Phase 2 Operational Readiness Plan (ORP)

Georgia Department of Transportation ITS4US Deployment Project

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Final Report — April 11, 2025

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ITS4US

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U.S. Department of Transportation

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16. Abstract

The Georgia Department of Transportation ITS4US Deployment project, Safe Trips in a Connected Transportation Network (ST-CTN), is leveraging innovative solutions, existing deployments, and collaboration to make a positive impact using transportation technology to support safety, mobility, sustainability, and accessibility. The ST-CTN concept is comprised of an integrated set of advanced transportation technology solutions (connected vehicle, transit signal priority, machine learning, predictive analytics) to support safe and complete trips, with a focus on accessibility for those with disabilities, older adults, and those with limited English proficiency.

The Operational Readiness Plan (ORP) documents the testing and demonstration process in order to establish operational readiness for the ST-CTN system. The ORP includes the Operational Readiness Test Plan (ORTP) and the Operational Readiness Demonstration Plan (ORDP).

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1 Introduction

The Georgia Department of Transportation (GDOT) and Atlanta Regional Commission's (ARC) Safe Trips in a Connected Transportation Network (ST-CTN) project was selected by the U.S. Department of Transportation (USDOT) as a part of the ITS4US Deployment Program. The project seeks to enhance the traveler's complete trip travel experience by enhancing mobility, accessibility, reliability, and safety for system users, particularly for underserved communities, including people with disabilities, older adults, and users with limited English proficiency (LEP). This is done by leveraging innovative solutions, existing deployments and team collaboration such as integrating connected vehicle (CV) data with an open-source software-based trip planner that is used to provision web-based and mobile application user access. The trip planner will provide users with the ability to create a personalized trip plan with information regarding the navigation of physical infrastructure, the ability to resolve unexpected obstacles, and ensure users' visibility throughout the trip. The proposed deployment will provide targeted users with the ability to dynamically plan and navigate trips.

The Operational Readiness Plan (ORP) documents the testing and demonstration process in order to establish operational readiness for the ST-CTN system. The ORP details the testing approach to ensure that the system requirements documented in the System Test Plan (STP) are met. The ORP includes the Operational Readiness Test Plan (ORTP), which provides a comprehensive list of test procedures and the mechanisms for which testing will be completed. Additionally, the ORP includes the Operational Readiness Demonstration Plan (ORDP), which ensures that the system performs as expected in key use cases and scenarios. The demonstration process, including the overall demonstration strategy and list of demonstration events, are provided within this document. When all testing is satisfactorily completed and all demonstrations are suitably successful, the deployment can be considered ready to move into an operational phase.

1.1 Intended Audience

The ST-CTN project is being led by the Georgia Department of Transportation (GDOT). The intended audience for this ORP is the USDOT and the ST-CTN project team, which includes GDOT and the following partners:

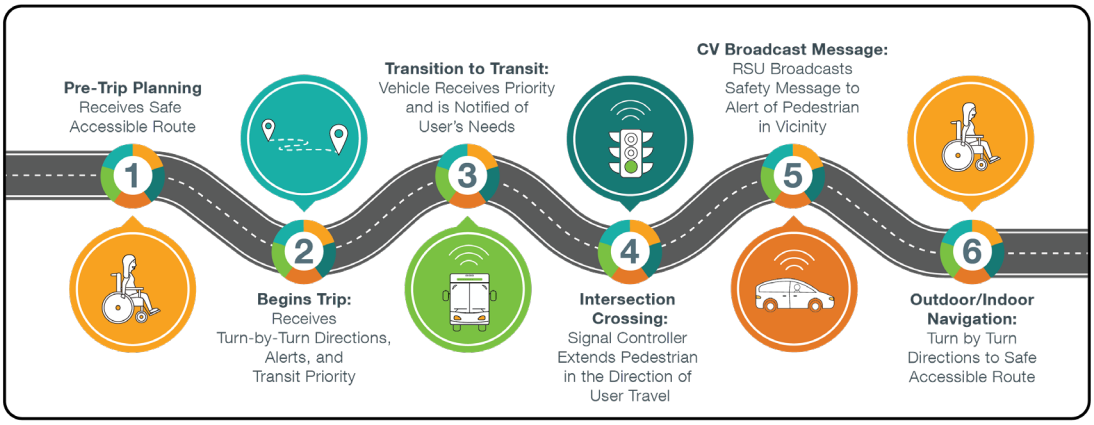
- ARC
- Gwinnett County
- Statewide Independent Living Council of Georgia (SILCGA)
- GO Systems and Solutions (GOSystems)
- Georgia Institute of Technology (GA Tech)
- Arcadis
- ICF International, Inc. (ICF)

- Kimley-Horn and Associates, Inc. (KHA)
- Georgia Tech Research Institute (GTRI)
- Avail Technologies (Avail)

This document provides the details regarding operational readiness for the ST-CTN deployment and is intended to be utilized as a reference by peer agencies and industry professionals that are interested in deploying a system similar to the ITS4US ST-CTN Deployment.

1.2 Project Background

The ST-CTN project aims to upgrade and integrate existing technologies and services to assist underserved populations with completing their complete trip successfully, safely, and reliably. The vision of the project is to provide users complete trip functionality with directions, conditions, and status on the links between trip legs that are personalized based on the user's profile, while connecting the user to CV infrastructure to provide safer trips and more transportation network awareness. As an illustration of how the ST-CTN system will be used, transit-based trips were delineated into six segments (as depicted in **Figure 1**) to allow for easier understanding and a greater breakdown of priorities and goals.



Source: ARC, 2020

Figure 1. Traveler's Complete Trip

The delineated trip segments include the following steps and project components:

- **Step 1 Pre-Trip Planning.** The traveler plans for and receives a safe accessible route.
  - The ability to customize trip preferences based on the user's abilities.
- **Step 2 Begins Trip.** The traveler begins their trip and receives turn by turn directions, alerts, remote pedestrian activation, and can trigger transit signal priority (TSP) if the user requires additional time boarding or alighting a transit vehicle, is unable to stand for long periods, or is sensitive to weather conditions.
  - Turn by turn, shortest path, directions along pathways that meet user defined preferences.

  - Provides support services for users if they become disoriented or have issues accessing defined paths.
  - Activates TSP for buses if the user requires additional time boarding or alighting a transit vehicle, is unable to stand for long periods, or is sensitive to weather conditions.

- **Step 3 Transition to Transit.** The traveler transitions to transit and the transit vehicle receives priority and is notified of users' needs. TSP can be triggered if the bus is running behind schedule due to a longer boarding time needed by a user.
  - Provides users with transit trips that have accommodations that meet user defined preferences.
  - Sends alerts to transit vehicles when users need additional time to board, navigate internally, or alight the transit vehicle.
  - Remotely requests service from transit vehicles while waiting to board or alight.
  - Triggers TSP if the bus is running behind schedule due to a user needing additional time to board or alight.
- **Step 4 Intersection Crossing.** When crossing a signalized intersection, the traveler indirectly interacts with the signal controller in that an authorized system call is made to the controller which extends the pedestrian phase in the direction of user travel.
  - Allows the user to communicate with connected intersections if they are unable to reach or press the crosswalk button.
  - Provides the user with information about the intersection crossing and adds time to the crossing if needed.
- **Step 5 CV Broadcast Message.** Roadside units (RSUs) broadcast safety message to alert CVs of pedestrians in the intersection.
  - Provides the ability for users to remotely request service from transit vehicles while waiting to board or alight.
  - Provides communications to CVs from pedestrian crossing signal systems (via RSUs) to make them aware of pedestrians crossing a roadway.
  - Provides communications between transit vehicles and travelers waiting at a transit stop to make them aware of each other.
- **Step 6 Outdoor/Indoor Navigation.** The traveler is provided with turn-by-turn directions to a safe accessible route.
  - Hands-free navigation via mobile apps and/or wearables and accessible channels (haptic, voice, text).
  - Alerts and dynamic rerouting in response to changes in path conditions.
  - Provides the user with accessible routes into and through transit hubs within the project area.
  - Provides users with updates on the operating status of indoor infrastructure such as elevators and escalators.

There is an additional **Step 7** that is not part of the traveler's complete trip but is part of the St-CTN system: **Reporting.** This step provides summaries of the data collected during the Complete Trip process.

System development and system integrations completed within the scope of this project will enable travelers – specifically those in the underserved community – to program and safely complete single mode or multimodal trips that are based on their abilities; improve the transition between modes by providing additional details to users and transit service operators; suggest dynamic routing changes based on infrastructure condition and calculated delay.

The existing initiatives that are being leveraged to support the proposed ST-CTN system are defined in more detail below as well as those components that will be developed specifically to support ST-CTN project evaluation. The icons and colors depicted below are used throughout the SAD to clearly identify the critical components of ST-CTN. In some cases, partner agencies are upgrading the services within their current systems to create a more robust data set or toolset for the ST-CTN program.



OTP for G-MAP. Atlanta Rider Information and Data Evaluation System (ATL RIDES) includes an Open Source Software (OSS) multi-modal trip planning and mobile application, integrated mobile fare payment options, and a Connected Data Platform (CDP) using regional General Transit Feed Specification (GTFS) transit service data. The tool supports multi-agency context, multilingual support, and mobile app turn-by-turn directions. The OpenTripPlanner (OTP) architecture facilitates integration with additional OSS tools including a data analytics engine, call center module with application programming interfaces (APIs), and account management system. The existing ATL RIDES application will be modified and enhanced based on ST-CTN project needs and leveraged to create a new, independent application which will be differentiated as the *OTP for G-MAP* subsystem (hereafter referred to as G-MAP).



SIDEWALKSIM. SidewalkSim is an asset management system and shortest path (lowest impedance) routing tool for pedestrian pathways. Site inspections provide more detailed Americans with Disabilities Act (ADA)- and inclusive- design and condition data for use in pathway accessibility analysis. SidewalkSim identifies the best path between any two points in the pedestrian network, given the set of pathway characteristics and any user-specified needs and route penalties.



CV1K. The Atlanta region is home to one of the largest CV deployments in the United States – Regional Connected Vehicle Infrastructure Deployment Program (CV1K). CV1K is deploying interoperable CV technologies at signalized intersections throughout the Atlanta region using both Dedicated Short-Range Communications (DSRC) and Cellular Vehicle to Everything (C-V2X) technologies to deliver safety and mobility-based applications. The program provides support to configure, operate, and maintain CV infrastructure and applications, including TSP. Gwinnett County is one of the largest recipients of the first phase of this deployment.



CVTMP. Gwinnett County's Connected Vehicle Technology Master Plan (CVTMP) sets out to develop and improve economic viability and quality of life, address the needs and challenges to motorized and non-motorized modes, establish guidelines for deploying technology, and have broad applicability to Gwinnett, other local jurisdictions, and across the state—to set the standard for implementing CVs. Among the high priorities is establishing a mobile accessible safety program and alternative strategies for TSP in Gwinnett County.



STM. The Space Time Memory (STM) platform processes traffic volume and speed data from multiple monitoring and modeling sources, tracks network performance measures, and predicts evolving route conditions using traditional and machine learning techniques. The STM projects trip trajectories through the transportation network, as network conditions change in space and time. This tool will be applied to analyze and predict performance through the multi-modal transportation network. The shortest path analysis will be applied to the combined roadway, transit, sidewalk, and shared-use path networks, allowing routing decisions to incorporate travel time, safety, and other impedances into path selection.

In addition, the ST-CTN system will include the development of a Performance Measurement Dashboard (PMD) that is not currently in use.



PMD. The PMD is a data storage and distribution tool that archives operational, survey and performance metrics of the system. The PMD is envisioned to ingest, quality check, and curate all types of data – static and dynamic, structured and unstructured, open and private datasets. The PMD will store the datasets so that they can be viewed and accessed based on user roles. The PMD will include a public PMD for the public to access open data presented on an interactive dashboard to the public.

1.3 Scope

This document details the plan to test and demonstrate the operational readiness of the ST-CTN deployment. The ORP seeks to validate that the ST-CTN system addresses the needs and desired capabilities identified in the Concept of Operations (ConOps) and meets the system requirements defined in the Systems Requirements and Specifications (SyRS) Document and System Test Plan (STP). The ORP is intended to be a living document and will be updated to reflect final test procedures and readiness demonstration changes throughout the remainder of Phase 2.

2 Operational Readiness Test Plan (ORTP)

The Operational Readiness Test Plan (ORTP) defines the operational objectives and requirements for a system that must be demonstrated through testing. It also identifies who is responsible for each task, creates a timeline for each task, and what tests must succeed before going live. This plan provides objectives and background for the operational readiness testing. The plan also includes the test approach, the test deliverables, responsibilities, staffing and training needs, schedule, risks and contingencies, and test approvals.

2.1 ORTP Introduction

The ORTP provides a summary of the set of tests and supporting demonstrations that together establish operational readiness. The ORTP has the following objectives and background.

2.1.1 Objectives

The ORTP defines the following objectives:

- **Test approach.** This approach includes the project items to be tested; hardware, software, tools, resources and environment to be used to support the testing; types of tests to be performed; and resources and constraints.
- **Operational Readiness Test Deliverables.** This section outlines the test artifacts.
- **Responsibilities.** This section describes the responsibilities of each entity involved in the testing.
- **Staffing and Training Needs.** This section identifies the staffing and coordination activities required prior to conducting tests.
- **Schedule**. This section describes the schedule for conducting the operational readiness tests and any interdependencies between the different test cases.
- **Risks and Contingencies**. This section describes the known risks and contingency plans while conducting the tests
- **Operational Readiness Test Approvals.** This section lists the person(s) who are required to confirm completion of the system testing.

2.1.2 Background

The development of the ORTP is guided by the ConOps, specifically the defined end user's complete trip concept diagram and steps (described in Section 1.2 of this document) and the use cases defined in Section 6 of the ConOps document. The ConOps defines two use cases: Use Case 1: Traveler's Complete Trip with ST-CTN and Use Case 2: Connected Vehicle Applications.

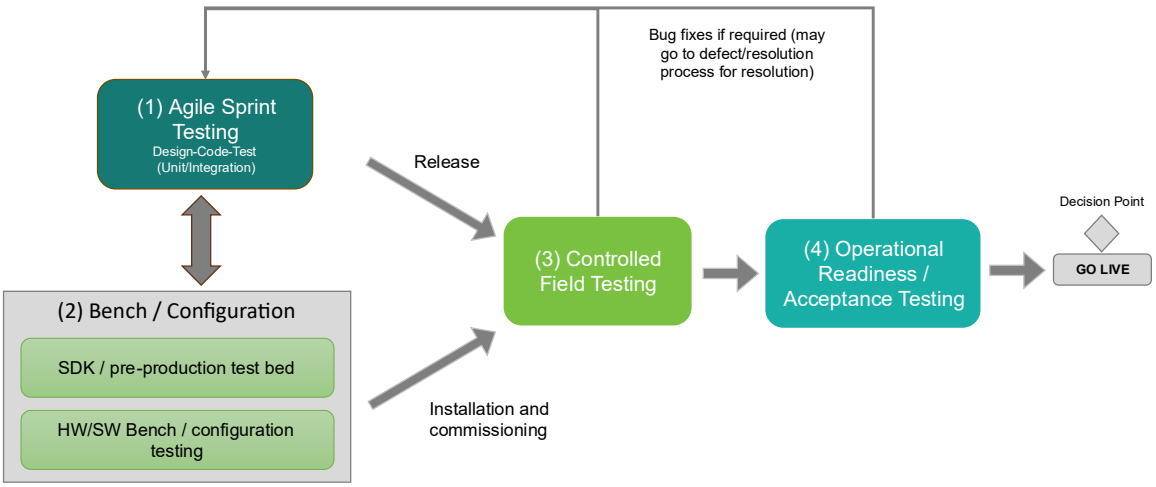
The tests that are identified in this ORTP are documented in the System Test Plan (STP), which is a precursor plan that gives a high-level overview of the types of testing. The STP defines the system test strategy, the flow of testing, and the interdependence between activities. The STP discusses the overall test processes within the program, including how test failures are handled, how regression testing is accomplished, how deficiencies/defects are handled and reported, and how the test results are reported. The STP includes a Requirements Traceability Matrix (RTM) that shows traceability between every system requirement, its test verification method, and the specific test cases that it verified. The ORTP provides a more detailed approach of all of these elements. Prior to the start of the operational testing defined in the ORTP, a System Test Results Summary (STRS) was provided that summarized test results from the testing outlined in the STP, which included pass/fail status of the test, number of defects found, and number of defects resolved.

The Installation and Operational Readiness Schedule (IORS) will include a work breakdown structure of activities and dependencies required to implement ORP. After the operational demonstrations, the test results of the tests identified in the ORTP will be documented and reported according to the processes identified in this ORP.

2.2 Approach

The high-level testing overview as shown in **Figure 2** describes the high-level approach for testing systems in-development (Agile) and existing systems (Bench/Configuration). The two processes are integrally connected through the interface integration. APIs or Software Development Kits (SDK) are tested during the Agile development of the STM or G-MAP, while any hardware component or configurable commercial-off-the-shelf (COTS) software product is verified through its output or proprietary configuration tools. The testing approach merges into a single process flow once the hardware/ COTS is deployed into a controlled environment for verification and validation by stakeholders. These controlled tests are typically conducted manually by trained staff who follow a formal testing procedure. Once controlled field testing is completed, the system is deployed into a production environment where full, comprehensive system testing occurs.

The decision point to go-live depends on the passage of acceptance criteria – verification that all requirements are met and validation that the system performs as expected (that user needs are met). Verification testing is performed prior to validation testing, and validation testing composes the core of the operational readiness testing processes.



Source: GDOT, 2023

Figure 2. High-Level Testing Approach

As depicted in **Figure 2**, the STP/PMD and G-MAP subsystems includefive major testing phases and processes for defect tracking. A high-level summary of each expected test phase along with the process of documentation is described as the following:

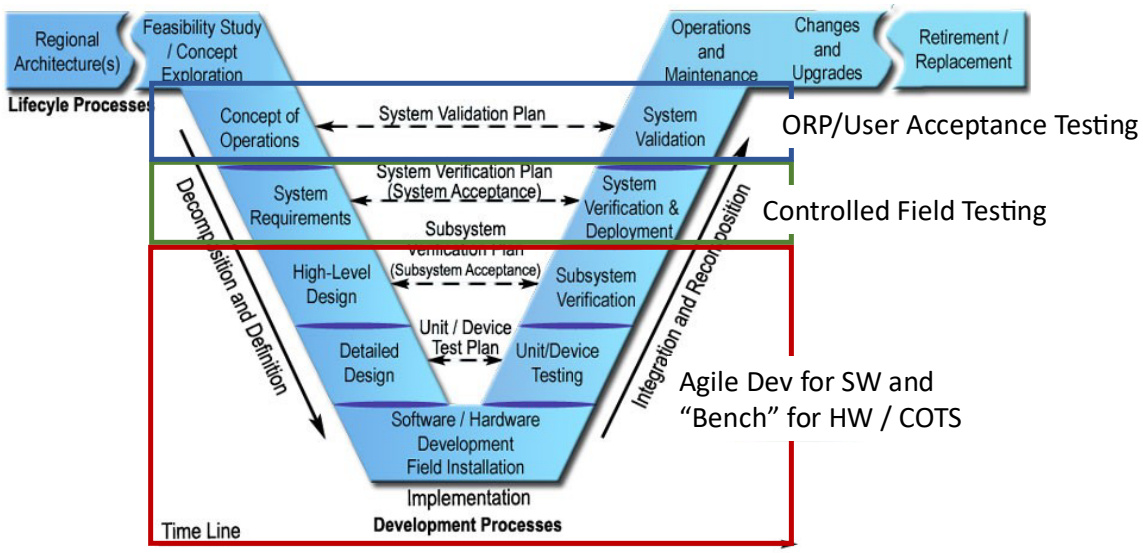
1. *Agile Sprint Testing*: Agile development includes a pre-production environment where each user story is tested and then merged and tested with the code base. Both the STM and G-MAP will undergo this process before it is released to controlled field testing. The expected types of testing to occur during Agile development consist of unit and integration testing.
    a. *Unit Testing:* Each user story will be tested for acceptance of functionality before the code is integrated into the larger code-base. A user story may consist of a self-defined unit of the subsystem (e.g., notification in G-MAP) or an integration element using an API or SDK from an external system (e.g., G-MAP and Ride Request API). Testing of the interface is typically conducted using a pre-production environment provided by the vendor of the existing system or COTS.
    b. *Integration (merge) Testing:* Integration testing is composed of merging new or revised code into the base code, for example, when a user story module is merged with the G-MAP code base.
2. *Bench and Configuration Testing*
    a. Bench testing is the inspection stage of receiving and testing equipment to ensure hardware or software meets the expected specifications. Examples of bench testing include inspecting that the battery is fully charged, determining if SDK can be compiled correctly, or if equipment is in working order. It might also consist of analyzing that the equipment operates within its specified parameters.
    b. Configuration testing consists of determining whether the system produces the desired results once the equipment or software is installed.
3. *Controlled Field Testing (CFT):* Once the Agile process issues a release, user acceptance Alpha testing will begin. Alpha testing continues after each release and includes the integrated components when they are in a ready-state to test (e.g., hardware has been inspection, and COTS configured). The testing may be conducted in the field, a simulated environment, or test bed. Since controlled testing will occur throughout the Agile process with interim releases, full system testing occurs on the system that is currently deployed. The final CFT for the full system occurs at the end of the sprints. This final set of testing –

using automated and manual test procedures for a comprehensive set of test scenarios and data sets- will cover the full system testing in a controlled environment.

4. *Operational Readiness / Full System Testing:* Once the final set of CFT occurs and the system is fully deployed, the full / operational testing will be performed in the production environment ("real-world"). Testing documentation will show that the tests have been verified against the requirements and validated against user needs / expectations. The use cases developed in the ConOps to meet user needs will be demonstrated to key stakeholders during operational readiness demonstrations.
5. *Defect / Deficiency Tracking and Resolution Processes:* The testing process also includes a process to track defects and deficiencies discovered during the testing process. This tracking and resolution process tracks a defect through its lifecycle from detection to resolution, including describing the tests that are required (i.e., regression tests) to show that the defect has been fixed.

2.2.1 Overall Test Strategy

The "Vee" systems engineering diagram visually represents a sequential development process, but does not necessarily describe the integration of COTS, existing systems, or Agile methodologies. The types of system development and verification and validation (V&V) approach used by the ST-CTN can be summarized by three tiers that correspond to the three phases depicted in **Figure 2** (Agile Development for software (SW) and "Bench" for hardware (HW)/COTS, CFT, and ORP/User Acceptance Testing). **Figure 3** describes the "Vee" diagram testing and V&V tiers in context of the three testing tiers defined by the ST-CTN project.



Source: USDOT with Annotations by GDOT, 2023

Figure 3. Relationship Between ST-CTN Testing Approach and System Engineering "Vee" Diagram Testing Phases

Starting from the junction (bottom) of the "Vee" diagram, the Agile process incorporates detailed design, software development and unit testing into incremental units (i.e., user stories). Prior to moving to the next user story, the current user story code is integrated into the main code branch (or code base). In doing so, merging the current code with the main branch requires that a sample or all previous automated test procedures are executed to verify the code works as

expected. Because each user story is associated with a requirement(s), the system engineering traceability is preserved from requirement to design and test procedure / case result. The Agile demonstration ceremony incorporates interim end-to-end demonstration (system verification) with user acceptance (system validation) through stakeholder demonstrations. This provides stakeholders the opportunity to contribute input and see progress during development instead of waiting until the end of complete system development, when changes will be much more difficult to make.

COTS and existing systems such as the indoor navigation system, traffic signal system, and the Ride Request application do not include detailed or high-level design elements for their functional components. These elements are proprietary or out of scope of the ST-CTN system. Rather, they require component inspection and analysis that the operations and/or results are as expected. This bench testing corresponds to device testing, and the configuration testing provides end-to-end results that correspond to the subsystem verification.

The CFT corresponds to the system acceptance or system verification plan. Several times during the Agile development process, a release will be produced on the pre-production platform that will be subject to CFT testing. CFT testing includes a combination of automated testing, data analysis, and alpha testing. Each requirement is tested in a controlled environment against boundary data and through formal test procedures. For example, the same test procedure may be tested on multiple test platforms and channels, such as web browsers (e.g., Edge, Chrome, Firefox) and mobile operating systems (iOS, Android). These tests are end-to-end tests (also called black box testing). All technical – functional, performance and operational - requirements will be tested in the CFT phase. User facing software tests will include accessibility and usability. The ST-CTN will conduct several CFT tests following each major software release (see schedule). At the final CFT, the system should be fully integrated and tested.

The ORP describes elements of the system validation plan which includes how this STP will be implemented. The ORP ensures that the system meets user needs and expectations. The ORP includes a summary of the test results and demonstration of the use cases.

2.2.2 Test Identifier Structure

The test procedures are identified by release number and test case. Within each release, test procedures are associated with the Epics documented in the STP. This is to ensure that the appropriate functionality and requirements are tested in each test procedure. For each test procedure, a unique test case is identified, depending on the platform or device the test procedure is intended for. The system test procedure and system test case terms are defined as:

- **System Test Procedure** – Each test procedure includes an introduction, body and scoring section. The introduction describes the purpose, requirement(s) under test (if applicable), the execution conditions (i.e., trigger event), and inputs. The body of the test procedure includes a sequence of actions, expected results, remarks, and blank entry for the tester to mark the results. The end of each test procedure includes a scoring section for the tester to mark pass or identify any defect in the system.

- **System Test Case** – A formal test case is developed and conducted during the CFT for each major release. The test case describes one or more **system test procedures** that are manually conducted to exercise the system on different platforms (web, mobile).

The Test ID for the test procedures is defined with the following nomenclature:

AB-C.D-EF-GH, where:

- AB = Release number
    - R1 = Release 1
    - R2 = Release 2
    - R3 = Release 3
    - R4 = Release 4
- C.D = Test procedure number
    - C = 1, 2, 3, or 4 (depending on the release number)
    - D = Number of test procedure in ascending order
- EF = Test case ID
    - 01 = iOS (iPhone)
    - 02 = Android
    - 03 = Google Chrome
    - 04 = Microsoft Edge
    - 05 = Firefox
    - 06 = Safari
- GH = Retest case ID

For example, the Test ID R2-2.3-01 is associated with the third test procedure in release 2 for an iOS device (iPhone).

2.2.3 Test Structure and Management

The following subsections document the information, materials, and mechanisms associated with the testing process.

Test Procedure Format

Each test procedure will be documented in a Microsoft Word file that contains the following items:

- **Test header**. The test header is a table that contains relevant information regarding the test procedure. If applicable, the test header includes the test ID, test procedure name,

device/platform, release version, test case number, browser version, operating system (OS) version, application version, test data ID, requirement ID(s), date tested, tester, and test result (pass/fail). An example test header is provided in **Figure 4**.

Header Information	
Term	**Description**
Test ID	R1-1.2-03
Test Procedure Name	Account Creation
Device/Platform	Google Chrome
Release Version	1
Test Case Number	03
Browser Version	Version 126.0.6478.185
OS Version	Windows 11, version 23H2
Application Version	n/a
Test Data ID	n/a
Requirement ID(s)	1.1.0-012, 1.1.0-013, 1.2.0-018, 1.2.0-022, 1.2.0-023, 1.2.0-024, 1.4.0-039
Date Tested	7/29/2024
Tester	Tarek Elfallah
Pass/Fail	Fail

Figure 4. Example Test Header Screenshot

- **Related Test Data.** The related test data is provided in a table after the test header, as identified in **Figure 5**, and includes the following information:
    - **Test Objective**: The test objective states the objective of the test procedure and lists any scenarios included in the test procedure, if applicable.
    - **Requirement IDs and Definitions**: The requirement IDs, that the test procedure is evaluating, are documented and defined within the test procedure.
    - **Prerequisites**: Any prerequisites that are necessary for the tester to complete the test procedure should be noted.

Example Procedure: Guest Functions
Objective: Ensure that G-MAP provides the necessary functionality to successfully plan a trip for a guest. **Requirement ID & Description:** • **1.2.0-018 – G-MAP Core Functionality** - The system shall utilize the OTP and ATL RIDES (IMI grant) functionality, interfaces, architecture and infrastructure as the core G-MAP for the ST-CTN. **Prerequisite:** Desktop: bring up app on browser

Figure 5. Example of the Related Test Data screenshot

- **Step by step testing instructions**. The step by step testing instructions provide a detailed, sequential guide that outlines the specific actions and procedures to be followed by the tester during the testing process. These instructions are designed to ensure consistency, accuracy, and completeness in testing by providing clear, easy-to-follow steps. As identified in **Figure 6**, the instructions are included in a table, directly after the related test data, and contain the following columns:

- **Test Step/Requirements**: Sequential instructions that the tester is to follow and complete
- **Expected Result**: Describes the expected outcome for each step to assist the tester in identifying if the test is proceeding correctly
- **Validation (Pass or Fail):** The tester indicates if the test step has passed or failed the expected result
- **Comment:** This field is intended for the tester to input any relevant or useful information that was discovered or input during the testing process

Test Step/Requirement	Expected Result	P	F	Comment
1. Desktop: click on URL to open app gmap.ibi-transit.com	Splash page opens with current location (mobile) or Gwinnett (desktop) as center of the map	x		
2. Manipulate map – move (grab), enlarge (+ or scroll), minimize (- or scroll), point north (up arrow)	Map will move from current location	x		
3. Click on transit stops layer (toggle Transit Stops)	Transit stops will appear and disappear from your map.	x		

Figure 6. Example of the Step-by-Step Instructions screenshot

- **Test Result**. The test result, whether G-MAP passed or failed the test, is documented within the test header.

2.2.3.1 Master Test Matrix Format

The master test matrix is a sheet, within the comprehensive Microsoft Excel file (Test Matrix.xlsx, designed to document and manage the testing procedures throughout the testing process. It serves the key functions listed below:

- **Documentation of testing procedures**. It documents all the testing procedures and includes all the related information associated with each test procedure, such as test ID, test procedure name, test case, test result, test status, file URL and more.
- **Tracking Progress.** It monitors the progress of the testing activities, providing a clear view of which tests have been completed, which are in progress, and which are yet to be started.

The information documented within the master test matrix is defined in **Table 1**.

Table 1. Master Test Matrix Metric and Descriptions

Metric	Description
Test ID	The unique identifier assigned to each test procedure to distinguish it from others. The Test ID will include an abbreviation that represents the release version (i.e. R1) and will be followed by the testing procedure (1.0), and finally, will be followed by the test case number. The Test ID naming nomenclature is further explained in Section 2.2.2.
Test Procedure Name	The name or title of the specific test procedure.
Device/Platform	The specific device or platform (e.g., iOS, Android) on which the test is being conducted.
Release Version	The release version for G-MAP that the test procedure is associated with.
Test Case Number	The test case describes one or more system test procedures that are manually conducted to exercise the system on different platforms (web, mobile).
Browser Version	The version of the web browser used during the test (if applicable).
OS Version	The version of the operating system on the device being tested.
Application Version	The version of G-MAP used during the test.
Test Data ID	Data used to test certain features of the STM or G-MAP. For example, when testing the routing for wheelchair vs. low vision vs. no assistive device, the data sent in the STM Impedance API may have a curb cut removed from an intersection in the path of a designated origin-destination.
Requirement ID(s)	The requirement ID(s) the test procedure is testing for.
Test Date	The date on which the test was conducted.
Tester	The name of the person who performed the test.
Pass/Fail	The tester should record a successful test (one that meets all the criteria of the test being performed) as pass. The tester should record an unsuccessful test (one that does not meet the criteria of the test being performed or has other bugs necessary to perform the test) as Fail.

Metric	Description
Verification Method	The verification method to ensure the requirements are met, as defined in Section 2.4 of the STP. • **Inspection** – Where the requirement is verified by visual inspection or review of software code. • **Demonstration** – Where the requirement is verified by demonstrating a specific capability or action. Demonstration is usually verified during the execution of the test itself; you witness the capability accomplishing the requirement. • **Analysis** – Where the requirement is verified by an analysis method. As an example, performance metric algorithms are usually verified by analysis to ensure that the data and calculations are ingested and processed correctly. • **Test** – Where the requirement is verified by a test that is run and then later verified by analysis, inspection or demonstration. Many times, performance requirements are verified by test as it may not be immediately obvious if a performance requirement was met until analyzing logs to determine the precise times when events occurred.
Script Writer	The person who wrote the test script.
Script Status	The current status of the test script (e.g., draft, final, in review).
Test Procedure URL	The URL link to the test procedure word document.
Test Data URL	The URL link to the test data. This data will not be accessible by the public.

2.2.3.2 Description of Master Issues / Remediation matrix

Within the master test matrix file, the sheet labeled remediation matrix serves as the log to manage, track, and report issues that are discovered throughout the testing process. The remediation matrix will document all the test steps that fail within the test procedures and track the remediation progress. **Table 2** identifies the information included in the remediation matrix.

Table 2. Remediation Matrix Metric and Descriptions

Metric	Description
Test ID	The unique identifier assigned to each test procedure to distinguish it from others. The Test ID will include an abbreviation that represents the release version (i.e. R1) and will be followed by the testing procedure (1.0), and finally, will be followed by the test case number. The Test ID naming nomenclature is further explained in Section 2.2.2.
Test Procedure URL	The URL link to the test procedure word document.

Metric	Description
Test Step	The test step within the test procedure that the issue was identified.

Severity	The severity level of each defect will be recorded according to the values defined in the STP.
	
	1. **Low:**
	  ○ Impacts to user experience and usability, e.g., feedback from users on UI, notifications, turn-by-turn directions
	  ○ Incorrect information due to data input (e.g., GTFS, OpenStreetMap triggered by incorrect directions)
	  ○ Minor failure identified during CFT procedure (e.g., missing flow in user process)
	2. **Medium:**
	  ○ Impacts to operations or integrated operations that do not impact safety, privacy, or security
	  ○ Impacts to user accessibility when challenges arise in UI/UX
	3. **High:**
	  ○ Impacts to participant safety or system security that is localized (e.g., at a specific intersection)
	  ○ Persistent defect or anomaly occurring in system
	4. **Critical:**
	  ○ Impacts that disrupt or shuts down system operations
	  ○ Cybersecurity issue that impacts Personally Identifiable Information (PII)

Description	An explanation of the issue encountered during testing.
Date Reported	The date the issue was reported.
Date Resolved	The date the issue was resolved.
Status	Each issue will be monitored and given a specific status. The status values have previously been defined in Section 6.4 of the STP. • **Open**: defect is identified as an issue that must be resolved and is designated a ticket • **In-progress**: ticket is assigned to a developer to resolve • **Resolved**: a ticket was resolved and is waiting for final testing and approval • **Closed**: a ticket received final testing and approval from the technical team • **Abandoned**: a ticket was abandoned because it no longer is a problem (code was changed) or due to an external factor • **Re-opened**: a closed ticket was reopened because the problem continues to occur
Status Notes	Additional notes or comments about the current status of the issue.

Metric	Description
Reporter	The name of the person who reported the issue.
Remediation Comment	Comments or notes on the actions taken to remediate the issue.
OTP Ticket ID	The ID associated with the software development ticket on the Jira board.
Retest Status	Indicates whether the issue needs to be retested after remediation and the current status of that retest (e.g., incomplete, in-progress, complete, n/a).
Retest Version	The specific version of the retest, in ascending order (e.g., 1, 2, 3, 4, etc.).
Retest Date	The date the test procedure was retested.

2.3 Operational Readiness Test Deliverables

Operational Readiness Test Deliverables will consist of the following sets of artifacts:

Test Procedures – the set of test procedures that verify the components that will be demonstrated to show operational readiness of all aspects of the G-MAP system. The template for the test procedure is described in Section 2.2.3. **Table 3** contains a list and high level description of each test procedure that will be conducted on various platforms.

System Test Results Summary (STRS) – the *Master Test Matrix,* an Excel workbook described above (Test Matrix.xlsx) that includes:

- **Master Test Matrix Sheet** – a comprehensive list of the test cases and their results (described in Section 2.2.3.2).
- **Test Data** – List of test data and their description that are used to verify that system operates in different readiness modes including varying impedance factors and performance metrics.
- **Issues / Remediation Management Sheet** – a comprehensive list of a summary of test defects that occurred while testing. The sheet includes current remediation status and approach. (described in Section 2.2.3.3)
- **Test Summary Metrics** – summary list of test results, issues and resolved issues.

Test Results Summary Documentation (TRSD) – a zipped set of all test case results conducted throughout the system test period.

Table 3 contains a list and high-level description of each test procedure that will be conducted on various platforms or number of test cases that will be conducted for each test procedure. The last (5th) column of the table indicates the location within the provided file structure to each test procedure. Note that any tests that include trip execution or journeying can only be conducted on a mobile platform (i.e., Android, iOS) when tracking is enabled.

Table 3. Test Procedure List

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R1-1.1	Guest Functions	Ensure that G-MAP provides the necessary functionality to successfully plan a trip for a guest. This includes functions such as searching for a transit route, planning a trip using mode filters, and printing a trip. Release 1: Core Functionality	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R1\R1-1.1_Guest Functions
R1-1.2	Account Creation	Ensure that G-MAP successfully creates a user account. This includes linking a mobile phone number to a user account and defining a user's mobility preferences. Release 1: Epic 3A	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R1\R1-1.2_Account Creation
R1-1.3	Trip Planning for Registered Users	Ensure that G-MAP successfully plans a trip for registered users. This includes functions such as identifying places of interest (POI) and planning a trip considering the user's mobility preferences. Release 1: Core Functionality	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R1\R1-1.3_TripPlanning_AccountHolders
R1-1.4	Preferences	Ensure that G-MAP records a registered user's preferences, such as favorite locations and notification preferences for saved trip plans. This includes tracking notifications for saved trip plans. Release 1: Core Functionality	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R1\R1-1.4_Preferences

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R2-2.1	Live Tracking	Ensure that G-MAP tracks the traveler accurately when executing a trip. The tester confirms if G-MAP correctly identifies their position while proceeding along the instructed route, deviating from the instructed route, and crossing through intersections. Release 2: Epic 4	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R2\R2-2.1_Live Tracking
R2-2.2	Dynamic Trip Planning	Ensure that G-MAP tracks the traveler accurately when veering off the instructed route and provides an alternative route for the traveler to follow. This procedure also tests SMS notifications for saved trip plans. Release 2: Epic 8	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R2\R2-2.2_Dynamic Trip Planning
R2-2.3	Route Enhancements	Ensure that G-MAP accounts for route enhancements, such as pedestrian impendences based on various mobility preferences. This also includes testing the transit transfer slack for trips with multiple transit routes. Release 2: Epic 3B	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R2\R2-2.3_Route Enhancements
R2-2.4	Ride Request	Activate Ride Request through a transit trip. Review log file following executed trip to check on trigger and message events. Release 2: Epic 17	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R2\R2-2.4_Ride Request

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R3-3.1	Customer Satisfaction In-App Survey	Test approach to in-app survey when a traveler deviates from their trip plan. Rules include that the user should not be asked to respond to surveys more than once per week. Release 3: Epic 1	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R3\R3-3.1_Customer Satisfaction In-App Survey
R3-3.2	Feedback Module	Test efficacy of Leave Feedback button. Release 3: Epic 1	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R3\R3-3.2_Feedback Module
R3-3.3	PED-X	Ensure that PED-X is actuated for qualifying travelers at intersection crossings. This includes tests for hands free actuation of pedestrian calls and that extra time is granted to cross an intersection for qualifying travelers. Release 3: Epic 5	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R3\R3-3.3_PED-X
R3-3.4	PMD	Ensure that the PMD ingests data, reports performance measures, and allows users to download data. Release 3: Epic 15	03 = Google Chrome	Test Procedures 2024_10_18\R3\R3-3.4_PMD

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R3-3.5	G-MAP to STM	The test confirms the trip histories, complete trip logging, travel statistics and G-MAP to STM by reviewing the files generated and retrieved on a daily basis by the STM administrators. They are deposited in the STM AWS 3S Bucket. Release 3: Epic 15	03 =Google Chrome	Test Procedures 2024_11_12\R3\R3-3.5_PrivatePMD
R4-4.1	STM	Ensure that the STM Impedance API is generated and provided to G-MAP every 15 minutes.	03 = Google Chrome	Test Procedures 2024_10_18\R4\R4-4.1_STM
R4-4.2	Call Center	Ensure that a user can call and connect with a customer service agent. The customer service agent can provide support to the user and plan a trip for them.	03 = Google Chrome	Test Procedures 2024_10_18\R4\R4-4.2_Call Center
R4-4.3	Indoor Navigation - GJAC	Ensure that G-MAP provides the necessary functionality to successfully plan and execute a trip using indoor navigation at GJAC. This includes successfully arriving, navigating through, and leaving an indoor navigation facility. Indoor turn-by-turn directions and impedances are tested within this procedure. Release 4: Epic 14	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R4\R4-4.3_Indoor Navigation - GJAC

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R4-4.4	Indoor Navigation – OneStop Norcross	Ensure that G-MAP provides the necessary functionality to successfully plan and execute a trip using indoor navigation at OneStop Norcross. This includes successfully arriving, navigating through, and leaving an indoor navigation facility. Indoor turn-by-turn directions and impedances are tested within this procedure. Release 4: Epic 14	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R4\R4-4.4_Indoor Navigation_OneStop Norcross
R4-4.5	Trusted Companion	Ensure that a trusted companion can set up notifications and track a traveler through various types of trips. If the trusted companion is a registered user, this test ensures that the trusted companion can set up account preferences. Release 4: Epic 6	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R4\R4-4.5_Trusted Companion
R4-4.6	Group Travel	Ensure that registered and unregistered users, including trusted companions, can successfully plan and execute a trip together. Release 4: Epic 6	01 = iOS (iPhone) 02 = Android	Test Procedures 2024_10_18\R4\R4-4.6_Group Travel
R4-4.7	Practice Mode	Exercise the G-MAP Practice Mode for various mobility profiles.	01 = iOS (iPhone) 02 = Android 03 = Google Chrome 04 = Microsoft Edge 05 = Firefox 06 = Safari	Test Procedures 2024_10_18\R4\R4-4.7_Practice Mode

Test ID	Test Name	Test Description	Platforms (# test cases)	File Location
R4-4.8	TSP	Ensure that TSP is granted to buses when they are behind schedule and a G-MAP user submits a ride request.	01 = iOS (iPhone) 02 = Android	Test Procedures 2025_01_20\R4\R4-4.8_TSP

2.4 Responsibilities

System testing roles and responsibilities are described in **Table 4.**

Table 4. ORTP Roles and Responsibilities

Role	Testing Responsibilities
Agreement Sponsors (USDOT)	Sponsor, advise and oversee project including processes, documentation, approval of system deployment and operational readiness.
Executive Management Team (EMT)	Oversee project including development and efficacy of system deployment.
System Engineering Lead (SEL)	Oversee and coordinate technical teams, establish development and testing schedules, anticipate and mitigate obstacles for deployment, review and escalate issues to EMT. Implement system engineering processes including providing verification and validation of system requirements and user needs.
Test Manager	Responsible for developing and conducting test cases. Coordinate Controlled Field and System testing including: • Review test procedures for System Testing • Assign test cases to testers (based on platforms and mobility modes). • Collect and aggregate test results and record issues on Issues/Remediation Sheet. • Review and track resolution process for testing • Summarize results in test results documentation • Identify and assign retest of test cases to Testers
Configuration Manager	• Verify that Requirements are correctly traced to test procedures • Review comprehensive verification and validation of requirements-test traceability.
Testers	• Conduct tests • Report results
STM / G-MAP Developers	• Participate in test procedure reviews • Participate and report on status of test issues / remediation activities

Role	Testing Responsibilities
Existing System / COTS (operators)	The operators of existing systems, software-as-a-service (SaaS) and COTS that are integrated into the ST-CTN deployment. These teams support the integration testing of existing or COTS with G-MAP and STM. These include the following systems and organizations: • Ride Request – Gwinnett County Department of Transportation (GCDOT), Ride Gwinnett and Avail Technologies -- their vendor • Indoor Navigation – Gwinnett County Facilities and CXApp/360ns, the indoor navigation vendor. • PED-X – Gwinnett County IT, GCDOT, and GDOT • Connected Vehicle (CV) – GDOT for RSD and 360ns for enhanced TSP • Public PMD – ICF and ARC

2.5 Staffing and Training Needs

No training needs are required for testers and staff conducting the testing. Pre-requisite coordination is required with Infrastructure Owner Operators (IOO) staff for several tests. **Table 5** lists the staffing and coordination activities required prior to conducting tests.

Table 5. Staffing Needs for Testing

Test ID / Name	Testing Needs

All Tests	Testers need at a minimum:
	• iPhone mobile device – quantity 1
	• Android mobile device – quantity 1
	• Browsers:
	  ○ MacOS – Safari User
	  ○ Windows OS – Chrome, Edge, Firefox

R2-2.4 Ride Request	Coordinate “ride-along” with Ride Gwinnett staff prior to testing Coordinate with Avail to pull log files
R3-3.3 PED-X	Coordinate with Gwinnett ID / GCDOT / GDOT staff prior to testing.
Indoor Navigation	Coordinate with Gwinnett facilities manager prior to testing

2.6 Schedule

ORT will commence following each software release in which key system components of G-MAP, STM and all the integrated applications are fully deployed. **Table 6** provides the ORTP schedule. In addition to ORT release testing, the schedule includes time for interim unit testing and bug fixes.

Table 6. ORTP Schedule

Activity	Start	Stop	Dependency
Final G-MAP, STM and integrated application Software Release	2/2022	2/14/2025	All systems are fully integrated and ready to be tested.
System testing and debugging	12/22/2023	2/26/2025	All systems are fully tested with no more than “minor” defects (e.g., user experience improvements).
Test bed version of Public PMD Release	10/18/2024	2/14/2025	STM provides sample feeds to be integrated and tested in the public PMD. Note: final testing will not be completed until Phase 3 when PMD is transferred to ARC and begins to receive “live” data.
Test Results Summary submitted (full results documentation)	12/22/2023	3/3/2025	Completion of testing.
USDOT Review Test Results	3/3/2025	3/17/2025	
Operational Test Readiness Confirmed	3/17/2025	3/28/2025	Depends on availability and approval of USDOT to schedule a date.

2.7 Risks and Contingencies

Table 7 describes the known risks and mitigation strategies that will be implemented conducting the tests.

Table 7. ORTP Risks and Mitigation Strategies

ID	Risk	Risk Index	Mitigation Strategy
ORP-1	Degraded GPS signal due to foliage or concrete canyon. There are known locations in Lawrenceville with right-of-way between buildings or under foliage where interference with GPS signals occurs.	Probability – 5 Severity – 3 **Index – 15**	Significant testing has been scheduled and will be conducted prior to the event. In addition, the schedule includes additional time for remediation and re-testing to ensure the application is ready for demonstration. Work arounds are being considered as a method to mitigate this risk.
ORP-2	An unknown critical issue will prevent the application from working accurately.	Probability – 2 Severity – 4 **Index – 8**	Interim releases are planned and will be tested to identify critical issues during the development process.
ORP-3	Testers do not have access to the platforms needed for testing.	Probability – 2 Severity – 2 **Index – 4**	The Test Manager has purchased an Android phone for use during testing.
ORP-4	Testers may not understand the intended functionality being tested or how to use the application.	Probability – 3 Severity – 2 **Index – 6**	Weekly testing coordination calls with team members developing the application, writing the test procedures, and testers are held to ensure that procedures are comprehensive and clear.
ORP-5	The Indoor Navigation System (INS) relies on bluetooth beacons that have technical limitations related to location accuracy. This issue is exacerbated in open areas, i.e., GJAC entrance and lobby.	Probability – 5 Severity – 3 **Index – 15**	The ST-CTN project team continues to work to isolate issues to improve indoor navigation user experience. The team has met with CXApp (multiple times) as well as members of the fellow ITS4US deployment team, Niagara Frontier Transportation Authority, Buffalo to gain insight. The team has implemented recommendations from those meetings and continues to troubleshoot.

2.8 Operational Readiness Test Approvals

ORT approvals, shown in **Table 8**, confirm completion of the system testing. The approvals confirm that the operational readiness test plan includes a complete set of tests that are needed to verify the system is ready for demonstration and that these tests have been conducted and passed or any issues are assigned a minimum defect impact of low.

Signatories affirm that they have reviewed the test procedures, cases, and results (in the Master Test Matrix – tests and issues log), and these tests have been conducted prior to the Operational Readiness Demonstration.

Table 8. ORTP Approvals

Role | Name	Date of Test Approval
Project Manager: Alan Davis (GDOT)	**Date:**
Test Manager: Joseph Yawn (ICF)	**Date:**
Test Designer: Tarek Elfalah (ICF)	**Date:**
Product Owner: Joseph Hacker (ARC)	**Date:**
System Engineering Lead: Polly Okunieff (GO Systems and Solutions)	**Date:**

3 Operational Demonstration Readiness Plan (ORDP)

The ORDP provides an overview of the approach and intended plan for the operational demonstration that will ensure the readiness of the ST-CTN system. Demonstrations are intended to exhibit a set of selected integrated, end-to-end system capabilities central to the deployment concept of operations (e.g., key use cases). Select demonstrations will be conducted as live, real-time activities with the federal team wherein the success and failure of the demonstration are directly observable. There are three objectives of the operational demonstration:

1. Demonstrate the G-MAP system functions and features.
2. Demonstrate the system back-end operations.
3. Demonstrate how the G-MAP application improves safety, mobility, reliability, and accessibility for underserved communities.

This ORDP will ensure the team achieves these objectives.

3.1 ORDP Introduction

The ORDP has the following objectives and background.

3.1.1 Objectives

The purpose of the ORDP is to define the plan that will be implemented to demonstrate the operational readiness of the ST-CTN deployment. The ORDP will achieve the following objectives:

- **Approach.** Define the demonstration approach. **Section 3.2** provides the approach that will be implemented to demonstrate the operational readiness of the ST-CTN system.
- **Features and Functionality.** Identify the project items to be demonstration. System features and functionality that have been developed to meet the identified needs of the system will be demonstrated.
- **Demonstration Support.** Identify the hardware, software, tools, resources and environment to be used to support the demonstrations. All resources required to support the demonstration are identified and defined.
- **Demonstration Types.** Define the types of demonstrations to be performed. Each type of demonstration is defined and described.
- **Constraints.** Define constraints. Constraints are defined as well as the intended approach to demonstrate the full system as required, working around any constraints or limitations.

- **Roles and Responsibilities.** Define roles and responsibilities. Roles and responsibilities for each operational readiness demonstration participant are defined to ensure safe, efficient, and successful implementation.
- **Change Control and Communication.** State the process for change control and communication coordination for key activities. The change control process that will be leveraged as well as the process for coordinating key activities is defined.

3.1.2 Background

The development of the ORDP is guided by the ConOps, specifically the defined end user's complete trip concept diagram and steps (shown in **Figure 1**) and the use cases defined in Section 3.2.2 of the ConOps document. The ConOps defines two use cases: Use Case 1: Traveler's Complete Trip with ST-CTN and Use Case 2: Connected Vehicle Applications.

In addition, the ORDP is guided by the Operational Readiness Concept Briefing (ORCB) which was held on September 6, 2023. The ORCB provided an opportunity for the ST-CTN project team to share the preliminary approach and overview of the operational readiness demonstration. Although the specific demonstration routes have been modified, the general approach and demonstration elements have been maintained.

3.2 Approach

This section describes the overall demonstration strategy for the ORDP. Details related to the demonstration events, tracking, obstacles and restrictions, constraints, related testing, configuration management, and the plan for system integration are provided.

3.2.1 Overall Demonstration Strategy

This section describes the overall demonstration strategy workflow and describes the demonstrations that need to be performed to verify that the system is operating as expected. Demonstrations will be held at and in the vicinity of the Gwinnett Justice and Administration Center (GJAC) and OneStop Norcross facilities. It is expected that demonstrations will be completed over a two-day period with a designated contingency time in the event that a demonstration has to be reconducted. The demonstrations have been planned to handle variations in conditions. ST-CTN project team staff will be on-site during the event to ensure resiliency should any unforeseen events occur. Demonstrations will be clearly described before each activity begins. Related test procedures (as described in Section 2.3) and relevant demonstration elements will be defined. Demonstration elements include safety, security and privacy, operations and maintenance, and performance measurement.

Demonstrations are defined within the context of the ST-CTN use cases, Use Case 1: Traveler's Complete Trip with ST-CTN and Use Case 2: Connected Vehicle Applications. The following use case summaries are provided below, further description can be found in the ConOps.

Use Case 1: Traveler's Complete Trip with ST-CTN. Describes how a traveler will plan and navigate their complete trip with the ST-CTN system. The use case identifies the major actions by trip segment. The traveler will interact with the system through one or more of the G-MAP user interface (UI) channels – mobile app, web site, or call center. The traveler uses G-MAP

functionality to plan, execute travel, and complete a trip. The user is able to do so by personalizing, selecting, and activating information on directions, conditions, and status along their trip. The traveler will leverage their device to communicate with CV infrastructure to experience a safer trip. The six steps of the complete trip are shown in Figure 1 (Section 1.2) and listed below.

Step 1 **Pre-Trip Planning.** The traveler plans and receives a safe accessible route.

Step 2 **Begins Trip.** The traveler receives turn by turn directions, alerts, and transit priority.

Step 3 **Transition to Transit.** The traveler transitions to transit. The transit vehicle receives priority (if needed) and is notified of users' needs.

Step 4 **Intersection Crossing.** The traveler interacts with the signal controller which actuates and extends the pedestrian phase in the direction of user travel (as needed).

Step 5 **CV Broadcast Message.** RSUs broadcast safety message to alert of pedestrian/bicyclist in vicinity.

Step 6 **Outdoor/Indoor Navigation.** Turn by turn directions are provided to the traveler to enable a safe accessible route indoors at the GJAC and OneStop Norcross facilities.

There is an additional **Step 7** that is not part of the traveler's complete trip but is part of the St-CTN system: **Reporting**. This step provides summaries of the data collected during the Complete Trip process.

Use Case 2: Connected Vehicle Applications. The ST-CTN system will connect the traveler with the connected intersections by leveraging applications currently being deployed in the pre-existing CV Program. The traveler will trigger safety messages and requests through the G-MAP mobile app. The applications that will be implemented include:

- **Mobile Accessible Pedestrian Signal System (PED-SIG).** An application that allows for an automated call via the Secure MU Gateway from the smart phone of [any authorized] pedestrian [using the MU – G-MAP app] to the traffic signal to acuate the pedestrian phase in the direction of their travel. In addition, if the traveler has indicated that they may move slower, the app will trigger an extended pedestrian crossing time.

- **Pedestrian in Signalized Crosswalk Warning (Transit).** A pre-existing application that broadcasts a personal safety message (PSM) such that transit bus operators, and any vehicle with onboard equipment, receive an alert that a vulnerable road user (VRU) is in the vicinity.

- **Ride Request.** The Ride Request application allows a transit passenger to send a stop request to an approaching transit vehicle. This application allows a transit vehicle to know that a passenger has requested a transit stop from an infrastructure device, if they require assistance onboarding or alighting the bus, and at which stop they will alight.

- **Transit Signal Priority.** An application that provides signal priority to transit vehicles at intersections and along arterial corridors. The TSP application uses Vehicle-to-Infrastructure (V2I) communications to allow a transit vehicle to request a priority at one

or a series of intersections. This application can contribute to improved operating performance of the transit vehicles by reducing the time spent stopped at a signal during the red indication.

Demonstrations are aligned with the use cases and will be of two types, demonstration events and individual demonstrations. Demonstration events are active in nature and will require participants to physically engage in travel for all or portions of a complete trip. Demonstration events may require participants to go outside and will be constrained by environmental factors such as weather. The demonstration events have been designed to limit participant exposure and a Ride Gwinnett shuttle will be used if participants are unable to complete a demonstration event due to environmental constraints.

Individual demonstrations are live or simulated activities that take place in a conference room where it is possible to access the backend of the system. Individual demonstrations are not constrained by environmental factors but do rely on reliable access to the internet. These demonstrations will take place within a conference room at GJAC where internet is available and reliable.

Demonstrations will be held in accessible, public spaces. No organizational processes or restrictions are expected to impact demonstrations.

3.2.2 Demonstration Identifier

This section describes the demonstration identifier structure and the version control of each demonstration. This structure will support configuration management of ORDP versions. Each demonstration will be assigned a unique demonstration identifier as defined below:

A-BC-D.E.F, where:

- A = Demonstration Type
    - DE = Demonstration Events
    - ID = Individual Demonstrations
- BC = Associated Use Case
    - CT = Use Case 1: Traveler’s Complete Trip with ST-CTN
    - CV = Use Case 2: Connected Vehicle Applications
- D = Complete Trip Step
    - 1 = Step 1 Pre-Trip Planning
    - 2 = Step 2 Begins Trip
    - 3 = Step 3 Transition to Transit
    - 4 = Step 4 Intersection Crossing

    - 5 = Step 5 CV Broadcast Message
    - 6 = Step 6 Outdoor/Indoor Navigation
    - 7 = Step 7 Reporting
- E = Demonstration ID
- F = Demonstration Version

The demonstration version (F) will indicate the version of the demonstration. If there is a need to replicate or re-do the demonstration, the demonstration version will be updated sequentially to reflect the number of times the demonstration has been completed or attempted.

3.2.3 ORD Agenda

The Operational Readiness Demonstration will show the depth of functionality implemented by the ST-CTN system. **Table 9** shows the schedule for the first day of the demonstration and **Table 10** shows the schedule for the second day. For each section, the activity refers to high-level functions to be demonstrated. The Responsibility / Location column indicates the person(s) that will be lead the activity and identifies the location where the demonstrations will occur. Asterisks were added next to activities that could be shown virtually again in the future as a contingency plan should the event not go as scheduled.

On Day 1, demonstration events and individual demonstrations will take place at GJAC with an activity that will include taking a short transit trip.

Table 9. ORD Schedule for Day 1

Time	Activity	Lead / Location
9:00 - 9:15 AM	**Welcome and Introductions**	A. Davis / K. Wakhisi GJAC
9:15 - 9:30 AM	**Agenda and Logistics**	N. Smusz-Mengelkoch GJAC
9:30 - 10:20 AM	**Mobility Modes and Impedance Layers (Step 1)*** ID-CT-1.1 - STM Data Ingestion ID-CT-1.2 - STM Impedance Calculations ID-CT-1.3 - STM Mobility Profile Impedance Calculations ID-CT-1.4 - G-MAP Trip Plans per Mobility Profile	STM Developers: R. Guensler and A. Guin. G-MAP Developer: J. Campbell. GJAC

Time	Activity	Lead / Location
10:20 - 10:30 AM	**Break**	
10:30 - 11:15 AM	**Pre-Trip Planning (web and mobile) (Step 1)** DE-CT-1.4 - G-MAP Plan Trip as a Guest DE-CT-1.5 - G-MAP Create Account DE-CT-1.6 - G-MAP Login / Logout DE-CT-1.7 - G-MAP Recover Password and Login DE-CT-1.8 - G-MAP Registered Plan and Manage Preferences for Trip DE-CT-1.9 - G-MAP Manage Preferences DE-CT-1.10 - G-MAP Add Trusted Companion DE-CT-1.11 - G-MAP Accept Trusted Companion Role DE-CT-1.12 - G-MAP Plan Trip without Trusted Companion	G-MAP Developer: J. Campbell. GJAC
11:15 - 11:30 AM	**Pre-Trip Planning - Support for Travelers (web / mobile) (Step 1)*** DE-CT-1.13 - G-MAP Review Help Menu DE-CT-1.14 - G-MAP Review Practice Mode DE-CT-1.15 - G-MAP Forward Feedback Form DE-CT-1.16 - G-MAP Call Center Module	N. Smusz-Mengelkoch GJAC
11:30 - 12:30 PM	**Lunch**	
12:30 - 1:00 PM	**Begin Trip - Outside (Step 2)** DE-CT-2.1 - Plan Outdoor Trip DE-CT-2.2 - G-MAP Receive Trip Notification DE-CT-2.3 - G-MAP Trusted Companion Receive Trip Notification DE-CT-2.4 - G-MAP Receive Turn-by-Turn Directions DE-CT-2.5 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions DE-CT-2.6 - G-MAP Receive Survey about Trip Deviation	G-MAP Developer: J. Campbell Outside GJAC
1:00 - 1:45 PM	**Begin Trip - Transit (Step 2)** DE-CT-2.7 - G-MAP Plan Transit Trip (for 1:20pm bus arrival time) DE-CT-2.8 - G-MAP Bus Receives Trip Notification DE-CT-2.9 - G-MAP Bus Enters Stop Zone DE-CT-2.10 - G-MAP and G-MAP Trusted Companion Receive Bus ETA Notification	G-MAP Developer: J. Campbell Bus Stop outside GJAC

Time	Activity	Lead / Location
1:45 - 2:00 PM	**Transition to Transit (Step 3)** DE-CV-3.1 - G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) - Part 1 (field) DE-CV-3.2 - Ride Gwinnett Bus Driver Receives Message About Traveler	G-MAP Developer: J. Campbell On Bus
2:00 - 2:45 PM	**Intersection Crossing (Step 4)** DE-CV-4.1 - PED-X Display Actuation Request - Part 1 (field) DE-CV-4.2 - G-MAP Actuates Intersection Extended Walk Time Request - Part 1 (field) DE-CV-4.3 - Pedestrian in Signalized Crosswalk Warning (PSM)	G-MAP Developer: J. Campbell Destination Bus Stop
2:45 - 3:45 PM	**Outdoor / Indoor Navigation (Step 6)** DE-CT-6.1 - G-MAP Plan Outdoor to Indoor Trip DE-CT-6.2 - G-MAP Receive Trip Notification DE-CT-6.3 - G-MAP Receive Turn-by-Turn Directions DE-CT-6.4 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions	G-MAP Developer: J. Campbell GJAC
3:45 - 4:00 PM	**Break**	
4:00 - 4:15 PM	**CV Broadcast Message (Step 5) and CV Logs*** ID-CV-5.1 - RSU Message Logs ID-CV-3.1 - G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) - Part 2 (office) ID-CV-4.1 - PED-X Display Actuation Request - Part 2 (office) ID-CV-4.2 - G-MAP Actuates Intersection Extended Walk Time Request - Part 2 (office)	Gwinnett County: D. Tongson GJAC
4:15 - 4:45 PM	**Day 1 Feedback**	N. Smusz-Mengelkoch GJAC
4:45 - 5:00 PM	**Day 1 Close Out**	K. Wakhisi GJAC

Table 10 shows the schedule for the ORD second day activities. Time has been built into the schedule at the beginning of Day 2 as a buffer for any potential schedule delay. On Day 2, demonstration events and individual demonstrations will take place at both GJAC and OneStop Norcross facilities. Demonstration events being held on Day 2 will include outdoor activity around the OneStop Norcross facility.

Table 10. ORD Schedule for Day 2

Time	Activity	Responsibility | Location
8:00 - 10:00 AM	**Contingency** (to be determined based on Day 1 progress)	TBD GJAC
10:00 - 10:15 AM	**Welcome Back**	A. Davis GJAC
10:15 - 11:15 AM	**Performance Measurements: Statistics and Surveys (Step 7)*** ID-CT-7.1 - Private PMD Push Out Tracking Data Sets ID-CT-7.2 - Private PMD Aggregate Weekly Statistics ID-CT-7.3 - Private PMD Ingest and Present Weekly Metrics ID-CT-7.4 - Private PMD Distribute Survey Links ID-CT-7.5 - Private PMD Distribute Unique Survey Links to Individuals Via Email ID-CT-7.6 - G-MAP Distribute Unique Survey Links to Individuals Via App ID-CT-7.7 - Public PMD Visualize Metrics for Public ID-CT-7.8 - Public PMD Download Monthly Results Into PDF and CSV ID-CT-7.9 - Public PMD Visualize Metrics for Public ID-CT-7.10 - PMD Download Yearly Results Into PDF and CSV	Private PMD Developer: A. Guin G-MAP Developer: J. Campbell Public PMD Developer Rep: N. Smusz-Mengelkoch GJAC
11:15 - 11:30 AM	**Operations and Maintenance*** ID-CT-7.11 - CXApp Facilities Update (CXApp backoffice interface) ID-CT-7.12 - G-MAP Updates	G-MAP Developer: J. Campbell GJAC
11:30 - 12:00 PM	**Security and Privacy*** ID-CT-1.17 - G-MAP Delete Account	G-MAP Developer: J. Campbell GJAC
12:00 - 1:30 PM	**Lunch and Travel to Norcross**	

Time	Activity	Responsibility | Location
1:00 - 1:45 PM	**Complete Trip from OneStop Norcross to Bus Stop (Step 2)** DE-CT-2.1 - Plan Outdoor Trip DE-CT-2.2 - G-MAP Receive Trip Notification DE-CT-2.3 - G-MAP Trusted Companion Receive Trip Notification DE-CT-2.4 - G-MAP Receive Turn-by-Turn Directions DE-CT-2.5 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions DO NOT BOARD THE BUS	G-MAP Developer: J. Campbell Norcross to Bus Stop outside OneStop Norcross
1:45 - 2:30 PM	**Sidewalk Data Collection Process** ID-CT-1.18 - Demonstrate Vehicle Mount Camera and Set-up ID-CT-1.19 - Demonstrate Detailed Data Collection with Wheelchair Inspection ID-CT-1.20 - Demonstrate OSM Editing	Sidewalk Data Collection Lead: R. Guensler Norcross
2:30 - 2:45 PM	**Break**	
2:45 - 4:00 PM	**Day 2 and Demonstration Feedback**	N. Smusz-Mengelkoch Norcross
4:00 - 4:15 PM	**Demonstration Close Out**	K. Wakhisi Norcross

3.2.4 Demonstration Events

Demonstration events will occur with live attendance from USDOT and will actively engage participants to observe the features and functionality of the ST-CTN system. Demonstration events will be led by key ST-CTN project team members. Participants of the demonstration events will include USDOT, project team members responsible for the development of the system, IOOs such as ARC, GDOT, GCDOT, and community representatives from organizations such as SILCGA. Demonstration events will originate from GJAC or OneStop Norcross facilities and will include time outside and on a bus or shuttle. Participants will be able to leave personal articles in the secured conference room. Demonstration events will begin and end at the facility; participants will be shuttled in the event of inclement weather. At the conclusion of a series of demonstration events, participants will be asked to provide feedback about room for improvement.

Table 11 provides the test procedures and relevant demonstration elements for each demonstration event.

Table 11. Demonstration Events

ID	Demonstration Event	Related Test Procedures
DE-CT-1.4	G-MAP Plan Trip as a Guest	R1-1.1 Guest Functions
DE-CT-1.5	G-MAP Create Account	R1-1.2 Account Creation
DE-CT-1.6	G-MAP Login / Logout	R1-1.2 Account Creation
DE-CT-1.7	G-MAP Recover Password and Login	R1-1.2 Account Creation
DE-CT-1.8	G-MAP Registered Plan and Manage Preferences for Trip	R1-1.4 Preferences
DE-CT-1.9	G-MAP Manage Preferences	R1-1.4 Preferences
DE-CT-1.10	G-MAP Add Trusted Companion	R4-4.5 Trusted Companion
DE-CT-1.11	G-MAP Accept Trusted Companion Role	R4-4.5 Trusted Companion
DE-CT-1.12	G-MAP Plan Trip without Trusted Companion	R1-1.3 Trip Planning for Registered Users
DE-CT-1.13	G-MAP Review Help Menu	R4-4.7 Practice Mode
DE-CT-1.14	G-MAP Review Practice Mode	R4-4.7 Practice Mode
DE-CT-1.15	G-MAP Forward Feedback Form	R3-3.2 Feedback
DE-CT-1.16	G-MAP Call Center Module	R4-4.2 Call Center
DE-CT-2.1	Plan Outdoor Trip	R2-2.1 Live Tracking
DE-CT-2.2	G-MAP Receive Trip Notification	R2-2.1 Live Tracking
DE-CT-2.3	G-MAP Trusted Companion Receive Trip Notification	R2-2.1 Live Tracking R4-4.5 Trusted Companion
DE-CT-2.4	G-MAP Receive Turn-by-Turn Directions	R2-2.2 Dynamic Trip Planning
DE-CT-2.5	G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions	R2-2.2 Dynamic Trip Planning
DE-CT-2.6	G-MAP Receive Survey about Trip Deviation	R3-3.1 Customer Satisfaction In-App Survey
DE-CT-2.7	G-MAP Plan Transit Trip (for 1:20pm bus arrival time)	R2-2.4 Ride Request

ID	Demonstration Event	Related Test Procedures
DE-CT-2.8	G-MAP Bus Receives Trip Notification	R2-2.4 Ride Request
DE-CT-2.9	G-MAP Bus Enters Stop Zone	R2-2.4 Ride Request
DE-CT-2.10	G-MAP and G-MAP Trusted Companion Receive Bus ETA Notification	R2-2.4 Ride Request R4-4.5 Trusted Companion
DE-CV-3.1	G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) - Part 1	R2-2.4 Ride Request
DE-CV-3.2	Ride Gwinnett Bus Driver Receives Message About Traveler	R2-2.4 Ride Request
DE-CV-4.1	PED-X Display Actuation Request - Part 1	R3-3.3 PED-X
DE-CV-4.2	G-MAP Actuates Intersection Extended Walk Time Request - Part 1	R3-3.3 PED-X
DE-CV-4.3	Pedestrian in Signalized Crosswalk Warning (PSM)	R3-3.3 PED-X
DE-CT-6.1	G-MAP Plan Outdoor to Indoor Trip	R4-4.3 Indoor Navigation - GJAC R4-4.4 Indoor Navigation – OneStop Norcross
DE-CT-6.2	G-MAP Receive Trip Notification	R2-2.1 Live Tracking
DE-CT-6.3	G-MAP Receive Turn-by-Turn Directions	R2-2.2 Dynamic Trip Planning
DE-CT-6.4	G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions	R2-2.2 Dynamic Trip Planning

3.2.5 Individual Demonstrations

Individual demonstrations will occur with live attendance from USDOT to demonstrate the features and functionality of the ST-CTN system that cannot be experienced in the same way as demonstration events. Individual demonstrations include activities that present backend functionality or system operations. Individual demonstrations will be led by key ST-CTN project team members. Participants of the individual demonstrations will include USDOT, project team members responsible for the development of the system, and IOOs such as ARC, GDOT, GCDOT. Community representatives from organizations such as SILCGA will be welcomed to

attend but may not be as interested in these types of demonstrations. Individual demonstrations will be conducted at the GJAC facility in a conference room or at a room in the OneStop Norcross facility. At the conclusion of each individual demonstration, participants will be welcome to ask questions and provide feedback about room for improvement.

Table 12 provides the individual demonstrations, related test procedures, and relevant demonstration elements.

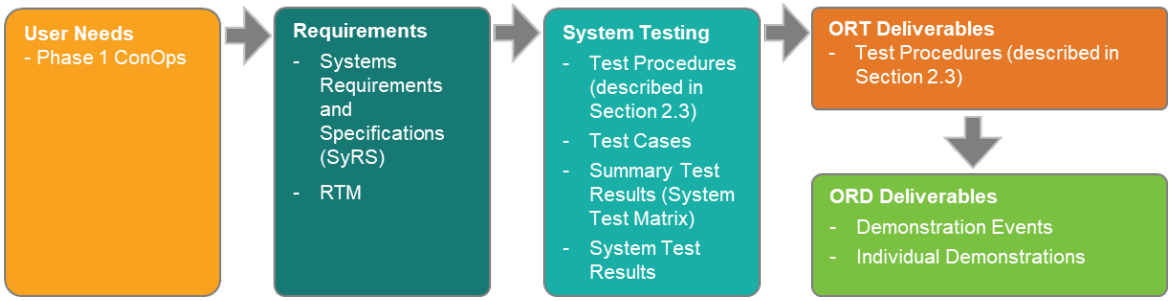
Table 12. Individual Demonstrations

ID	Individual Demonstration	Related Test Procedures
ID-CT-1.1	STM Data Ingestion	R4-4.1 STM
ID-CT-1.2	STM Impedance Calculations	R4-4.1 STM
ID-CT-1.3	STM Mobility Profile Impedance Calculations	R4-4.1 STM
ID-CT-1.4	G-MAP Trip Plans per Mobility Profile	R1-1.3 Trip Planning for Registered Users
ID-CV-5.1	RSU Message Logs	
ID-CV-3.1	G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) - Part 2	R2-2.4 Ride Request
ID-CV-4.1	PED-X Display Actuation Request - Part 2	R3-3.3 PED-X
ID-CV-4.2	G-MAP Actuates Intersection Extended Walk Time Request - Part 2	R3-3.3 PED-X
ID-CT-7.1	Private PMD Push Out Tracking Data Sets	R3-3.4 PMD
ID-CT-7.2	Private PMD Aggregate Weekly Statistics	R3-3.4 PMD
ID-CT-7.3	Private PMD Ingest and Present Weekly Metrics	R3-3.4 PMD
ID-CT-7.4	Private PMD Distribute Survey Links	R3-3.4 PMD R3-3.1 Customer Satisfaction In-App Survey

ID	Individual Demonstration	Related Test Procedures
ID-CT-7.5	Private PMD Distribute Unique Survey Links to Individuals Via Email	R3-3.4 PMD R3-3.1 Customer Satisfaction In-App Survey
ID-CT-7.6	G-MAP Distribute Unique Survey Links to Individuals Via App	R3-3.1 Customer Satisfaction In-App Survey
ID-CT-7.7	Public PMD Visualize Metrics for Public	R3-3.4 PMD
ID-CT-7.8	Public PMD Download Monthly Results Into PDF and CSV	R3-3.4 PMD
ID-CT-7.9	Public PMD Visualize Metrics for Public	R3-3.4 PMD
ID-CT-7.10	PMD Download Yearly Results Into PDF and CSV	R3-3.4 PMD
ID-CT-7.11	CXApp Facilities Update (CXApp backoffice interface)	R4-4.3 Indoor Navigation – GJAC R4-4.4 Indoor Navigation – OneStop Norcross
ID-CT-7.12	G-MAP Updates	R1-1.4 Preferences
ID-CT-1.17	G-MAP Delete Account	R1-1.4 Preferences
ID-CT-1.18	Demonstrate Vehicle Mount Camera and Set-up	R4-4.7 Practice Mode
ID-CT-1.19	Demonstrate Detailed Data Collection with Wheelchair Inspection	R4-4.7 Practice Mode
ID-CT-1.20	Demonstrate OSM Editing	R4-4.7 Practice Mode

3.3 Operational Readiness Demonstration Deliverables

This section describes the ORDP documentation provided to support the demonstration of operational readiness of the ST-CTN system. The testing and demonstration approach has been designed to provide traceability to ST-CTN use cases, requirements, and needs. The demonstration deliverables provide traceability in a comprehensive but manageable manner to allow for easier review and configuration management. **Figure 7** provides a graphical representation of the traceability from end user needs to the demonstration deliverables.



Source: GDOT, 2025

Figure 7. ORD Deliverable Traceability

Each section of the demonstration will follow a similar approach in which the section leader (shown in **Section 3.6**) will guide the demonstration through each demonstration event and individual demonstration. The demonstrations will be provided in relevant formats, web, Android, and iOS. A PowerPoint presentation will be used to guide each demonstration section, either on-screen in a conference room or by hard copy packet. The PowerPoint presentation will serve as the demonstration deliverables. The ST-CTN project team will provide hard copy deliverables for demonstration participants that will include space to make notes and/or questions. Participant feedback will be captured throughout the demonstrations and each day will conclude with a time to reflect and receive additional feedback. **Table 13** lists all the deliverables to be included in the ORD.

Table 13. ORD Deliverables

Demonstration Deliverable	Platform
Section 1: Mobility Modes and Impedance Layers (Step 1) • ID-CT-1.1 - STM Data Ingestion • ID-CT-1.2 - STM Impedance Calculations • ID-CT-1.3 - STM Mobility Profile Impedance Calculations • ID-CT-1.4 - G-MAP Trip Plans per Mobility Profile	Backend

Demonstration Deliverable	Platform
Section 2: Pre-Trip Planning (Step 1) • DE-CT-1.4 - G-MAP Plan Trip as a Guest • DE-CT-1.5 - G-MAP Create Account • DE-CT-1.6 - G-MAP Login / Logout • DE-CT-1.7 - G-MAP Recover Password and Login • DE-CT-1.8 - G-MAP Registered Plan and Manage Preferences for Trip • DE-CT-1.9 - G-MAP Manage Preferences • DE-CT-1.10 - G-MAP Add Trusted Companion • DE-CT-1.11 - G-MAP Accept Trusted Companion Role • DE-CT-1.12 - G-MAP Plan Trip without Trusted Companion	Web, Android, iOS
Section 3: Pre-Trip Planning - Support for Travelers (Step 1) • DE-CT-1.13 - G-MAP Review Help Menu • DE-CT-1.14 - G-MAP Review Practice Mode • DE-CT-1.15 - G-MAP Forward Feedback Form • DE-CT-1.16 - G-MAP Call Center Module	Web, Android, iOS
Section 4: Begin Trip - Outside (Step 2) • DE-CT-2.1 - Plan Outdoor Trip • DE-CT-2.2 - G-MAP Receive Trip Notification • DE-CT-2.3 - G-MAP Trusted Companion Receive Trip Notification • DE-CT-2.4 - G-MAP Receive Turn-by-Turn Directions • DE-CT-2.5 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions • DE-CT-2.6 - G-MAP Receive Survey about Trip Deviation	Android, iOS
Section 5: Begin Trip - Transit (Step 2) • DE-CT-2.7 - G-MAP Plan Transit Trip (for 1:20pm bus arrival time) • DE-CT-2.8 - G-MAP Bus Receives Trip Notification • DE-CT-2.9 - G-MAP Bus Enters Stop Zone • DE-CT-2.10 - G-MAP and G-MAP Trusted Companion Receive Bus ETA Notification	Android, iOS

Demonstration Deliverable	Platform
Section 6: Transition to Transit (Step 3) • DE-CV-3.1 - G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) – Part 1 • DE-CV-3.2 - Ride Gwinnett Bus Driver Receives Message About Traveler	Backend, Android, iOS, Bus Operator Module
Section 7: Intersection Crossing (Step 4) • DE-CV-4.1 - PED-X Display Actuation Request – Part 1 • DE-CV-4.2 - G-MAP Actuates Intersection Extended Walk Time Request – Part 1	Backend, Android, iOS
Section 8: Outdoor / Indoor Navigation (Step 6) • DE-CT-6.1 - G-MAP Plan Outdoor to Indoor Trip • DE-CT-6.2 - G-MAP Receive Trip Notification • DE-CT-6.3 - G-MAP Receive Turn-by-Turn Directions • DE-CT-6.4 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions	Android, iOS
Section 9: CV Broadcast Message (Step 5) and CV Logs • ID-CV-5.1 - RSU Message Logs • ID-CV-3.1 - G-MAP for Enhanced TSP (sends trigger via Ride Gwinnett & TSP proxy server) - Part 2 • ID-CV-4.1 - PED-X Display Actuation Request - Part 2 • ID-CV-4.2 - G-MAP Actuates Intersection Extended Walk Time Request - Part 2	Backend
Section 10: Day 1 Feedback	

Demonstration Deliverable	Platform
Section 11: Performance Measurements: Statistics and Surveys (Step 7) • ID-CT-7.1 - Private PMD Push Out Tracking Data Sets • ID-CT-7.2 - Private PMD Aggregate Weekly Statistics • ID-CT-7.3 - Private PMD Ingest and Present Weekly Metrics • ID-CT-7.4 - Private PMD Distribute Survey Links • ID-CT-7.5 - Private PMD Distribute Unique Survey Links to Individuals Via Email • ID-CT-7.6 - G-MAP Distribute Unique Survey Links to Individuals Via App • ID-CT-7.7 - Public PMD Visualize Metrics for Public • ID-CT-7.8 - Public PMD Download Monthly Results Into PDF and CSV • ID-CT-7.9 - Public PMD Visualize Metrics for Public • ID-CT-7.10 - PMD Download Yearly Results Into PDF and CSV	Backend, Web, Android, iOS
Section 12: Operations and Maintenance • ID-CT-7.11 - CXApp Facilities Update (CXApp backoffice interface) • ID-CT-7.12 - G-MAP Updates	Backend
Section 13: Security and Privacy • ID-CT-1.17 - G-MAP Delete Account	Backend, Web, Android, iOS
Section 14: Complete Trip from OneStop Norcross to Bus Stop (Step 2) • DE-CT-2.1 - Plan Outdoor Trip • DE-CT-2.2 - G-MAP Receive Trip Notification • DE-CT-2.3 - G-MAP Trusted Companion Receive Trip Notification • DE-CT-2.4 - G-MAP Receive Turn-by-Turn Directions • DE-CT-2.5 - G-MAP Receive Notification of Adjustment to Turn-by-Turn Directions DO NOT BOARD THE BUS	Android, iOS

Demonstration Deliverable	Platform
Section 15: Sidewalk Data Collection Process • ID-CT-1.18 - Demonstrate Vehicle Mount Camera and Set-up • ID-CT-1.19 - Demonstrate Detailed Data Collection with Wheelchair Inspection • ID-CT-1.20 - Demonstrate OSM Editing	Backend
Section 16: Day 2 and Demonstration Feedback	

3.4 Responsibilities

Table 14 list the roles and responsibilities for team members who will be part of the operational readiness demonstrations.

Table 14. ORD Responsibilities

Organization	Role	Responsibility
USDOT / Elina Zlotchenko and Norah Ocel	Agreement Sponsors (USDOT)	Sponsor, advise and oversee project including processes, documentation, approval of system deployment and operational readiness. Participate in demonstrations and confirm that the ST-CNT system is ready for use.
GDOT / Alan Davis	Co-Project Manager Lead	Overall success of the operational readiness testing and demonstration. Hosting duties.
ARC / Kofi Wakhisi	Co-Project Manager Lead	Overall success of the operational readiness testing and demonstration. Hosting duties.
ARC / Joseph Hacker	Co-Deployment Lead	Technical event planning and technical logistics during the operational demonstration.
ICF / Natalie Smusz-Mengelkoch	Co-Deployment Lead	Technical event planning and technical logistics during the operational demonstration. Operational readiness demonstration of the public PMD.
GOSS / Polly Okunieff	Systems Engineering Lead	Systems engineering documentation related to the operational testing and demonstrations.

Organization	Role	Responsibility
SILCGA / Jordan Hall	Community Outreach Lead	Representing the underserved end user communities that G-MAP has been developed to support.
ICF / Joseph Yawn	System Test Lead	Operational readiness testing and documentation.
Arcadis / Jon Campbell	G-MAP Developer Lead	Operational readiness demonstration of G-MAP.
GA Tech / Randy Guensler	Pedestrian Data Collection and STM Developer Lead	Operational readiness demonstration of the pedestrian data collection methodology and STM.
GA Tech / Angshuman Guin	STM and Private PMD Developer Lead	Operational readiness demonstration of STM and the private PMD.
Gwinnett County / Danny Tongson	Gwinnett County Project Lead	Gwinnett County host. Local technical lead.
Ride Gwinnett / Loammi Aviles	Ride Gwinnett Project Lead	Ride Gwinnett host. Ride Gwinnett logistics and backend access.
Gwinnett County Traffic Operations / Ken Keena	Gwinnett County Traffic Operations Lead	Gwinnett County Traffic Operations host. Traffic signal system logistics and backend access.

3.5 Staffing and Training Needs

No training needs are required for staff conducting the demonstration events.

3.6 ORDP Schedule

Table 15 provides the schedule for the development and implementation of the ORDP. The ORDP schedule is dependent on the successful completion and acceptance of system testing.

Table 15. ORDP Schedule

Activity	Due Date
ORP Draft Submittal	10/21/2024
USDOT ORP Review	11/27/2024

Activity	Due Date
ORP Walkthrough	12/1 – 12/2/2024
Reserve GJAC, OneStop Norcross facilities and Ride Gwinnett shuttle	12/11/2024
ORD Logistics Planning	12/2/2024 – 2/21/2025
Testing Results Summary Documentation	5/2/2025
ORD On-Site Dry Run	5/6 – 5/7/2025
ORD On-Site Preparation	6/2/2025
ORD	6/3 – 6/4/2025

3.7 Risks and Contingencies

Table 16 provides a summary of potential risks and mitigation strategies related to the operational demonstration.

Table 16. ORDP Risks and Mitigation Strategies

ID	Risk	Mitigation Strategy
ORP-5	A critical issue will prevent the application from working accurately.	Significant testing has been scheduled and will be conducted prior to the event. In addition, the schedule includes additional time for remediation and re-testing to ensure the application is ready for demonstration.
ORP-6	The weather will impact the demonstration.	Planned outdoor activities are close to the GJAC and OneStop Norcross locations. Local weather will be monitored in advance and the day of the event closely. If needed, outdoor activities will be reorganized on the agenda to accommodate better weather throughout the day.
ORP-7	Another local event will take place at GJAC and/or the OneStop Norcross location impacting the demonstration at the venue.	Gwinnett County will follow their reservation process to ensure that access and event space is secured well in advance of the demonstration.

ID	Risk	Mitigation Strategy
ORP-8	A key person is unavailable (i.e., sick or delayed travelling) on the day of the event.	Coordination and planning will include the identification of back-up personnel to cover for key staff if necessary.

3.8 Approvals

ORD approvals, shown in **Table 17**, confirm completion of the demonstration and user acceptance testing. The approvals confirm that the operational readiness demonstration plan includes a complete set of demonstrations that are needed to validate the system, and that the system is ready for release to the public. Signatories affirm that they have witnessed the successful demonstrations conducted for USDOT and our stakeholders.

Table 17. ORD Approvals

Approver Role	Date of Approval
Co-Project Manager: Alan Davis (GDOT)	**Date:**
Co-Project Manager: Kofi Wakhisi (ARC)	**Date:**
Co-Deployment Lead and Product Owner: Joseph Hacker (ARC)	**Date:**
Co-Deployment Lead: Natalie Smusz-Mengelkoch	**Date:**
Community Outreach Lead: Jordan Hall	**Date:**

4 References

Table 18 includes a list of documents referenced during the plan, including URLs and USDOT Publication Numbers, where possible.

Table 18. References

ID	Referenced Documents
[ConOps]	Georgia Department of Transportation. Deliverable Task 2 Concept of Operations (Phase 2 Update). Atlanta: U.S. Department of Transportation. (2024).
[ORCB]	Georgia Department of Transportation. Deliverable Task 2G Operational Concept Briefing. Atlanta: U.S. Department of Transportation. (2023).
[PMESP]	Georgia Department of Transportation. Deliverable Task 2K Performance Measurement and Evaluation Support Plan. Atlanta: U.S. Department of Transportation. (2023).
[SDS]	Georgia Department of Transportation. Deliverable Task 2E Software Development Schedule (incorporated into the Phase 2 Program Management Plan (PMP)). Atlanta: U.S. Department of Transportation. (2024).
[STP]	Georgia Department of Transportation. Deliverable Task 2G System Test Plan. Atlanta: U.S. Department of Transportation. (2023).
[SySR]	Georgia Department of Transportation. Deliverable Task 6 System Requirements Specification (Phase 2 Update). Atlanta: U.S. Department of Transportation. (2024).
[TM]	GDOT Test Matrix (2024)

Appendix A. Acronyms and Abbreviations Glossary

Table 19 below provides a list of acronyms or abbreviations and association meanings.

Table 19. Acronyms and Definitions

Acronym or Abbreviation	Meaning
ADA	Americans with Disabilities Act
API	Application Programming Interface
ARC	Atlanta Regional Commission
ATL Rides	Atlanta Rider Information and Data Evaluation System
Avail	Avail Technologies
CDP	Connected Data Platform
CFT	Controlled Field Testing
ConOps	Concept of Operations
COTS	Commercial-Off-The-Shelf
CV	Connected Vehicle
CV1K	Regional Connected Vehicle Infrastructure Deployment Program
C-V2X	Cellular Vehicle to Everything
CVTMP	Connected Vehicle Technology Master Plan
DSRC	Dedicated Short-Range Communications
EMT	Executive Management Team
GA Tech	Georgia Institute of Technology
GCDOT	Gwinnett County Department of Transportation
GDOT	Georgia Department of Transportation

GJAC	Gwinnett Justice and Administration Center
G-MAP	OTP for G-MAP Subsystem
GOSystems	GO Systems and Solutions
GTFS	General Transit Feed Specification
GTRI	Georgia Tech Research Institute
HNTB	HNTB Corporation
Arcadis	Arcadis
ICF	ICF International, Inc.
IOO	Infrastructure Owner Operators
IORS	Installation and Operational Readiness Schedule
LEP	Limited English Proficiency
KHA	Kimley-Horn and Associates, Inc.
ORCP	Operational Readiness Concept Briefing
ORDP	Operational Readiness Demonstration Plan
ORP	Operational Readiness Plan
ORTP	Operational Readiness Test Plan
OS	Operating System
OSS	Open Source Software
OTP	OpenTripPlanner
PED-SIG	Mobile Accessible Pedestrian Signal System
PMD	Performance Measurement Dashboard
RSU	Roadside Unit
RTM	Requirements Traceability Matrix
SDK	Software Development Kit
SEL	System Engineering Lead

SILCGA	Statewide Independent Living Council of Georgia
ST-CTN	Safe Trips in a Connected Transportation Network
STM	Space Time Memory
STP	System Test Plan
STRS	System Test Results Summary
TRSD	Test Results Summary Documentation
TSP	Transit Signal Priority
UI	User Interface
USDOT	U.S. Department of Transportation
V&V	Verification and Validation Approach
V2I	Vehicle-to-Infrastructure

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