - Utilize DRT Provider resources (staff, vehicles, etc.) as needed.
  - Leverage DRT Provider CASD/mobile technologies to identify customers in need of evacuation and transportation to medical facilities, emergency shelters, and other locations.

- Coordinate emergency operations and collective available DRT Provider resources for transport. Notify customers of service changes due to the emergency.
- TMCC Access Methods. Leverage proposed TMCC access methods to communicate information with customers, such as providing information by telephone, announcements on the website and mobile APP, and making trip and schedule changes, etc.
- TTT Provider Portal. DRT Providers may utilize the Provider Portal to communicate customer and service needs and issues between one another. DRT provider staff may also “chat” between one another and share trips to ensure customer service is expedited.

9 References

9.1 Local and Other Supporting Documents

9.1.1 TMCC Advisory Committee Meeting Notes: June 27, 2017, August 31, 2017, and October 26, 2017.

9.1.2 TMCC Advisory Subcommittees Meeting Notes - Transportation Provider, Technology, and User/Rider: May 2, 2017; June 8, 2017; and August 31, 2017.

9.1.3 TTT Systems Requirements Capabilities Matrix – Vendor Outreach, August – September 2017.

9.1.4 SLO County MSAA Traceability Matrix, July 2017.

9.1.5 MSAA Revised Flow Chart, SLOCOG, November 15, 2016.

9.1.6 RouteMatch Software presentation for TMCC Advisory Committee, August 31, 2017.

9.1.7 SLO Adult Services Policy Council - MSAA TMCC Overview Presentation, September 1, 2017.

9.1.8 Northwest Denver MSAA Project, Via Mobility, Boulder, CO.

9.1.9 "Multimodal Payments Convergence – Part One: Emerging Models and Use Cases, Version 1.0," Secure Technology Alliance and Association for Commuter Transportation, March 2017 (http://actweb.org/wp-content/uploads/2017/03/Multimodal-Payments-Convergence-White-Paper-FINAL-Mar-2017.pdf)

9.1.10 "Why Transit is Boarding The Mobile-Payments Train," Digital Transactions, February 2016 (http://www.digitaltransactions.net/news/story/Why-Transit-Is-Boarding-the-Mobile-Payments-Train/)

9.1.11 One-Call/One-Click Operations Guide, National Association of Area Agencies on Aging (n4a), March 2014.

9.1.12 Ride-On/SLO County MSAA Project Website (http://ride-on.org/msaa.php)

9.1.13 Stakeholder Agency Websites.

9.1.14 Baseline Industry Standards & Best Practice Suggestions, Community Transportation Association Northwest, 2017.

9.1.15 "Designing Customer-focused Coordinated Demand Response Transportation Services in San Luis Obispo," SLO County MSAA Project Session Presentation and Audience Comments, California Association for Coordinated Transportation (CalACT) Spring Conference, Lake Tahoe, CA, April 26, 2017.

9.1.16 "Leveraging Technology for Real-World Impacts," SLO County MSAA Project Session Presentation and Audience Comments, Community Transportation Association of America (CTAA) Expo, Detroit, MI, June 15, 2017.

9.1.17 "Development of Transactional Data Specifications for Demand-Responsive Transportation," Transportation Cooperative Research Program G-16 (Active), August 2017 (expected completion: March 2018), Transportation Research Board, Washington, DC (http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4120)

9.1.18 "Assessment of Mobile Fare Payment Technology for Future Deployment in Florida," Florida Department of Transportation, March 2016 (http://www.fdot.gov/transit/Pages/FinalReportMobileFarePayment20160331.pdf)

9.1.19 Mobility Services for All Americans (MSAA) Travel Management Coordination Center (TMCC) Phase 1, System Design, Lower Savannah Council of Governments, SC, June 30, 2008.

9.1.20 Mobility Services for All Americans (MSAA) Phase 1 - System Development and Design: Travel Management Coordination Center (TMCC), Deliverable #4: System Design, Paducah Area Transit System, Paducah, KY, June 30, 2008.

9.1.21 Open Source Resources.

9.1.21.1 "Open Source Cities Tapping the Software Commons for Future Transit Innovation," Adam Cohen, Mobility Lab, October 10, 2016. (https://mobilitylab.org/2016/10/10/open-source-cities-tapping-the-software-commons-for-future-transit-innovation/)

9.1.21.2 Open Trip Planner Development Information (https://github.com/opentripplanner/OpenTripPlanner)

9.1.21.3 Open Source Initiative, AC Transit (http://www.actransit.org/open-source/)

9.1.21.4 "Open Source Software for Transit Agencies," Bibianna McHugh, Tri-Met, National Rural ITS Conference, September 4, 2008. (http://www.nritsconference.org/downloads/Presentations08/MiniTraining_Open1.pdf)

9.1.21.5 "How To Overcome Daunting Challenges in Rural Transit with Computer-Aided Scheduling," Paul Sorenson, CTAA Magazine, 2016. (http://web1.ctaa.org/webmodules/webarticles/articlefiles/MichiganCT_HowTo.pdf)

9.1.21.6 "Free as in puppy: The hidden costs of free software, Ben Cotton, opensource.com, February 13, 2017. (https://opensource.com/article/17/2/hidden-costs-free-software)

9.1.21.7 "Open Source Software: The Hidden Cost of Free," Raj Sabhlok, Forbes. (https://www.forbes.com/sites/rajsabhlok/2013/07/18/open-source-software-the-hidden-cost-of-free/#74f2a17b4001)

9.1.21.8 "8 Open Source Benefits Every Agency Should Know," Sarah Anderson, Cambridge Systematics, September 13, 2017, Metro Magazine. (http://www.metro-magazine.com/technology/article/715435/8-open-source-benefits-every-agency-should-know)

9.1.21.9 "Free & Open-Source vs. Proprietary: How Construction Software Licenses Stack Up," Janna Finch, Software Advice. (https://www.softwareadvice.com/resources/free-construction-management-software-vs-paid/)

9.1.21.10 "Pros and cons of open source software," Simon Hill, crowdsourced testing, August 29, 2016. (https://crowdsourcedtesting.com/resources/pros-cons-open-source-software/)

9.1.21.11 "What Is Free Open-Source Software – Pros & Cons, Best Options," David Gomez, Money Crashers. (https://www.moneycrashers.com/free-open-source-software-definition/)

9.1.21.12 "Disadvantages of open source software," INVEST NI. (https://www.nibusinessinfo.co.uk/content/disadvantages-open-source-software)

9.1.22 Transit and New Shared-Use Modes -Key Questions from the Transit Agency's Perspective; a Discussion Paper," Brendon Hemily, ITS America for USDOT, July 18, 2016.

9.2 MSAA and Systems Engineering References

9.2.1 The San Luis Obispo County Travel Management Coordination Center (TMCC) Final System Requirements, Ride-On Transportation, July 13, 2017.

9.2.2 The San Luis Obispo County Travel Management Coordination Center (TMCC) Concept of Operations, Ride-On Transportation, September 16, 2016.

9.2.3 Final Project Management Plan (PMP), The San Luis Obispo County Travel Management Coordination Center (TMCC) Project, Ride-On Transportation, January 27, 2016.

9.2.4 The San Luis Obispo County Travel Management Coordination Center (TMCC) Application to FTA, Ride-On Transportation/RTA, July 2014.

9.2.5 MSAA System Design Document Template v0.1, Noblis, March 7, 2017.

9.2.6 FTA MSAA Project Sites Monthly Conference Call Meetings.

9.2.7 SLO County ITS Architecture – Status Update, SLOCOG, June 5, 2017.

9.2.8 FTA Mobility on Demand Sandbox Initiative ITS Research – 2016 Program Projects, USDOT/FTA (https://www.transit.dot.gov/research-innovation/mobility-demand-mod-sandbox-program.html).

9.2.9 Systems Engineering Guidebook for ITS, Section 3.5.2 High Level Design, USDOT/FHWA (https://www.fhwa.dot.gov/cadiv/segb/views/document/sections/section3/3_5_2.cfm).

9.2.10 Integrated Corridor Management: Implementation Guide and Lessons Learned, Version 1.1, USDOT/FHWA, February 2012.

9.2.11 Systems Engineering Process for ITS: An Introduction for Transportation Professionals, USDOT/FHWA/FTA, January 2007

9.2.12 ITS Benefits, Costs, and Lessons Learned: Update Report, Final, USDOT, March 2017 (http://www.itsknowledgeresources.its.dot.gov/its/bcllupdate/pdf/BCLL_2017_Combined_JPO-FINALv6.pdf)

9.2.13 Mobility on Demand, ITS Benefits, Costs, and Lessons Learned, ITS Knowledge Resources (online), USDOT, September 2017 (http://www.itsknowledgeresources.its.dot.gov/its/bcllupdate/MOD/)

9.2.14 ITS Standards Transit Training Modules, USDOT (https://www.pcb.its.dot.gov/stds_modules_transit.aspx)

9.2.15 API Resources:

9.2.15.1 "What Is an API? (Application Programming Interface)," Mulesoft. (https://www.mulesoft.com/resources/api/what-is-an-api)

9.2.15.2 "Do you know what a REST API is?," sitepoint.com. (https://www.sitepoint.com/developers-rest-api/)

9.2.15.3 "What is an API?," Mulesoft, YouTube, June 19, 2015 (https://www.youtube.com/watch?v=s7wmiS2mSXY)

9.2.15.4 "REST API concepts and examples," WebConcepts, YouTube, July 14, 2014 (https://www.youtube.com/watch?v=7YcW25PHnAA)

9.2.15.5 Calculating the Cost of API Integration, Cloud Elements, August 8, 2014 (https://blog.cloud-elements.com/calculating-cost-api-integration)

9.2.15.6 How much does your API cost to maintain?, Apigee Community, (https://community.apigee.com/articles/27576/how-much-does-your-api-cost-to-maintain.html)

Appendix A: Document Version Changes

Version Number	Date	Description of Changes	Status
01	January 16, 2017	Draft Document	Submitted to FTA for review and comment.
02	March 12, 2018	Final Document	Approved by FTA.

Appendix B: Industry Outreach Contacts

Customer-facing Front End (Website)

- SLOCOG/511
- Cambridge Systematics (One-Click)
- Routematch
- City of Denver (Go Denver)
- Xerox (developed Go Denver app)

APP Development

- Cambridge Systematics (One-Click)
- UnWire - GoPass (used by DART, Dallas, TX)
- City of Denver (non-vendor) – Cynthia Patton-Go Denver
- Routematch
- MuvMe

TTT Scheduling Components

- Routematch
- TripSpark (Trapeze)
- Ecolane
- Syncromatics/Mobilitat Software
- IT Curves
- Limo Anywhere
- UZURV
- Tap Rides/Double Map

TTT Provider Portal Components

- Routematch
- Ride Connection (Clearinghouse)
- Bridgegate
- Demand Trans

TTT Fare Management Components

- Delerrok
- Acumen Transit
- Routematch
- Token Transit
- PayNearMe (PNM)

Full Service – Commercial-Off-The-Shelf Solutions

- Routematch Mobility Solution
- TripSpark (Trapeze)
- Ecolane

Active Technology Projects

- FTA Mobility on Demand Sandbox Projects
    - Valley Metro, Phoenix, AZ - Routematch Project
    - Dallas Area Rapid Transit (DART) Mobility
- MSAA Projects
    - Via Mobility, Boulder, CO
    - Atlanta Regional Commission, Atlanta, GA
    - Greater Wisconsin Agency on Aging Resources, Madison, WI
- Utah Ride Link
- Nashville Transit - Demand Trans Project

Appendix C: Traceability Matrix

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.00	Provide Transportation Services and Information through the following means: In-Person, Telephone, Website, and Mobile APP	High	3.2.1	The system shall provide customer access through in-person, telephone, website, and mobile application (APP) interfaces.	ITS	M	Access Method Subsystem - In-Person, Telephone, Website, Mobile APP components
21	1.00	Provide Transportation Services and Information through the following means: In-Person, Telephone, Website, and Mobile APP	High	3.2.3	The system shall be accessible by smartphone and mobile phone.	ITS	M	Access Method Subsystem - Mobile APP component
21	1.00	Provide Transportation Services and Information through the following means: In-Person, Telephone, Website, and Mobile APP	High	3.2.4	The system shall also enable support staff, including DRT Providers, with direct electronic access to the TMCC through internet website and mobile APP (staff portals), to support in-person and telephone customer service.	ITS	M	TTT Subsystem - Staff Portal components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.00	Provide Transportation Services and Information through the following means: In-Person, Telephone, Website, and Mobile APP	High	4.2.4	Telephone Access	Non-ITS	M	Access Method Subsystem - Telephone component
21	1.00	Provide Transportation Services and Information through the following means: In-Person, Telephone, Website, and Mobile APP	High	4.2.5	In-Person Access	Non-ITS	M	Access Method Subsystem - In-Person component
21	1.01	Provide customer with transportation service options and agency contact information	High	3.3.2.3	The system shall provide staff access portal capability for telephone and in-person customer interfaces to assist customers without access to technology.	ITS	M	TTT Subsystem - Staff Portal components
21	1.01	Provide customer with transportation service options and agency contact information	High	3.3.3.1.10	Utilize existing customer profile information for prior selected trips to “auto-fill” the trip request information.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Reservations & Scheduling

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.01	Provide customer with transportation service options and agency contact information	High	3.4.3.3	The system shall provide an existing customer (registered) using the website or mobile APP with the following secure access features: 3.4.3.3.1 Profile login. 3.4.3.3.1.1 Utilize currently available login technology with ID, password, and forgotten password. 3.4.3.3.1.2 Provide forgotten password restoration options for login and password identification. 3.4.3.3.2 Manage profile and preferences. 3.4.3.3.3 Determine DRT Provider program eligibility. 3.4.3.3.4 Schedule new trip reservations. 3.4.3.3.5 Manage existing trip reservations. 3.4.3.3.6 Seek ride arrival status. 3.4.3.3.7 Manage fares and payment for services.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Customer Entrance

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.01	Provide customer with transportation service options and agency contact information	High	3.4.6.9	The system shall interface with on board vehicle hardware to print receipts.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
			High	4.2.5.1.1	Provide transportation information and DRT Provider services.	Non-ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
			High	4.2.5.1.2	Identify physical in-person resource locations.	Non-ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
21	1.02	Utilize existing 511 and 211 electronic and telephone services	High	3.3.1.7	511 for traveler information and 211 for human service information.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
			High	3.4.1.7	511 for traveler information and 211 for human service information.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	3.2.1	The system shall provide customer access through in-person, telephone, website, and mobile application (APP) interfaces.	ITS	M	Access Method Subsystem - In-Person, Telephone, Website, Mobile APP components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	3.2.3	The system shall be accessible by smartphone and mobile phone.	ITS	M	Access Method Subsystem - Telephone components
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	3.2.4	The system shall also enable support staff, including DRT Providers, with direct electronic access to the TMCC through internet website and mobile APP (staff portals), to support in-person and telephone customer service.	ITS	M	Access Methods Subsystem and TTT Subsystem - Staff Portal components
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	4.1.2	TDD/TTY/California Relay Connection	Non-ITS	M	Access Method Subsystem - Telephone components
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	4.2.4	Telephone Access	Non-ITS	M	Access Method Subsystem - Telephone components
21	1.03	Provide accessible services for senior citizens and persons with disabilities	High	4.2.5	In-Person Access	Non-ITS	M	Access Method Subsystem - In-Person components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.04	Provide customer with a Fare Comparison of all transportation options (illustrate all available service providers and fares)	High	3.4.4.1, 3.4.4.1.4	Parent Input Requirement: The system shall provide the following Trip Reservations and Scheduling services. Sub requirement: The system shall provide the requested trip availability, fare, and estimated travel time.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling
21	1.05	Provide customer with real-time vehicle arrival and travel time information	High	3.3.4.1.5, 3.3.4.1.5.3	Parent Input Requirement: The system shall provide options for the customer to select the following day of service information for a scheduled ride. Sub requirement: Actual vehicle arrival time notification.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Management
21	1.05	Provide customer with real-time vehicle arrival and travel time information	High	3.3.6.7.5, 3.3.6.7.5.3	Parent Input Requirement: The system shall allow staff to search for the customer's day of trip vehicle status information. Sub requirement: Actual vehicle arrival time notification.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Management

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.05	Provide customer with real-time vehicle arrival and travel time information	High	3.4.5.1.5, 3.4.5.1.5.3	Parent Output Requirement: The system shall provide the customer with the following day of service information. Sub requirement: Actual vehicle arrival time notification.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Management
21	1.05	Provide customer with real-time vehicle arrival and travel time information	High	3.4.7.7.3, 3.4.7.7.3.3	Parent Output Requirement: The system shall allow staff to view the customer's day of trip vehicle status information. Sub requirement: Actual vehicle arrival time notification.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Management
21	1.06	Provide customer with a less than 1-hour DRT Provider response time to a ride request	High	3.4.4.1.3	DRT Providers shall respond to an existing customer trip request in one hour or less based on availability during regular business hours.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.06	Provide customer with a less than 1 hour DRT Provider response time to a ride request	High	3.4.7.6.4	DRT Providers shall respond to an existing customer trip request in one hour or less based on DRT Provider vehicle availability.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling
21	1.07	Provide customer with in-person (physical location) trip scheduling capability	High	3.2.1	The system shall provide customer access through in-person, telephone, website, and mobile application (APP) interfaces.	ITS	M	Access Method Subsystem - In-Person, Telephone, Website, Mobile APP components
21	1.07	Provide customer with in-person (physical location) trip scheduling capability	High	3.2.3	The system shall be accessible by smartphone and mobile phone.	ITS	M	Access Method Subsystem - Telephone components
21	1.07	Provide customer with in-person (physical location) trip scheduling capability	High	3.2.4	The system shall also enable support staff, including DRT Providers, with direct electronic access to the TMCC through internet website and mobile APP (staff portals), to support in-person and telephone customer service.	ITS	M	Access Methods Subsystem and TTT Subsystem - Staff Portal components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.07	Provide customer with in-person (physical location) trip scheduling capability	High	4.2.4	Telephone Access	Non-ITS	M	Access Method Subsystem - Telephone components
21	1.07	Provide customer with in-person (physical location) trip scheduling capability	High	4.2.5	In-Person Access	Non-ITS	M	Access Method Subsystem - In-Person components
21	1.08	Provide customer with trip journey planning services (fixed-para-train-taxi, etc.)	High	3.3.1.8	The system shall provide a URL to assist customers with multimodal transportation options.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
21	1.08	Provide customer with trip journey planning services (fixed-para-train-taxi, etc.)	High	3.4.2	The system shall provide a URL to assist customers with multimodal transportation options.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
21	1.08	Provide customer with trip journey planning services (fixed-para-train-taxi, etc.)	High	3.4.7.5	The system shall provide authorized staff with links to Information websites listed in Section 3.3.1.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Information
21	1.09	Communicate DRT Provider vehicle lift-equipped capability and vehicle capacity to customer	High	3.3.3.1.15	Provide lift-equipped vehicle availability and type options when scheduling a trip.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.09	Communicate DRT Provider vehicle lift-equipped capability and vehicle capacity to customer	High	3.3.6.6.15	Provide lift-equipped vehicle availability and type options when scheduling a trip.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling
21	1.09	Communicate DRT Provider vehicle lift-equipped capability and vehicle capacity to customer	High	3.4.4.1.4	The system shall provide the requested trip availability, fare, lit-equipped vehicle (if needed), and estimated travel time.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Routing & Scheduling
21	1.10	Enable direct phone call transfers between DRT Providers	High	4.2.4.1.5	Be capable of transferring telephone calls in a “One-Call” manner between DRT Providers.	Non-ITS	M	Access Method Subsystem - Telephone components
21	1.11	Create a single telephone number for customers to contact DRT Providers	High	4.2.4.1.1	Create a single, identifiable telephone number for customers to access services.	Non-ITS	M	Access Method Subsystem - Telephone components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
21	1.12	Provide customer with 24/7, 365/day, telephone service availability	High	4.2.4.1.3	Be accessible on a 24-hour basis, 365 days/week.	Non-ITS	M	Access Method Subsystem - Telephone components
22	1.13	Create simple to use APP and website for customer	High	3.2.1	The system shall provide customer access through in-person, telephone, website, and mobile application (APP) interfaces.	ITS	M	Access Method Subsystem - Website, Mobile APP components
22	1.13	Create simple to use APP and website for customer	High	3.2.3	The system shall be accessible by smartphone and mobile phone.	ITS	M	Access Method Subsystem - Telephone components
22	1.13	Create simple to use APP and website for customer	High	3.2.4	The system shall also enable support staff, including DRT Providers, with direct electronic access to the TMCC through internet website and mobile APP (staff portals), to support in-person and telephone customer service.	ITS	M	TTT Subsystem - Provider Portal components
22	1.13	Create simple to use APP and website for customer	High	4.2.4	Telephone Access	Non-ITS	M	Access Method Subsystem - Telephone components

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.13	Create simple to use APP and website for customer	High	4.2.5	In-Person Access	Non-ITS	M	Access Method Subsystem - In-Person components
22	1.14	Leverage DRT Provider data	High	3.4.7.7.1	The system shall access DRT Provider CASD database and provide the status if a scheduled customer trip.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Management
22	1.14	Leverage DRT Provider data	High	3.5.1	The system shall interface with DRT provider legacy CASD systems and databases for customer trip scheduling and management.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Trip Reservations & Scheduling and Trip Management
22	1.15	Enable "new" riders to register for applicable services(s)	High	3.3.2.1	The system shall provide a new customer (not registered) the option of skipping the account registration process until required.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Customer Entrance

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.15	Enable "new" riders to register for applicable services(s)	High	3.3.2.4	The system shall provide a new customer using the website or mobile APP with the following secure access features. 3.3.2.4.1 Create a new account. 3.3.2.4.2 Create a user name and password. 3.3.2.4.3 Auto-create a unique customer ID. 3.3.2.4.4 Create a new customer profile. 3.3.2.4.5 Manage profile preferences and confirm eligibility for services. 3.3.2.4.6 Request information from DRT Provider regarding program eligibility.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Customer Entrance

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.15		High	3.3.6.4	The system shall record registration information for new customers entered by authorized staff (excluding those customers already served by a DRT Provider program, such as approved Runabout ADA paratransit riders) through the following secure services: 3.3.6.4.1 Create a new account. 3.3.6.4.2 User name and temporary password creation. 3.3.6.4.3 Auto-create a unique customer ID. 3.3.6.4.4 Create a new customer profile. 3.3.6.4.5 Manage profile preferences and confirm eligibility for services. 3.3.6.4.6 Request information from DRT Provider regarding program eligibility.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Customer Entrance

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.16	Utilize existing DRT Provider technologies	High	3.5.2	The system shall be capable of interfacing with DRT Provider fare payment systems.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.16	Utilize existing DRT Provider technologies	High	3.6.2	The system shall interface with DRT Provider legacy CASD systems to obtain trip level cost, reconciliation, and verification for billing and invoicing functions.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.16	Utilize existing DRT Provider technologies	High	4.2.4.1.8	Utilize existing legacy DRT Provider telephony systems and call centers.	Non-ITS	M	Access Method Subsystem - Telephone components
22	1.17	Provide a unified fare payment capability	High	3.3.5.1.2	The system shall allow DRT Provider staff access to renew existing customer fare media and payment accounts.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.3.5.1.3	The system shall permit the DRT Provider, customer, and sponsor to use a debit or credit card to renew fare media.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.17	Provide a unified fare payment capability	High	3.3.5.5	The system shall be scalable to manage multiple fare structures for all DRT Providers.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.3.6.10	The system shall permit the DRT Provider, customer, and sponsor to use a debit or credit card to renew fare media.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.4.6.4	The system shall be scalable to manage multiple fare structures for all DRT Providers.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.4.6.5	The system shall interface with any DRT Provider or human service agency fare technology.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.17	Provide a unified fare payment capability	High	3.4.6.13	The system shall permit the customer to pay the DRT provider directly, outside the fare management system.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.4.7.9	The system shall permit the DRT Provider, customer, and sponsor to use a debit or credit card to renew fare media.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Customer Entrance and Fare Management
22	1.17	Provide a unified fare payment capability	High	3.5.2	The system shall be capable of interfacing with DRT Provider fare payment systems.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management
22	1.17	Provide a unified fare payment capability	High	3.5.8	The system shall meet all applicable ITS standards.	ITS	M	TTT Subsystem - all components
22	1.17	Provide a unified fare payment capability	High	3.5.6	The system shall be capable of interfacing with any DRT Provider or human service agency fare management systems.	ITS	M	TTT Subsystem - Customer and Staff Portals components - Fare Management

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.17	Provide a unified fare payment capability	High	4.5.2.4	Create fare media management policies and procedures.	Non-ITS	M	Non-ITS (System)
22	1.17	Provide a unified fare payment capability	High	4.5.5.2	Identify DRT Provider fare structures applicable to the TMCC.	Non-ITS	M	Non-ITS (System)
22	1.17	Provide a unified fare payment capability	High	4.5.5.3	Develop and document fare management policies and procedures. Specifically address riders with fare payment challenges.	Non-ITS	M	Non-ITS (System)
22	1.17	Provide a unified fare payment capability	High	4.5.5.4	Develop DRT Provider and participating stakeholder fare management processes, including reimbursement rates for coordinated trips.	Non-ITS	M	Non-ITS (System)
22	1.17	Provide a unified fare payment capability	High	4.5.5.5	Develop and document DRT Provider accounting processes, including payment and fare management services.	Non-ITS	M	Non-ITS (System)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.17	Provide a unified fare payment capability	High	4.5.5.7	Establish fare media accounting and reimbursement procedures with all DRT Providers and other participating stakeholders.	Non-ITS	M	Non-ITS (System)
22	1.18	Provide customer with secure online access for electronic services	High	3.1.7.3	The system shall provide secure access to TTT Portals based on stakeholder level, including (see Section 2.1): 3.1.7.1 Customer Portal: Individual 3.1.7.2 Staff Portal: Prior-approved Caretakers, Sponsors, Human Service Agencies, and Community Organizations. Provider Portal: Prior-approved DRT Providers.	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.18	Provide customer with confirmed fare after booking trip	High	3.4.4.1.15	DRT Provider confirms the existing customer's requested trip and fare within ten seconds.	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.18	Provide customer with confirmed fare after booking trip	High	3.4.4.1.16	DRT Provider sends the confirmed trip, fare, and cancellation policy information to the existing customer by e-mail or text (preference listed in their profile).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.18	Provide customer with confirmed fare after booking trip	High	3.4.7.6.13	DRT Provider confirms the existing customer's requested trip and fare.	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.18	Provide customer with confirmed fare after booking trip	High	3.4.7.6.14	DRT Provider sends the confirmed trip, fare, and cancellation policy information to the existing customer by e-mail or text (preference listed in their profile).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.19	Provide customer with trip confirmation (after trip is scheduled)	High	3.4.4.1.16	DRT Provider sends the confirmed trip, fare, and cancellation policy information to the existing customer by e-mail, text, phone, website, or APP (preference listed in their profile).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.19	Provide customer with trip confirmation (after trip is scheduled)	High	3.4.7.6.13	DRT Provider confirms the existing customer's requested trip and fare.	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.19	Provide customer with trip confirmation (after trip is scheduled)	High	3.4.7.6.14	DRT Provider sends the confirmed trip, fare, and cancellation policy information to the existing customer by e-mail or text (preference listed in their profile).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	1.20	Enable data to be shared between DRT Providers	High	4.3.10	The system shall provide secure data sharing between agencies, such as existing customer trip information.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.21	Trip verification/confirmation (who owns the trip - client's host agency?)	High	3.4.4.1.17	Provide the confirmed trip and fare information to the existing customer's sponsoring agency (if applicable).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	1.21	Trip verification/confirmation (who owns the trip - client's host agency?)	High	3.4.7.6.15	Provide the confirmed trip and fare information to the existing customer's sponsoring agency (if applicable).	ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.00	Create DRT Provider inter-agency service agreements	High	4.5.1.1	Create DRT Provider inter-agency agreements for TMCC participation.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.01	Create a DRT Provider "agency-only" telephone number	High	4.2.4.1.9	Create a DRT Provider "staff only" telephone number to address administrative, operations, and customer needs.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.03	Develop operations coordination protocols between DRT Providers (business rules)	High	4.5.2.3	Develop DRT Provider operational policies and procedures to support inter-agency trip coordination and TMCC service provision, such as trip booking, day of service trip management (where applicable), staff communication, age eligibility, and customer needs support.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.04	Develop minimum DRT Provider levels of insurance, staff training, and maintenance	High	4.5.2.2	Develop the following service provision requirements. 4.5.2.2.1 Minimum level of vehicle insurance. 4.5.2.2.2 Staff training requirements (CSR, administrative, driver). 4.5.2.2.3 Technology support and maintenance. 4.5.2.2.4 Vehicle maintenance.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.06	Encourage customers to use fixed route as options to DRT	High	4.5.10.1	Encourage customers to utilize fixed route transit services.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.07	Understand DRT Provider institutional barriers	High	4.5.10.2	Identify and address DRT Provider barriers to participate in the TMCC.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.08	Involve DRT Provider governing boards in the process as appropriate (those applicable)	High	4.5.10.3	Engage DRT Provider Boards of Directors (those appropriate) in the TMCC process.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.09	Utilize existing DRT Provider call centers	High	4.2.4.1.5	Be capable of transferring telephone calls in a “One-Call” manner between DRT Providers.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.09	Utilize existing DRT Provider call centers	High	4.4.3	The system shall be designed so that all telephone access functions can be transferred to another DRT Provider or stakeholder agency.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.09	Utilize existing DRT Provider call centers	High	4.4.6	The system shall be capable of being managed from remote locations for emergency management purposes.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.09	Utilize existing DRT Provider call centers	High	4.6.1	Develop DRT Provider operational protocols to support inter-agency trip coordination and TMCC service provision, such as trip booking, day of service trip management, staff communication, age eligibility, and customer needs support.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.11	Create a project name and logo	High	4.5.7.3	Market new TMCC brand and co-brand with other participating DRT Provider, transportation, and information stakeholders.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.12	Place logo in a visible location on all participating DRT Provider vehicles	High	4.5.7.5	Identify methods for the receipt, collection, and tracking of customer feedback.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.13	Marketing and promote the TMCC to the public	High	4.5.7.1	Create a TMCC marketing plan, including a cost-sharing agreement to implement the marketing plan.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.13	Marketing and promote the TMCC to the public	High	4.5.7.2	Create a new TMCC brand, including name and logo.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.13	Marketing and promote the TMCC to the public	High	4.5.7.3	Market new TMCC brand and co-brand with other participating DRT Provider, transportation, and information stakeholders.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.14	Conduct customer education campaign	High	4.5.7.4	Promote new TMCC brand through public education, adverting, and logo on all participating TMCC DRT Provider vehicles.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.15	Establish accounting (payment/reimbursement) procedures between providers	High	4.5.5.4	Develop DRT Provider and participating stakeholder fare management processes, including reimbursement rates for coordinated trips.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.15	Establish accounting (payment/reimbursement) procedures between providers	High	4.5.5.5	Develop and document DRT Provider accounting processes, including payment and fare management services.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.15	Establish accounting (payment/reimbursement) procedures between providers	High	4.5.5.6	Create fare media management policies and procedures.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)

Revised ConOps Page #	Need #	Collated Stakeholder Need	Stakeholder Priority (from ConOps)	Primary or Sub Requirement ID#	Requirement	Requirement Category (ITS/Non-ITS)	Project Requirements (M=Mandatory; O=Optional)	High-Level System Design Component
22	2.17	Conduct DRT Provider staff training	High	4.5.8.1	Create and provide TMCC start-up and ongoing training for DRT Providers and other stakeholder staff on all system policies and procedures.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.17	Conduct DRT Provider staff training	High	4.5.8.2	Train DRT Provider and participating stakeholder staff on the website, mobile, telephone, in-person, and staff portal access methods and features.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)
22	2.18	Identify DRT Provider staff to support the TMCC	High	4.5.4.1	Identify DRT Provider and participating stakeholder staffing and roles in support of the TMCC.	Non-ITS	M	Non-ITS (System) - Referenced in System Requirements (non-functional)