



Event Parking Management User Acceptance Testing Test Plan

for the Smart Columbus
Demonstration Program

FINAL REPORT | May 11, 2020



Produced by City of Columbus

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- Experience Columbus
- Parking Operators
- Division of Parking Services
- Mid-Ohio Regional Planning Commission
- ParkMobile

Abstract

The purpose of this Smart Columbus User Acceptance Testing Test Plan is to establish a common framework for conducting testing activities in support of the Event Parking Management project. The plan facilitates processes among project stakeholders, including City of Columbus – Division of Parking Services, Experience Columbus, Parking Operators, Mid-Ohio Regional Planning Commission, ParkMobile, and other stakeholders. The plan categorizes all components that make up the system of interest, outlines the testing strategy, defines the test tasks and interactions with other system elements, and provides a governance scaffold for the execution of all testing activities. The governance scaffold includes the tools to be used for logging, tracking, monitoring, and reporting test outcomes.

The primary goals of the User Acceptance Testing Test Plan are to evaluate how well the system conforms to the allocated requirements and satisfies the system of interest's intended use and user needs. The evaluation will include analysis, demonstration, inspection, and testing of various products, systems, and data to provide final acceptance of the system and allow movement forward to the next phase in the project.

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Project Summary

PROJECT BACKGROUND

The Event Parking Management (EPM) project is one of the eight projects in the Smart Columbus program and is considered the future of smart parking. Creation of the EPM system will allow travelers to identify current projected parking availability near their target destination to help reduce additional driving that might otherwise be required to find suitable parking. Users of this system will have access to parking reservations and payment options (for garage and surface lot parking). Benefits of an EPM system include increased knowledge of available parking in the downtown and Short North areas during events, reduced parking-related congestion, and reduced emissions.

The project scope will encompass public-class parking facilities within the downtown region (geographic scope detailed below), as well as loading zones, public surface lots, and parking meter expected availability information. The city-owned, restricted-parking garages and surface lots used for employees and short-term visitors will not be included in the EPM project.

The amenities in **Table 1** are planned for deployment in this project.

Table 1: EPM Project Scope

40,000+ spaces in parking garages	The project will capture parking availability and other parking-related data from parking garages and transmit the data to the EPM Central System and then to the Smart Columbus Operating System (Operating System). The garages will allow access to traveler accounts to provide a means of payment for parking through integration with the Smart Columbus Common Payment System (CPS). Refer to the Multimodal Trip Planning Application (MMTPA) Concept of Operations (ConOps) for more information on payments integration. ¹
4,300 parking meters	The project will collect parking-related data from single-space parking meters and transmit the data back to the Operating System to project availability.
30,000+ spaces in surface lots (estimated)	The project will capture parking-related data from private surface lots and transmit that data to the Operating System.
130 loading zones	The project will collect restriction information for loading zones designated by the City of Columbus.

¹ <https://d3h2plpmmz6qe4.cloudfront.net/2019-07/Multi-Modal%20Trip%20Planning%20System%20Concept%20of%20Operations.pdf>

EPM Central System	The EPM project will consist of several new software modules working together to deliver the EPM service, including a front-end-traveler user interface and back-end central system that will connect, capture, relate, store, and respond to real-time parking data collected from various sources and equipment. EPM will interface with the Operating System to house the real-time and archived data and allow stakeholders operational and reporting access. These combined software modules make up the EPM system and will provide current, projected, and complete views of parking status and availability to help travelers plan and pay for parking and realize the City's smart parking vision and goals.
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Source: City of Columbus

PROJECT OBJECTIVES

Smart Columbus has partnered with public and private agencies with a shared focus on enhancing user experience, quality of life, and satisfaction. The project has established intermediate goals and objectives that, when reached, will signal progress toward reaching successful outcomes.

The City of Columbus identified the following objectives to measure EPM impact:

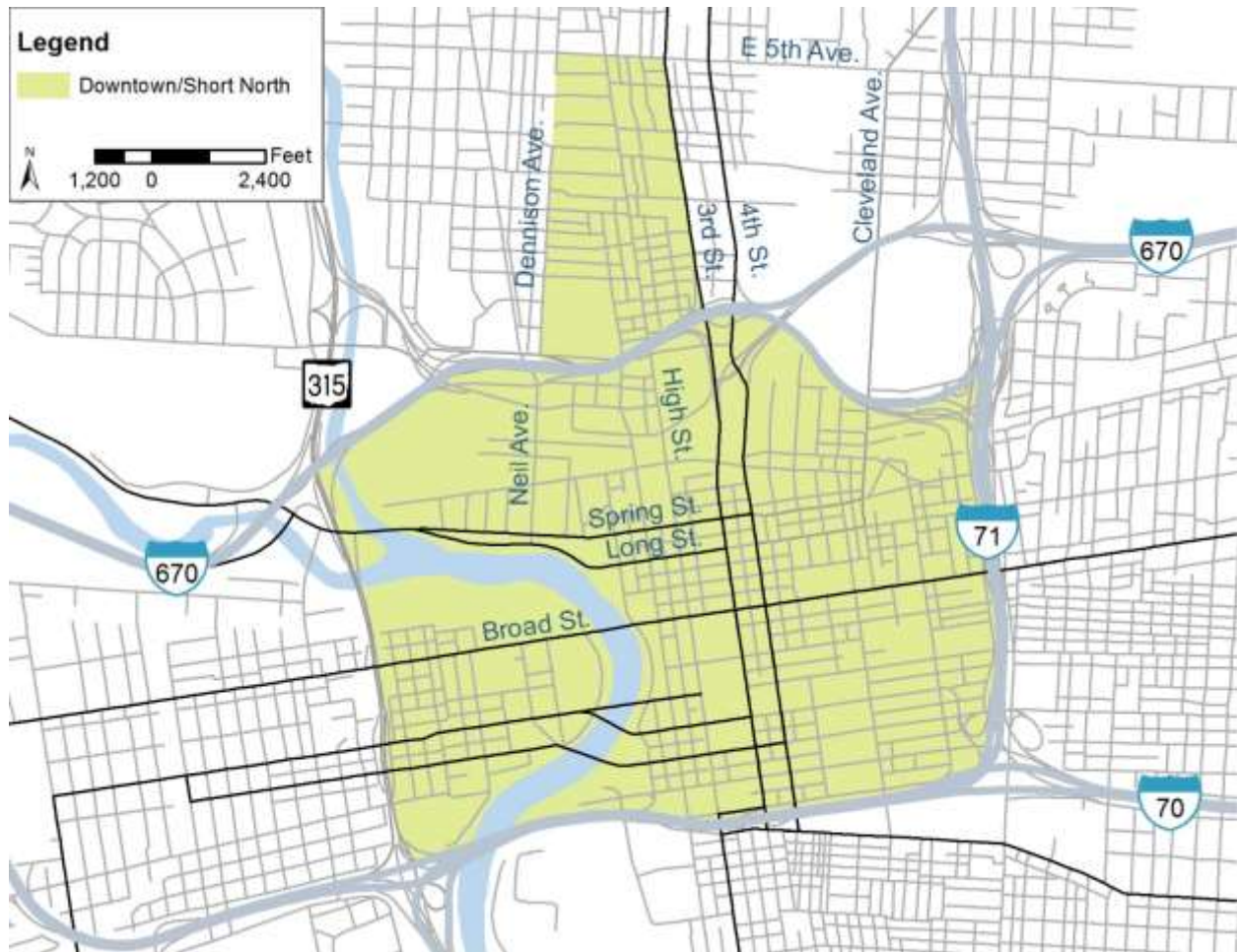
- Increase knowledge of available parking in the downtown area and Short North during events
- Reduce parking-related congestion
- Reduce vehicle emissions

SYSTEM GEOGRAPHIC SCOPE

The EPM project focuses on the Downtown and Short North areas for parking garage, surface lot, parking meter, and loading zone information. The parking meter and loading zone information will be expanded citywide.

The Downtown boundaries are consistent with those of the central business district, which is bounded by SR-315 on the west, I-70 on the south, I-71 on the east, and I-670 on the north. In addition, the Short North area includes the High Street corridor from I-670 on the south, Dennison Avenue on the west, Third Street on the east, and Fifth Avenue on the north.

Figure 1 presents the geographic boundaries for the EPM project.



Source: City of Columbus

Figure 1: Downtown Columbus and the Short North Area

Chapter 1. Introduction

1.1. OVERVIEW

This User Acceptance Testing (UAT) Test Plan was prepared to verify the Event Parking Management (EPM) project elements to commission the system for operation and evaluate the functional deployment against its intended function and implementation of the system design. The UAT Test Plan is also intended to demonstrate to project stakeholders that adequate consideration has been given to all aspects of the testing effort to demonstrate readiness of EPM for production use.

The UAT will establish a common framework for testing. This includes describing various testing types and methods, as well as setting expectations for which method(s) should be used and when each method should be used. The document provides information on which functional components and features will and will not be tested, identifies tester roles, instructs testers how to capture defects, and defines pass/fail criteria. This UAT also provides testers with a set of test cases (**Chapter 5**) intended to evaluate the degree to which system functionality conforms to the system requirements, which are traced to user needs.

An outline of the project's test report is provided in **Appendix A**. However, this document is not a test report. Therefore, once all testing activities have been completed, a test report will be developed for traceability purposes and submitted for review.

1.2. OBJECTIVES

The UAT Test Plan supports the following specific objectives:

- Ensure conformance to functional and non-functional requirements
- Demonstrate that all contract requirements have been provided
- Verify necessary functions, communications, and operational interfaces
- Identify how each testable requirement will be demonstrated, including the method for performing the test
- Identify the results that will constitute success for each test
- Identify the resources required to complete each test
- Identify all the deliverables that will result from completing the testing
- Document issues identified during testing and provide an action plan to resolve them
- Ensure that issues are identified and fixed before go-live

1.3. REFERENCES

The EPM system will be constructed to meet the user needs and features identified in the Concept of Operations (ConOps) and to meet the requirements in the System Requirements (SyRS). This document is also supported by other system design documents including System Architecture and Standards Plan, Safety Management Plan and Performance Management Plan. The documents listed in **Table 2** provide additional details on achieving the outcomes for the project.

Table 2: References

Title	Publication Date
IEEE 829 Test Plan Outline https://standards.ieee.org/standard/829-2008.html	Jul 18, 2008
Smart Columbus Demonstration Program Event Parking Management Concept of Operations https://d3h2plpmmz6qe4.cloudfront.net/2019-07/Event%20Parking%20Management%20Concept%20of%20Operations.pdf	Jun 27, 2018
Smart Columbus Demonstration Program Event Parking Management System Requirements https://d3h2plpmmz6qe4.cloudfront.net/2019-07/Event%20Parking%20Management%20System%20Requirements.pdf	Dec 11, 2018
Smart Columbus Demonstration Program System Architecture and Standards Plan https://d2rfd3nxvhnf29.cloudfront.net/2020-02/SCC-B-SASP-UPDATED_2-25-2020.pdf	Feb 25, 2020
Smart Columbus Demonstration Program Demonstration Site Map and Installation Schedule https://d2rfd3nxvhnf29.cloudfront.net/2020-01/SCC-B-DSP-IS-FINAL-20200124.pdf	Jan 24, 2020
Performance Measurement Plan for the Smart Columbus Demonstration Program https://d2rfd3nxvhnf29.cloudfront.net/2019-08/Smart%20Columbus%20Performance%20Measurement%20Plan.pdf	Jun 2019
Smart Columbus Demonstration Program Safety Management Plan https://d2rfd3nxvhnf29.cloudfront.net/2020-03/SCC-F-Safety%20Management%20Plan_12-05-2019_FINAL.PDF	Dec 5, 2019

Source: City of Columbus

More information about the Smart Columbus Demonstration Program can also be found on the Smart Columbus website.²

This UAT was adopted from the Institute of Electrical and Electronics Engineers (IEEE) 829-2008 Test Plan Outline and includes tailored project-specific processes recommended by that document, addressing management life cycle test processes.

1.4. TEST TEAM ROLES AND RESPONSIBILITIES

Table 3 identifies the anticipated tester roles and responsibilities for the EPM elements.

² www.smart.columbus.gov

Table 3: Tester Roles and Responsibility Matrix

Role	Description	Testers
System owner/City of Columbus project manager	City of Columbus representative overseeing the completion of this project and its testing. Responsible for overseeing adherence to individual policies of service providers.	Ryan Bollo, City of Columbus
Test manager(s)	Responsible for test report summaries and scheduling.	Sai Geetha Koganti, HNTB
General tester (traveler)	General testing role with domain knowledge in transportation and/or familiarity with EPM system requirements.	Andrew Wolpert, City of Columbus
		Sonja Summer, City of Columbus
		Amanda Ford, City of Columbus
		Amber Kohlberg, City of Columbus
		Jeff Kupko, Michael Baker International
		Sherry Kish, HNTB
		Alex Kavanagh, HNTB
		Sai Geetha Koganti, HNTB
Technical tester	A technically advanced user who can perform advanced system tests such as validating point-to-point data validation.	Warner Moore, Gamma Force
		Jarred Olson, Accenture
		Amanda Ford, City of Columbus
		Amber Kohlberg, City of Columbus
		Casey Ellis, ParkMobile
Parking operators	A parking operator who has a contract to show parking availability on the PARKAPP.	Park Place, Citrin, SP+, Towne Park

Source: City of Columbus

1.5. TEST PLAN SCHEDULE

Table 4 shows the timeline for major deliverables before the project goes live. Please refer to **Chapter 2** for risks associated with the project schedule.

Table 4: EPM Project Testing Schedule

Deliverable	Timeline	Notes
Product stabilization	3/31/2020 – 4/13/2020	

Deliverable	Timeline	Notes
Acceptance testing (Releases 1 and 2)	4/14/2020 – 4/21/2020	
Regression testing until acceptance	5/7/2020 – 5/15/2020	
EPM Final Test Plan	5/8/2020	
Draft Test Report (Releases 1 and 2)	5/18/2020	Test results will be summarized for internal use only. The Draft Test Report will be submitted following Release 3 testing, which will include test results of Releases 1 and 2.
Soft Launch (Releases 1 and 2)	7/1/2020	Public release of ParkColumbus app and web with Releases 1 and 2 features. There will be no recruiting or outreach accompanied with this soft launch.
Release 3 test procedures (added to this Test Plan)	7/31/2020	This document will be updated with the procedures for Release 3 test cases. These will be written when the features and functionality are available.
Public Launch	9/10/2020	Requires improvement/trend toward normal travel volumes. Labor Day is the new target based on recent Centers for Disease Control statements indicating return to school in the fall.
Release 3 development	5/4/2020 – 10/30/2020	
Release 3 testing (monthly)	8/3/2020 – 10/30/2020	
Webinar for Test Plan, preliminary test results, and launch*	10/29/2020	
Draft Test Report (Releases 1, 2, and 3)	11/23/2020	
Final Test Report (Releases 1, 2, and 3)	12/16/2020	
Integration to ParkColumbus app and web (Release 3)	8/1/2020 – 11/13/2020	Release 3 features will be integrated into the “Live” version of the ParkColumbus app and web as they are developed and tested.

*Webinar will be delayed if the go live date is delayed.

Source: City of Columbus

Chapter 2. Risks and Contingencies

Several parts of the EPM project are outside the project team's control but have direct impacts on the process and must be validated. Risks, contingencies, and mitigating factors for the EPM project testing are:

- Parking operator agreements could not be in place in time to support EPM release testing. Risks include inability to test parking availability or parking reservations provided by all the parking operators. However, ParkMobile is in regular contact with the parking operators and has agreements signed with several of them. All parking operators have received the draft contract.
- The EPM application relies on the parking operator's application programming interface (API) to update parking information and confirm reservations and payments. If those external systems have unplanned failures or degraded service, the EPM application would be unable to provide travelers with services, which could lead to adverse perceptions from community members. The project team will work with external systems to mitigate this risk by coordinating service-level agreements (SLAs) and strategies for monitoring and notification in case of service disruption.
- Early adopters may experience usability issues, risks, and/or annoyances common to early-stage product use and may therefore be dissuaded from using the system in the future. This risk is low, as the ParkColumbus application is already in operation.
- There may be technical challenges involved with integrating CPS and ParkColumbus. Overcoming these challenges may delay the schedule. To mitigate this risk, CPS and EPM vendor teams meet regularly to work through integration processes and anticipate any issues before they arise.
- Resource availability issues may affect the testing schedule, leading to a delay in acceptance testing. To mitigate the risk, the City will leverage additional resources from the Smart Columbus consultant contracts for additional support if needed. Training material will be provided to the testers before testing to familiarize them with testing tools. Testing team and vendor will meet regularly to discuss features and functionality of the system to understand the application as a whole while testing. Testers will also be required to leverage the test tools, which will provide an up-to-date snapshot for new testers to quickly get up to speed on test procedures, expectations, and progress.
- Schedule risks are associated with various integration and external elements of the project, including:
 - The Operating System for parking availability – The Operating System team is developing a predictive analytics tool for on-street parking and loading zones availability. This tool will need to integrate with ParkMobile. Discussions are ongoing between project teams so that development, integration, and user experience are all discussed in parallel.
- Schedule risks associated with COVID-19 pandemic – The COVID-19 pandemic has affected the launch of the EPM application in various ways. The State of Ohio implemented a stay-at-home order, travel restrictions, and a state of emergency that are in effect through May 2020. Removal of these orders and restrictions will be phased throughout summer 2020. As a result, most, if not all, major events in Central Ohio have been cancelled or rescheduled for fall 2020. For this reason, the public launch and marketing efforts have been delayed until Labor Day 2020. The City assumes that by then, residents will have returned to work, and some events, depending on size, may be held. With this delay, the development team will continue to implement Release 3 requirements as planned, with implementation of these features into the production application taking place through October 30, 2020. The schedule in the Test Plan, shown in **Table 4** accounts for these assumptions.

Chapter 3. Approach

This section contains the overall approach to testing. The testing strategy is designed to ensure that each major group of features or feature combinations is adequately tested. Major activities, techniques, and tools that are used to test the designated groups of features are defined in this section.

3.1. TESTING APPROACH

This UAT Test Plan describes the approach for acceptance of the integrated EPM system. Two methods were used in combination: a systems engineering V-model was used to develop system requirements, and agile development was used to deliver those requirements. A key aspect of documentation is use of software tools that enable development, tracking, and traceability throughout the process.

Agile development was selected to deliver the EPM system to allow for iterative and incremental delivery and to respond quickly to changes during the development process. Using agile development also ensured that the development work was aligned to the highest business value for the City of Columbus and its stakeholders.

The project plan is divided into three releases (Releases 1, 2, and 3), allowing the development team to break down functionality into smaller, self-contained units that deliver value to the City. For the EPM system, the requirements listed in the EPM SyRS³ are broken down into test cases for testing and assigned an appropriate testing method and traceability method based on the functional requirement. Testers are responsible for executing test cases in accordance with the features being tested. For example, a “technical tester” with advanced knowledge of security and privacy will be responsible for testing requirements in the feature class of Administration, Policy, and Compliance. A tester with the role of “traveler” will be responsible for testing requirements that pertain to application usage features.

Operational scenarios from the project ConOps, as well as functional system requirements from the EPM SyRS, form the basis of the test cases in **Section 5.1**. These test cases are part of Releases 1 and 2 and make up the acceptance criteria for the operational readiness of the EPM elements.

The requirements that will be covered as part of Release 3 are listed in **Table 13**. Though the acceptance criteria are based on the operational readiness of the EPM elements covered in Releases 1 and 2 and listed in **Section 5.1**, continued development of Release 3 requirements and integration with the ParkColumbus application will take place. The schedule for Release 3 testing and integration into ParkColumbus is shown in **Table 4**.

3.2. TEST DELIVERABLES

During testing there will be additional artifacts that extend this plan to support and enhance the testing process. The following deliverables will result from the UAT testing process:

- Test cases

³ <https://d3h2plpmmz6qe4.cloudfront.net/2019-07/Event%20Parking%20Management%20System%20Requirements.pdf>

- Test scenarios
- Requirements Traceability Matrix
- Defects Matrix with corrective actions
- Change request log
- Error logs, bug reports, and/or screen captures (where feasible)
- Test Acceptance (see **Appendix A.7**)
- EPM Test Case Report (see **Appendix A.1.1**)
- EPM Test Plan and Report webinar

3.3. TEST TYPES

The EPM project has the following features: user accounts, parking reservations, parking availability, user preferences, parking amenities, and payment. Test types include functional and non-functional testing to validate the requirements. Various test types are used in this UAT to test each project features. Each methodology has a defined test objective, strategy, and pass/fail criterion (expected result). The following are examples of test types to be used:

- System testing – System testing involves testing the EPM system to verify that it meets specified requirements as defined in the SyRS for the system.
- Integration testing – Integration testing is performed to expose defects in the interfaces and in the interactions between the EPM and integrated components or systems.
- API testing – API testing involves testing APIs directly and as part of EPM integration testing to determine whether they meet expectations for functionality, reliability, performance, and security. API testing is performed manually, as opposed to automated API testing, which is the responsibility of the EPM developers.
- Installation testing – Installation testing follows a set of procedures that are necessary before the software can be used and tested.
- Unit testing – Unit tests are performed by the developer. Individual units or components of a software application are tested to validate that each unit or component performs as designed.
- Regression testing – Regression testing is performed against all requirements to verify that recent code changes, defect fixes, or performance updates have not adversely affected existing features.

3.4. VERIFICATION METHODS

Each of the EPM requirements requires a verification method, which details the plan for verifying the requirement based on its stated definition. For each test case defined in the Requirements Traceability Matrix (RTM), one of the verification methods listed in **Table 5** is assigned.

Table 5: Methods of Verification

Type	Description
Inspection	Verification through a visual, auditory, or tactile observation and comparison of observations with required attributes and characteristics of the system.

Type	Description
Demonstration	Verification that exercises the system software or hardware as it is designed to be used, without external influence, to verify that the system behaves as specified by the requirement.
Test	Verification using controlled and predefined inputs and other external elements (e.g., data, triggers) that influence or induce the system to produce the output specified by the requirement.
Analysis	Verification through indirect and logical conclusion using mathematical analysis, models, calculations, and derived outputs based on validated data sets.

Source: City of Columbus

3.5. TEST CRITERIA

3.5.1. Test Status

Each test case consists of several unique properties that should be considered holistically during the testing evaluation process. Properties include, but are not limited to, test identifier (ID), test objective, procedure, expected outcome, number of test runs that must be completed, and status. The RTM maintains the following status for each test case:

1. **Planned** – The test case has been defined, its role has been identified, testers have been assigned, and the test case is logged in the RTM as ready for testing.
2. **In progress** – The test case is underway but has not been completed.
3. **Passed** – A “passed” value indicates the defined number of tests have been completed by various testers without error and the expected result has been achieved. It is expected that each time this test is performed, independent of who is testing, the same successful results will be achieved.
4. **Failed** – A test case is marked as “failed” when it does not meet part or all of its expected outcomes. In this case, a defect would be logged, and a brief note would be entered in the comments column listing the defect ID for traceability. For all failed test cases, one or more defects must be logged to capture the details surrounding the failure and to track its status.
5. **Deferred** – A test case is marked as “deferred” when it cannot be performed at the time of testing or when requirements changed. If a test is deferred, the tester should provide a brief reason in the comments column of the RTM. The test manager is responsible for tracking deferred cases and evaluating the most appropriate time and/or response for addressing them.
6. **Canceled** – A test case is marked “canceled” when the requirement affiliated with the test case no longer applies to the project; that test case should be logged in the Change Request Log (see **Section 3.6.3**).

3.5.2. Entry/Exit Criteria

Entry criteria:

- Successful completion of EPM Releases 1, 2
- Test cases and scenarios added to the RTM
- Signed memorandum of understanding with parking operators in Columbus (84% of the market share in Columbus)

Exit criteria:

- All planned test cases and scenarios have been executed
- Test scenarios achieve a 100% pass ratio
- All defects found have been recorded in the defect management tool
- All high-severity defects have been resolved and retested
- A plan and schedule exist for resolution of outstanding issues
- A test report has been issued to stakeholders

3.5.3. Testing Suspension and Resumption

There could be cases in which a critical, severe defect is detected that is significant enough that, if not addressed, it would require one or more iterations of the same tests to be performed again or could even require suspension of testing. In such cases, the test manager should be notified immediately. He or she will work with stakeholders and vendors as appropriate to correct the issue as quickly as possible. Testing will resume once the test manager has confirmed the issue has been resolved.

The following situations would cause testing to be suspended:

- **App/ web crash** – Inability to execute a test case without crashing the app or web.
- **Inaccurate information** – Incorrect information associated with the parking availability, reservation, and/or payment information.
- **Network failure** – Failure of network connection required for normal operation.
- **Injury** – Any situation that could lead to bodily injury or significant damage to property.

3.6. TEST TOOLS

3.6.1. Requirements Traceability Matrix

An RTM will be used to ensure that 100% of the requirements are tested. The RTM is a spreadsheet that links requirements to test cases. The test manager will be responsible for updating the RTM, in coordination with other testers, to indicate the status of test cases and to record any applicable defects, notes, or observations. Test status includes planned, in progress, passed, failed, deferred, and canceled. A test case may be deferred because (1) it is not possible to test certain functionality yet because of dependencies on requirements or (2) the functionality is not available yet for testing, so testing must be deferred to a subsequent release. For example, for the EPM RTM, many of the requirements in Release 3 are still in development, especially those that require integration to external systems such as the Common Payment System or Operating System. The schedule for testing Release 3 requirements is shown in **Table 4**; in addition, the Release 3 test cases are currently presented in a separate matrix, in **Table 13** since the test cases do not have test procedures at this point.

A test case may be cancelled if the requirement for which it is written is determined to be obsolete. Obsolete requirements must follow a change request process that includes the rationale for why the requirement is no longer needed. Canceled test cases do not count toward the goal of ensuring that 100% of the requirements are tested.

3.6.2. Defect Log

The test manager will monitor the defect log for corrective action. A defect log will be used during testing to capture, track, monitor, and address anomalies observed during UAT. For each entry, the development team will work to understand and reproduce (where possible) the defect, identify the root cause, summarize a response, and log the activities undertaken to resolve the issue. Deferred tests must be assigned to a subsequent release to ensure 100% of the requirements are tested. The severity of the defect needs to be assessed and the defect must be assigned to the category of critical, high, medium, or low, where “critical” is the most serious classification, causing the feature or product to be unusable. Defects of this severity should be brought to the immediate attention of the test manager for further inspection, coordination, and decision-making. Low severity indicates a cosmetic observation.

The defect tracker will also be leveraged (with the RTM) to measure the feasibility and readiness of the software to be promoted to production. Additional information can be found in **Section 3.10**.

3.6.3. Change Request Log

The ability to track system design changes or changes to requirements associated with a feature is a fundamental strategy for configuration management and an important aspect of managing projects and maintaining traceability across the Smart Columbus program. The RTM provides testers with a change tracking mechanism to capture and justify requests for change, which often derive from a defect or an enhancement request. The City of Columbus project manager is responsible for assessing the impact of the change as it relates to the project objectives, schedule, cost, and so forth, and for providing final authorization on the request through the tool. **Appendix A.5, Table 20**, provides a record of all the change requests logged throughout the testing process, along with justifications and authorization status.

3.7. HARDWARE AND SOFTWARE REQUIREMENTS

iOS hardware requirements are:

- Operating system – Compatible with iPhone and iPad. iOS version 12.0 and greater
- Storage size – Minimum 65.9 MB

Android hardware requirements are:

- Operating system – Compatible with Android devices. Android version 9.0 and greater.
- Storage size – Minimum 17 MB

Web requirements:

- Google Chrome
- Safari
- Edge
- Firefox

3.8. ENVIRONMENTAL NEEDS

Testers must have an internet connection to test the EPM web portal as well as an Apple or Android smartphone to download and test the EPM app. Testers should also be familiar with ways to capture screenshots from their testing device in case an error occurs or the expected result is not achieved. Screenshots aid in debugging because they document the event for the development team.

3.9. CONTRACTUAL REQUIREMENTS

Listed below in **Table 6** are the contractual requirements defined in the EPM contracts.

Table 6: EPM Contractual Agreements

Phase	Contractual Requirement	Status
Development phase	Quality Assurance/Quality Control Plan	Pending
	Interfaces with external systems and other Smart Columbus projects	Pending
	Product demonstrations for Smart Columbus	On going
	Coordination meetings	On going
Prior to operational testing period	Acceptance test criteria	Complete
	Training Plan	Pending
Prior to deployment	Test results documentation	Pending
	Communications Plan	Pending
	Data Backup and Recovery Plan	Pending
	System Security Plan	Pending
	Overall System Schematic and Architecture Plan	Complete
	Participant Recruitment Plan	Pending
After deployment	Operations and Maintenance Plan	Pending
	Usage data to support performance measurement	Pending

Source: City of Columbus

3.10. MEASURES AND METRICS

The RTM contains a defect tracker, which testers will use to capture anomalies, incongruences, errors, or any other output inconsistent with the expected test case result. The RTM, combined with the defect tracker, will capture the following testing metrics:

- Total number of test cases
- Number and percentage of test cases passed
- Number and percentage of test cases failed
- Number and percentage of test cases deferred
- Number and percentage of defects found
- Number and percentage of high-severity defects
- Number and percentage of defects accepted
- Number and percentage of defects rejected
- Number and percentage of defects deferred
- Total number of testers

The City of Columbus will leverage these data points to determine the feasibility and operational readiness of the EPM project to receive final acceptance test approval as outlined in the test summary in **Appendix A.3.**

Chapter 4. Test Items

4.1. EPM FEATURES TO BE TESTED

The following features and capabilities of EPM will be tested:

- Traveler web portal
 - User profile/account
 - Individual
 - Fleet
 - Parking availability and restrictions
 - Event parking
 - Reservation
 - Discount/promotional code
 - Notifications and alerts
 - Payment
 - Guest account
 - User feedback
- Traveler mobile app
 - User profile/account
 - Parking availability and restrictions
 - Event parking
 - Reservation
 - Discount/promotional code
 - Notifications and alerts
 - Payment
 - Guest account
 - Navigation
 - User feedback
- Parking operator web portal
 - Demand-based pricing
 - Discounts
- Administrator web portal (City)
 - Demand-based pricing
- Predicted availability functionality

- On street
- Loading zone
- API/integration
 - CPS
 - Parking availability
 - Performance measurement data to operating system

4.2. FEATURES NOT TO BE TESTED

Some features will not be specifically addressed. Testing of these features will be indirect, inferred, or assumed because of other testing efforts:

- **API testing** – Inspection of service provider APIs will not be part of this UAT. Integration with parking operators through APIs to send and receive parking facility information will be demonstrated as part of development release testing.
- **Network security** – Inspection of individual transactions or packets will not be tested as part of this UAT. It is sufficient to accept the secure socket layer protection configured, which secures communication to the end user.
- **Support environment** – A Support environment will be demonstrated as part of the contractual requirements but not tested as part of this UAT.
- **Non-functional requirements** – Successful demonstration of requirements related to information management (IM), lifecycle (LC), availability and recovery (AR), maintainability (MT), disposal (DP), and policy and regulation (PR) requirements will be demonstrated through submittal and acceptance of the Data Backup and Recovery Plan, Overall System Schematic and Architecture Plan, and Operations and Maintenance Plan which are part of the contractual requirements listed in **Table 6**.
- **Data Requirements (DR)** – Data requirements will be verified in accordance with the Smart Columbus OS and Data Privacy Plan (DPP). Inspection of the API and data transmitted to the OS will ensure that all requirements have been met and that no PII has been transferred to the OS.
- **Performance Requirements (PRs)** – EPM will be tested for operational performance but will not undergo benchmarking for stress testing. Capacity, throughput, high availability, and disaster recovery are inherent to the requirements in the contract and managed through the contract awarded to ParkMobile.
- **Operations and maintenance** – Operations and maintenance requirements will be demonstrated in accordance with the Operations and Maintenance Plan as part of the contractual requirements listed in **Table 6**.
- **Obsolete Functional Requirements** – All functional requirements have been reviewed with the system owner and few of the requirements are considered obsolete after considering multiple scenarios and user needs listed in the EPM Concept of Operations. Requirements that are changed to obsolete and justification is listed in **Table 7**.

Table 7: Requirements Identified as Obsolete for EPM Testing

Requirement ID	Description	Justification
EPM-FN1910-V01	The EPMCS (Event Parking Management Central System) shall include a visual indicator showing the probability of finding open parking meter spaces and open loading zone spaces.	This was revised into two requirements to separate meters and loading zones. Please refer to test cases EPM-ADM006-V01 and EPM-ADM011-V01 in Table 13 .
EPM-FN1926-V01	Creating a profile in the EPMCS shall require submission of traveler's first and last name.	ParkMobile platform does not require to enter first and last name when creating a profile. Traveler can enter his or her first and last name later in the settings. ParkMobile has deployed numerous instances of its platform around the country, both off-the-shelf and customized white-label versions. ParkMobile's experience and industry best practice is to minimize the information that is collected when creating a profile. Therefore, the City and ParkMobile decided to carry the same settings to the ParkColumbus platform. It is for this reason this requirement is marked as obsolete.
EPM-FN1958-V01	The PARKAPP shall support mobile landscape mode (form factor).	This requirement is specific to the navigation. The app allows the traveler to open his or her navigation app (test case: EPM-APP008-V01) and can change to landscape mode if supported by the navigation app. Therefore, this requirement does not apply for ParkMobile.
EPM-FN1983-V01	The EPMCS shall be capable of mobile device payments by presenting a reservation ID through NFC, if supported by the traveler's mobile device.	Parking operators in Columbus mostly support bar codes for mobile device payments and do not support near-field communications (NFCs) as a payment method. Therefore, this requirement is considered obsolete for this project.

Source: City of Columbus

Chapter 5. Test Cases

5.1. ACCEPTANCE TEST CASES

The EPM elements will be tested across four different channels [Web, App (Apple and Android), Parking Operator Application and system administrator]. The test cases listed in the below tables are critically important to the acceptance of the EPM system, as it tests the system's ability to meet the requirements holistically, end-to-end, from all active participant viewpoints (traveler, parking operators, City of Columbus, and system administrator).

The tables below list the Release 1 and 2 requirements that make up for the operational readiness for the EPM elements.

- Test cases related to ParkColumbus web portal are listed in **Table 8**.
- Test cases related to ParkColumbus app for Apple are listed in **Table 9**.
- Test cases related to ParkColumbus app for Android are listed in **Table 10**.
- Test cases related to Parking Operator Application (OPAPP) are listed in **Table 11**.
- Test cases for EPMCS system administration, City of Columbus administration, Policy and Compliance are listed in **Table 12**.

The test cases outlined below are reflective of the capabilities the system must be able to perform in order to receive acceptance of the EPM system.

5.1.1. Web Portal Test Cases

The web portal is an essential channel for travelers to access ParkColumbus through a computer, regardless of the location where they may be accessing from (e.g., home, work, library, etc.). The test cases designed for the web portal will include top-to-bottom testing of the essential functions that are offered through ParkColumbus. Eight testers will test all the web portal test cases at different days and times of the week including early morning (before meters collect fees), mid-morning, afternoon, evening, weekdays, and weekends.

The following essential test cases are planned for the ParkColumbus web portal.

Table 8: ParkColumbus Web Portal Test Cases

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB001-V01	System	Demonstration	Multi-language	Verify that default language is English on the PARKWEB.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure:</p> <p>1. Ensure default language is English on the webpage when travelers open the webpage on their device and when they log in.</p> <p>Pass Criteria:</p> <p>Verification by eight independent testers: Language displayed should be English when ParkColumbus webpage is opened.</p> <p>Post-condition:</p> <p>N/A</p>	English is the default language within the PARKWEB.	Travelers	EPM-UN005-V01	EPM-FN1955-V01: The PARKAPP shall default to English language user interface.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB002-V01	System	Demonstration	Geolocation information	Verify that PARKWEB requests consent from the travelers before accessing location information.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Open ParkColumbus web portal for the first time. 2. Pop-up appears on the bottom of the screen asking about using accessing location “ParkColumbus wants to know your location – “Allow” or “Block”. 3. Click ‘Allow.’ 4. For more information, click ‘Privacy Policy’ located on the bottom of the screen. 5. Privacy Policy lists what data will be collected from the traveler along with accessing with geolocation data. 6. Traveler will also need to accept the terms of use and privacy policy to create an account with ParkColumbus.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: 1. Travelers will need to give location permission when they use the web portal for the first time. 2. Travelers will also need to accept Terms of Use and Privacy Policy while creating an account with ParkColumbus.</p> <p><u>Post-condition:</u> Traveler location information is accurate on the web portal after the permission to access location information is given by the traveler.</p>	Consent is requested to access traveler’s location when using ParkColumbus web portal.	Travelers	EPM-UN028-V01	EPM-FN1947-V01: The PARKAPP shall obtain affirmative express consent from the traveler before accessing geolocation information or contact info.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB003-V01	System	Demonstration	Geolocation information	Verify that PARKWEB determines current location to search for parking options.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Click 'Find Parking' located on top right panel of the webpage. 2. Click on the small compass symbol located on the bottom right corner of the webpage. 3. Traveler location shown on the map should be accurate to the traveler's current location.</p> <p>Pass Criteria: Verification by eight independent testers: traveler location shown on the map should be accurate to the traveler's location.</p> <p>Post-condition: Traveler's current location is accurate on the app.</p>	Current location shown in the app should match with traveler's current location.	Travelers	EPM-UN008-V01	EPM-FN1946-V01: The PARKAPP shall use the global positioning system (GPS) device of the traveler's smartphone to determine current location to search for parking options.
EPM-WEB004-V01	System	Inspection	Contact feature	Verify that PARKWEB provides link to City's 311 webpage which has email and telephone number to City's 311 system.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Click "Columbus 311" located on the top right of the ParkColumbus homepage. 2. City of Columbus 311 webpage opens on the browser that contains contact information.</p> <p>Pass Criteria: Verification by eight independent testers Traveler is able to find the link to City of Columbus 311 webpage on ParkColumbus webpage which has email and telephone number to City's 311 system.</p> <p>Post-condition: Traveler has navigated away from the ParkColumbus webpage and is on the City of Columbus 311 webpage.</p>	Link to City's 311 webpage is available on the PARKWEB.	Travelers	EPM-UN013-V01	EPM-FN1952-V02: The PARKAPP shall provide a link to the City's 311 webpage.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB005-V01	System	Demonstration	Search options	Verify that traveler is able to search for parking options without creating an account on the PARKWEB.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Enter street address in the search tab and click 'Find Parking.' 2. Parking locations around the search address pop up.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to search for parking options without creating an account.</p> <p><u>Post-condition:</u> Traveler will need to create an account or continue as guest to pay and reserve for parking.</p>	Able to search for parking options without creating a PARKWEB account.	Travelers	EPM-UN014-V01	EPM-FN2109-V01: Travelers shall not be required to create a profile to search for parking options.
EPM-WEB006-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to filter parking spaces that are Americans with Disabilities Act (ADA) accessible.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Find Parking' located on top panel of the PARKWEB page. 2. Click 'Apply Filters,' select 'Disabled Parking' and click 'Done.' 3. Results displayed on the map show parking facilities that have access to disabled parking spots. 4. From the results shown on the map, click on a parking facility, and scroll down to the amenities to confirm ADA parking is listed under amenities.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: Parking options displayed on the map are ADA accessible.</p> <p><u>Post-condition:</u> Traveler can log into his/her account, create an account or can continue as guest to reserve and pay for the parking.</p>	PARKWEB allows to filter parking options that are ADA accessible.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1900-V02: The EPMCS shall provide access to ADA accessible parking spaces in accordance with standards for accessible design as determined by the ADA EPM-FN3094-V02: The PARKAPP shall allow travelers to filter available parking spaces based on ADA compliance.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB007-V01	System	Demonstration	Search options	Verify the PARKWEB allows travelers to filter parking options based on the availability of EV charging.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Click 'Find Parking' located on top panel of the PARKWEB page. 2. Click 'Apply Filters,' select 'EV Charging' and click 'Done' 3. Results displayed on the map show parking facilities with EV Charging facility.</p> <p>Pass Criteria: Verification by eight independent testers: Parking options displayed on the map have EV charging facility.</p> <p>Post-condition: Map shows all the parking options which have EV charging facility.</p>	PARKWEB allows travelers to filter parking locations that have EV charging facility.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3095-V02: The PARKAPP shall allow travelers to filter available parking spaces based on availability of EV charging.
EPM-WEB008-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to search for parking options by entering a street address.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Enter street address in the search tab and click 'Find Parking'. 2. Parking locations around the search address pop up.</p> <p>Pass Criteria: Verification by eight independent testers: traveler should be able to enter any street address to search parking options near that location.</p> <p>Post-condition: Parking availability options around the searched address are displayed on the screen.</p>	Search for parking on the PARKWEB by entering a street address and find parking locations around the search address.	Travelers	EPM-UN008-V01	EPM-FN1948-V01: The PARKAPP shall provide the traveler the ability to search for parking options by entering a street address.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB009-V01	System	Demonstration	User accounts	Verify that PARKWEB allows travelers to enter their email address when creating a profile.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Log In/Sign Up' located on top right corner of the web page. 2. Enter email address, password and accept ParkMobile Terms of Use and Privacy Policy. 3. Click 'Create Your Account'. 4. Landing page shows access to ParkColumbus webpage.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler when creating a profile, should be able to provide their email address.</p> <p><u>Post-condition:</u> Traveler should be able to log in to their ParkColumbus with their email address and password.</p>	Travelers enter email address when creating a profile with PARKWEB.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1927-V01: Creating a profile in the EPMCS shall require submission of traveler's email address.
EPM-WEB010-V01	System	Demonstration	User accounts	Verify that PARKWEB allows travelers to enter their mobile number in their profile.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click three lines located on top right corner of the webpage and click 'Settings.' 2. Click 'Edit' under 'Contact' tab to enter mobile number. 3. Enter First name, last name and mobile number. 4. Click Save Updates.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to enter mobile number to the profile under account settings.</p> <p><u>Post-condition:</u> Traveler is logged in and the mobile number is added to his/her account.</p>	Traveler adds mobile number to their PARKWEB profile.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1930-V02: Creating a profile in the EPMCS should include the option of providing a traveler's mobile number.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB011-V01	System	Demonstration	User accounts	Verify the traveler can create and store profile information in the PARKWEB.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Log In/Sign Up' located on top right corner of the web page. 2. Enter email address, password and accept ParkMobile Terms of Use and Privacy Policy. 3. Click 'Create Your Account.' 4. Landing page shows access to ParkColumbus webpage. 5. Click three lines located on top right corner of the webpage and click 'Settings.' 6. Click 'Edit' under 'Contact' tab to enter mobile number. 7. Enter First name, last name and mobile number. 8. Click Save Updates.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should receive an email notification about creating and editing account information with ParkColumbus.</p> <p><u>Post-condition:</u> Traveler successfully creates an account and is logged into the ParkColumbus web.</p>	Travelers create EPM profile on the PARKWEB and edit and save to their profile information to their account.	Travelers	EPM-UN015-V01 EPM-FN1926-V01 EPM-FN1927-V01 EPM-FN1928-V01 EPM-FN1929-V01 EPM-FN1930-V01 EPM-FN1932-V01 EPM-FN1934-V01 EPM-FN1935-V01 EPM-FN1936-V01 EPM-FN1937-V01	EPM-FN1925-V01: The PARKAPP shall allow travelers to create a profile in the EPMCS to store profile information and mobile application settings.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB012-V01	System	Demonstration	User accounts	Verify that travelers can log in to their PARKWEB account with their login information.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Log In/ Sign Up' located on the top right of the webpage. 2. Enter registered email address or mobile number and password and click 'Sign In.'</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: travelers should be able to log in to their ParkColumbus web account with their login information.</p> <p><u>Post-condition:</u> Traveler is logged in to the ParkColumbus web.</p>	Travelers log in to their PARKWEB account with their login information.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1937-V01: Travelers shall have access to manage their profiles in the EPMCS by correctly entering their login information.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB013-V01	System	Demonstration	Parking reservations	Verify that traveler can pay for the reservation of parking space without a CPS account.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Find Parking' located on top right side of the webpage. 2. Enter street address and select date and duration of the parking reservation. 3. Select parking facility for reservation. 4. Enter email address or mobile number and password and click 'Sign In.' 5. If no existing account, click 'Continue as Guest' or click 'Create an account.' Enter required information to login. 6. Click 'Reserve. Park Here!' located on the left side of the dashboard showing the parking amenities and other information. 7. Enter 'Customer Details,' 'Vehicle Details,' and 'Payment Details'. 8. Click '+ Add Card' under payment methods to add a payment method to use when reserving a parking location. 9. Pay for the parking using the added card. 10. Click 'Complete Purchase.'</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to enter credit or debit card information and pay for the selected parking without having a CPS account.</p> <p><u>Post-condition:</u> Traveler pays for the parking reservation without a CPS account and received email confirmation for successful payment.</p>	Travelers pays for the parking space using a credit/debit card.	Travelers	EPM-UN016-V01	EPM-FN1940-V01: The PARKAPP shall allow a traveler to provide a payment without requiring use of a CPS account.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB014-V01	System	Demonstration	Parking reservation	Verify the PARKWEB provides confirmation code of a parking reservation to the traveler.	<p><u>Pre-condition:</u> Traveler has access to ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-WEB013-V01 to reserve parking. 2. If reservation is successful, confirmation code with reservation information and email with payment confirmation is provided to the user.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be presented with a confirmation code and a receipt of payment with email confirmation after reserving a parking facility through the ParkColumbus webpage.</p> <p><u>Post-condition:</u> Traveler can use the email confirmation to access the parking facility for the reserved time.</p>	Parking reservation confirmation is provided to the traveler after reserving a parking place through PARKWEB.	Travelers	EPM-UN006-V01 EPM-UN021-V01	<p>EPM-FN1914-V01: The EPMCS shall provide a response to the PARKAPP of a confirmed reservation.</p> <p>EPM-FN1915-V01: The confirmation response provided to the PARKAPP shall include a reservation confirmation code.</p> <p>EPM-FN1917-V01: The confirmation response provided to the PARKAPP shall include notice of payment completion and amount.</p>
EPM-WEB015-V01	System	Demonstration	Navigation	Verify that PARKWEB links to traveler's map based navigation to direct the traveler to the designated parking location.	<p><u>Pre-condition:</u> The ParkColumbus webpage is open and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-WEB013-V01 to reserve parking. 2. Open the Reservation, Click 'Get Directions' to open the webpage with map based navigation.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: ParkColumbus web should be able to open the map-based navigation system when travelers requests directions to the reserved parking location.</p> <p><u>Post-condition:</u> Traveler has navigated from the ParkColumbus app and is on his/her map-based navigation page.</p>	Link to map based navigation for route information to the reserved parking location is available on the PARKWEB.	Travelers	EPM-UN008-V01	EPM-FN1964-V01: The PARKAPP shall include the ability to link to map-based navigation on the traveler's smartphone to direct the traveler to the designated parking location.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB016-V01	System	Demonstration	Payment	Verify that travelers can pay for the parking on the PARKWEB without redirecting to another web page.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Follow steps listed in EPM-WEB013-V01 to reserve parking. 2. Traveler is on the ParkColumbus webpage from start to finish of the parking reservation.</p> <p>Pass Criteria: Verification by eight independent testers: traveler should be able to enter credit or debit card information and pay for the selected parking without redirecting to a different webpage.</p> <p>Post-condition: Traveler is still on the ParkColumbus webpage.</p>	Traveler completes the purchase of parking space within the PARKWEB without redirecting to another webpage.	Travelers	EPM-UN031-V01	EPM-FN1980-V01: Travelers shall be able to pay instantly without being redirected away from the PARKAPP to complete a transaction.
EPM-WEB017-V01	System	Demonstration	Parking reservation	Verify the PARKWEB does not provide reservation confirmation code if payment for parking reservation is not complete.	<p>Pre-condition: Traveler has access to the ParkColumbus webpage.</p> <p>Procedure: 1. Follow steps listed in EPM-WEB013-V01 to reserve parking. 2. If payment or reservation is unsuccessful, the traveler is redirected to the checkout page and an error message is displayed on the screen.</p> <p>Pass Criteria: Verification by eight independent testers: 1. Traveler should receive an error message upon an unsuccessful payment. 2. Payment method used should not be charged with the parking reservation amount when the reservation is unsuccessful.</p> <p>Post-condition: Payment is not processed and traveler is on the checkout page.</p>	Payment error message is displayed on the webpage within PARKWEB when the payment for parking reservation is not complete.	Travelers	EPM-UN006-V01 EPM-UN021-V01	EPM-FN1916-V01: The EPMCS shall not provide a reservation confirmation code if payment is not complete.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB018-V01	System	Demonstration	Parking reservation	Verify that PARKWEB provides paid status of parking reservation to the traveler in real-time.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Follow steps listed in EPM-WEB013-V01 to reserve parking. 2. If reservation is successful, a digital receipt of the reservation is displayed on the screen along with the amount paid and method of payment used and the reservation code. 3. Click on the three lines located at the top right corner of the ParkColumbus webpage and click 'Reservations.' 4. All upcoming reservations along with the payment confirmation should be listed on the landing page. 5. An email confirmation with the paid status of the parking reservation should be received within two minutes of the reservation.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be presented with a confirmation code and a receipt of payment with an email confirmation after reserving a parking facility through the ParkColumbus webpage.</p> <p><u>Post-condition:</u> Traveler can use the email confirmation to access the parking facility for the reserved time.</p>	Traveler receives email confirmation with the paid status of the parking reservation within two minutes after reserving a parking space through PARKWEB.	Travelers	EPM-UN031-V01	EPM-FN1921-V01: The EPMCS shall communicate the paid status of reservations to the PARKAPP in real-time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB019-V01	System	Demonstration	Parking reservation	Verify that PARKWEB allows travelers to select and pay only for selected period of time.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure – (for reservation):</u> 1. Click 'Reserve Parking for Later.' 2. Enter street address in search tab. 3. Click 'Arrive after,' select date and time and click 'Set.' 4. Click 'Leave by,' select date and time and click 'Set.' 5. Select parking facility for reservation. 6. Enter email address and mobile number and password and click 'Sign In.' 7. If traveler has no existing account, click 'Continue as Guest' or click 'Create an account.' 8. Enter required information to log in and continue. 9. Click 'Reserve. Park Here!' located on the left side of the dashboard showing the parking amenities and other information.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to select date and time while reserving for parking and pay for only the selected duration.</p> <p><u>Post-condition:</u> Traveler to get an email confirmation of successful payment.</p>	Traveler selects the date and time to park and pays only for the selected time.	Travelers	EPM-UN031-V01	EPM-FN1922-V01: The PARKAPP shall allow travelers to pay for a specific period of parking time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB020-V01	System	Demonstration	Event parking	Verify that travelers can purchase event parking packages.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Find Parking.' 2. Enter a street address or City, select a parking option displayed on the screen with a ticket symbol and click 'packages.' 3. Select a package. Example: 2019-20 Blue Jackets quarter season and click 'Select Parking' under the package name. 4. Select a parking location and click 'Reserve.'</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: 1. Traveler is able to purchase an event package for the Blue Jackets game. 2. Traveler reserves parking garage/lot access for the whole quarter season.</p> <p><u>Post-condition:</u> Traveler should receive an email confirmation about parking reservation and successful payment confirmation.</p>	Traveler selects the event parking package within the PARKWEB and reserve parking garage/lot access for all events listed in that package at once.	Travelers	EPM-UN001-V01	EPM-FN3269-V00: The EPMCS shall provide the ability for travelers to purchase event parking packages for events at stadiums and/or arenas.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB021-V01	System	Demonstration	Event parking	Verify that travelers can enter event access code when booking parking space associated with that event.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Find Parking.' 2. Enter a street address or City, select a parking option displayed on the screen with a ticket symbol and Click 'Events' or 'Packages.' 3. Select a package. Example: 2019-20 Blue Jackets quarter season or select an event. Example: 2020 Columbus Marathon - October 18, 2020 4. Click 'Apply Access Code' 5. Enter access code associated with that event and click 'Done.' 6. Several parking options are displayed on the map.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler is able to enter an access code for the 2020 Columbus Marathon. Multiple parking options are displayed on the screen that allow parking for the selected event.</p> <p><u>Post-condition:</u> Traveler uses the access code to book parking space for an event.</p>	Traveler enters an event access code when reserving parking space for an event.	Travelers	EPM-UN001-V01	<p>EPM-FN3272-V00: The PARKAPP shall provide the ability for travelers to enter an access code associated with an event.</p> <p>EPM-FN3273-V01: The PARKAPP provides travelers access to more parking options after entering event access code associated with that event.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB022-V01	Integration	Demonstration	Event parking	Verify that PARKWEB provides travelers the same discounted ticket prices offered at the stadiums.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case EPM-WEB021-V01 to select an event and enter access code. 2. Check the prices listed for the same event on the website at 'https://arenadistrict.clickandpark.com/' 3. Prices should match both listed on the event website and on the ParkColumbus website.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler is able to purchase an event package for the 2020 Columbus Marathon through ParkColumbus web with no price difference if purchased through the event website.</p> <p><u>Post-condition:</u> Traveler books for the event parking through the ParkColumbus web.</p>	PARKWEB provides same discounted prices for event parking as offered at the stadiums.	Travelers	EPM-UN001-V01	EPM-FN3275-V00: Event parking packages shall mirror the ticket packages offered discounted rates at stadiums and/or arenas.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB023-V01	System	Demonstration	User accounts	Verify that PARKWEB allows travelers to create a guest account for a one-time reservation.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Click 'Reserve Parking for Later.' 2. Select the parking facility to reserve parking. 3. Confirm the date and time of the reservation on the left side dashboard and click 'Reserve. Park Here!' 4. Page with Sign in fields should open with option to 'Continue as Guest.' 5. Click 'Continue as Guest.' 6. Enter valid email address, vehicle details and payment details. 7. Confirm the details and purchase the parking reservation.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to pay for parking reservation without creating an account with ParkColumbus.</p> <p><u>Post-condition:</u> Traveler reserves and pays for parking without creating an account with ParkColumbus.</p>	Traveler pays for a one-time parking reservation using the guest account feature on the PARKWEB.	Travelers	EPM-UN016-V01	EPM-FN1939-V02: The PARKAPP shall provide travelers with the option of creating an EPM guest account (temporary account) to book a one-time reservation.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB024-V01	System	Demonstration	User accounts	Verify that PARKWEB provides travelers access to transaction log consisting of a history of paid parking transactions, locations, and time and date.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage and has a ParkColumbus account.</p> <p><u>Procedure:</u> 1. Click 'Reserve Parking for Later.' 2. Enter email address or mobile number and password click 'Sign In.' 3. Click on the three lines on the right top corner of the ParkColumbus webpage. 4. Click 'Reservations' under 'Account.' 5. Click 'View History' to view all reservations made for the past 12 months.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: 1. Traveler should be able to view transaction history for up to 12 months on his/her ParkColumbus web account. 2. Transactions viewed should be only for the past 12 months and not beyond 12 months.</p> <p><u>Post-condition:</u> Transaction made for the past 12 months is displayed on the screen.</p>	PARKWEB provides access to paid parking transactions, locations and date and time of reservation for the past 12 months of parking reservations.	Travelers	EPM-UN015-V01	<p>EPM-FN1942-V01: The PARKAPP shall provide travelers with access to a transaction log consisting of a history of paid parking transactions, locations, and time and date.</p> <p>EPM-FN1943-V01: The transaction log shall be limited to prior 12 months of transactions.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB025-V01	System	Demonstration	User feedback	Verify that PARKWEB provides travelers customer care contact information for complaints.	<p><u>Pre-condition:</u> Traveler has access to the ParkColumbus webpage.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-WEB013-V01 to reserve parking. 2. Click 'View Your Order.' 3. Select the parking session for which there is a parking complaint. 4. Click 'support.parkmobile.io' to navigate to a different customer support webpage. 5. Scroll down to the end of the webpage and click 'Submit a request' or live chat with the support personnel.</p> <p><u>Pass Criteria:</u> Verification by eight independent testers: traveler should be able to submit an online request or live chat with ParkMobile support.</p> <p><u>Post-condition:</u> Parking operator information is displayed on the screen.</p>	PARKWEB provides access to ParkMobile customer care to contact with parking issues.	Travelers	EPM-UN012-V01	EPM-FN1951-V03: The PARKAPP shall provide the traveler the ability to contact the customer care with complaints.

Source: City of Columbus

5.1.2. Mobile App Test Cases

The mobile application is an essential channel for travelers to reserve and pay for parking through their personal device. Additional functionality, such as alerts about parking reservations and filtering search options will help enhance the experience of the traveler. The test cases designed for the mobile apps will include testing of the essential functions for each feature available. The following cases are planned for the ParkColumbus mobile applications. Eight testers will test all the mobile app test cases on different days and times of the week including early morning (before meters collect fees), mid-morning, afternoon, evening, weekdays, and weekends. The testers will split testing the Apple and Android versions of the app.

5.1.2.1. Test Cases for the Apple Mobile App

The following essential test cases are planned for the Apple mobile app.

Table 9: ParkColumbus Mobile App Test Cases for Apple Software

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP001-V01	System	Demonstration	Geolocation information	Verify that PARKAPP requests consent from the travelers before accessing the geolocation information or contact info.	<p><u>Pre-condition:</u> The ParkColumbus app is installed on the target device.</p> <p><u>Procedure:</u> 1. Open ParkColumbus app. 2. A message is displayed about using 'Location Services' to find nearby parking locations. 3. Click 'GOT IT.' 4. Pop-up appears on the screen asking about using location 'Allow While Using App,' 'Allow Once,' or 'Don't Allow.' 5. Click 'Allow While Using App' to search nearby parking locations. 6. For more information, click 'Settings' located on the bottom right corner of the screen and click 'Privacy Policy.' 7. Privacy Policy lists what data will be collected from the traveler along with accessing with geolocation data. 8. Traveler will need to accept the terms of use and privacy policy to create an account to sign up.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Travelers will need to give location permission when they use the app for the first time. 2. Travelers will also need to accept Terms of Use and Privacy Policy while creating an account.</p> <p><u>Post-condition:</u> Traveler location information is accurate on the app after the permission to access geolocation is given by the traveler.</p>	Consent is requested to access traveler's location when using the app on the Apple device.	Travelers	EPM-UN028-V01	EPM-FN1947-V01: The PARKAPP shall obtain affirmative express consent from the traveler before accessing geolocation information or contact information.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP002-V01	System	Demonstration	Geolocation information	Verify that PARKAPP uses GPS of traveler's smartphone to determine current location to search for parking options.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed for EPM-MAP001-V01 to allow tracking location. 2. Click 'Park' or 'Reserve.' 3. Traveler location shown on the map should be accurate to the traveler's current location.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler location shown on the map should be accurate to the traveler's location.</p> <p><u>Post-condition:</u> Traveler's current location is accurate on the app.</p>	Current location shown in the app should match with traveler's current location.	Travelers	EPM-UN008-V01	EPM-FN1946-V01: The PARKAPP shall use the GPS device of the traveler's smartphone to determine current location to search for parking options.
EPM-MAP003-V01	System	Demonstration	Multi-language	Verify that default language is English on the PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Default language should be English on the ParkColumbus app when travelers opens the app on their device and when they log in.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: Language displayed when ParkColumbus app is opened should be English.</p> <p><u>Post-condition:</u> N/A</p>	English is the default language within the app.	Travelers	EPM-UN005-V01	EPM-FN1955-V01: The PARKAPP shall default to English language user interface.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP004-V01	System	Inspection	Contact feature	Verify that PARKAPP provides link to City's 311 webpage which has email and telephone number to City's 311 system.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Locate and click "More" on bottom right corner of the screen and open. 2. Locate "Visit 311 Columbus Site". 3. Click on "Visit 311 Columbus Site" to navigate to City of Columbus 311 webpage for contact information.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: ParkColumbus app should navigate traveler to City of Columbus 311 webpage and traveler should be able to find contact information to 311.</p> <p><u>Post-condition:</u> Traveler has navigated away from the ParkColumbus app and is on the 311 webpage.</p>	Link to City's 311 webpage is available in the app on an Apple device.	Travelers	EPM-UN013-V01	EPM-FN1952-V02: The PARKAPP shall provide link to the City's 311 webpage.
EPM-MAP005-V01	System	Demonstration	View	Verify that PARKAPP supports mobile portrait mode on Apple devices.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Ensure phone screen settings are set to auto-rotate. 2. Change mobile view to landscape. 3. ParkColumbus app to remain in portrait mode.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: ParkColumbus app screen should remain in portrait mode.</p> <p><u>Post-condition:</u> ParkColumbus app is open and is in portrait mode.</p>	Only portrait mode is supported by the app on an Apple device.	Travelers	EPM-UN008-V01	EPM-FN1957-V01: The PARKAPP shall support mobile portrait mode (form factor).

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP006-V01	System	Demonstration	Search options	Verify that traveler is able to search for parking options without creating an account on the PARKAPP.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Park' or 'Reserve' tab. 2. Choose duration of parking time to search for parking options.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to search for parking options without creating an account.</p> <p><u>Post-condition:</u> Traveler will need to log in or create an account to park or reserve the selected parking option.</p>	Able to search for parking options without creating an account on the PARKAPP.	Travelers	EPM-UN014-V01	EPM-FN2109-V01: Travelers shall not be required to create a profile to search for parking options.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP007-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to filter parking spaces that are ADA accessible.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Click 'Filter' located on top right corner of the screen. 3. Toggles to select 'Handicap Accessible' under filter options and clicks 'Done.' 4. Parking options displayed on the map should be handicap accessible. 5. From the results shown on the map, click on a parking facility, and scroll down to the amenities to confirm ADA parking is listed under amenities.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: Parking options displayed on the map should be handicap accessible and should be in accordance with standards for accessible design as determined by the ADA.</p> <p><u>Post-condition:</u> Traveler can login to his/her account, apply filters and reserve for the parking.</p>	PARKAPP on the Apple device allows to filter parking options that are ADA accessible.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	<p>EPM-FN1900-V02: The EPMCS shall provide access to ADA accessible parking spaces in accordance with standards for accessible design as determined by the ADA.</p> <p>EPM-FN3094-V02: The PARKAPP shall allow travelers to filter available parking spaces based on ADA compliance.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP008-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to filter parking options based on the availability of EV charging.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Click 'Filter' located on top right corner of the screen. 3. Toggle to select 'EV Charging Available' under filter options and clicks 'Done.' 4. Parking options displayed on the map have EV charging infrastructure to charge EVs.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: Parking options displayed on the map have EV charging facility.</p> <p><u>Post-condition:</u> Map shows all the parking options which have EV charging facility.</p>	PARKAPP on an Apple device allows travelers to filter parking locations that have EV charging facility.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3095-V02: The PARKAPP shall allow travelers to filter available parking spaces based on availability of EV charging.
EPM-MAP009-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to search for parking options by entering a street address.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to begin searching for the parking options. 2. Under 'Search Location' tab, travelers enters street address to find parking in that area.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to enter any street address to search parking options in that location.</p> <p><u>Post-condition:</u> Parking availability options around the searched address are displayed on the screen.</p>	Search for parking on the PARKAPP on an Apple device by entering a street address.	Travelers	EPM-UN008-V01	EPM-FN1948-V01: The PARKAPP shall provide the traveler the ability to search for parking options by entering a street address.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP010-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to enter their email address when creating a profile.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. Click 'Create an Account' to create a profile with ParkColumbus app. 3. Enter email address and password. 4. Accept terms and conditions and privacy policy and click 'Sign In.' 5. On the next page, enter vehicle license plate number, State or Province and Nickname. 6. Click 'Done.'</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: When creating a profile, travelers should be able to provide their email address.</p> <p><u>Post-condition:</u> Travelers should be able to use email address to log in to their account.</p>	Travelers enter email address when creating a profile with PARKAPP on their Apple device.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1927-V01: Creating a profile in the EPMCS shall require submission of traveler's email address.
EPM-MAP011-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to enter their mobile number in their profile.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP010-V01 to create an account. 2. After creating an account, click 'Settings' and click 'Account Settings' to edit account information. 3. Under 'Account Settings,' traveler enters mobile number and clicks 'Save'.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should receive an email notification about the changes made to the account.</p> <p><u>Post-condition:</u> Traveler is logged in and the mobile number is added to his/her account.</p>	Traveler adds mobile number to their PARKAPP profile.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1930-V02: Creating a profile in the EPMCS should include the option of providing a traveler's mobile number.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP012-V01	System	Demonstration	User accounts	Verify the traveler can create and store profile information in the PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP010-V01 to create an account. 2. After creating an account, click 'Settings' and click 'Account Settings' to edit account information. 3. Under 'Account Settings,' traveler can edit account information and save it to the account in real-time.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should be able to log in to the ParkColumbus app account. 2. Traveler should receive an email notification about creating and editing account information with ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler successfully updated account information in the ParkColumbus app.</p>	Travelers create EPM profile on the PARKAPP installed on their Apple device and have access to their profile information.	Travelers	EPM-UN015-V01 EPM-FN1926-V01 EPM-FN1927-V01 EPM-FN1928-V01 EPM-FN1929-V01 EPM-FN1930-V01 EPM-FN1932-V01 EPM-FN1934-V01 EPM-FN1935-V01 EPM-FN1936-V01 EPM-FN1937-V01	EPM-FN1925-V01: The PARKAPP shall allow travelers to create a profile in the EPMCS to store profile information and mobile application settings.
EPM-MAP013-V01	System	Demonstration	User accounts	Verify that travelers can log in to their PARKAPP account with their login information.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. On the landing page, click 'Sign In' and enter email address or mobile number and password to log in to the ParkColumbus app account.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to log in to their ParkColumbus app account with their login information.</p> <p><u>Post-condition:</u> Traveler is logged in to the ParkColumbus app.</p>	Travelers log in to their PARKAPP with their login information.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1937-V01: Travelers shall have access to manage their profiles in the EPMCS by correctly entering their login information.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP014-V01	System	Demonstration	Navigation	Verify that PARKAPP links to traveler's map-based navigation to direct the traveler to the designated parking location.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Select start time and end time and click 'Find Parking.' 3. Select one of the parking options displayed on the map. 4. On the next page, traveler selects 'Directions' to get the route to the parking location from current location. 5. When 'Directions' is clicked, traveler's map-based navigation app opens with the route information.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: ParkColumbus app should be able to open the target device map-based navigation system when travelers requests directions to the selected parking location.</p> <p><u>Post-condition:</u> Traveler has navigated from the ParkColumbus app and is on his/her map-based navigation page.</p>	PARKAPP is linked to the traveler's map-based navigation on the Apple device to provide directions to designated parking location.	Travelers	EPM-UN008-V01	EPM-FN1964-V01: The PARKAPP shall include the ability to link to map-based navigation on the traveler's smartphone to direct the traveler to the designated parking location.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP015-V01	System	Demonstration	Geolocation information	Verify that location of the traveler is updated in real-time in PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed in EPM-MAP014-V01 to begin navigating to the reserved parking location. 2. Travel few blocks to make sure current location is updated on the map in real-time.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: ParkColumbus app should be able to update current location of the map in real-time.</p> <p><u>Post-condition:</u> Current location is updated on the map in real-time.</p>	Location of the traveler in the PARKAPP is the current location of the traveler when navigating to the parking reservation.	Travelers	EPM-UN008-V01	EPM-FN1965-V01: Map-based navigation shall use the GPS device of the traveler's smartphone to update the location of the traveler on the map in real-time.
EPM-MAP016-V01	System	Demonstration	Parking availability	Verify PARKAPP allows travelers to purchase additional parking meter time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. Selects the duration and pays for the parking either by adding a payment method or using the existing payment method.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: Traveler should be able to extend the parking meter time through the ParkColumbus App.</p> <p><u>Post-condition:</u> Traveler should get a notification of successful payment.</p>	Traveler extend parking meter time through PARKAPP on their Apple device.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1906-V01 EPM-FN1907-V01	EPM-FN1905-V01: The EPMCS shall allow purchase of additional parking meter time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP017-V01	System	Demonstration	Parking availability	Verify that PARKAPP will not allow travelers to purchase additional parking time past the maximum time allowed within mobile pay zones.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. Selects the duration. 4. Traveler will not be able to select duration more than the permitted time at that parking meter.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should not be able to extend the parking meter time through ParkColumbus app for more than the maximum parking meter limit.</p> <p><u>Post-condition:</u> Traveler should get a notification of successful payment.</p>	Traveler cannot extend parking meter time through the PARKAPP past the maximum time allowed.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1906-V02: The EPMCS shall not allow purchase of additional parking meter time past the maximum time allowed within mobile pay zones.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP018-V01	System	Demonstration	Parking availability	Verify that PARKAPP will not allow travelers to purchase parking time when restricted parking times are in effect.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. If there are any restrictions at the parking meter, traveler will not be able to purchase or extend the parking meter time.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should not be able to purchase or extend the parking meter duration when parking restrictions are in place or are coming up during the requested time period.</p> <p><u>Post-condition:</u> Traveler will need to select a different parking location due to parking restrictions at the current parking location.</p>	Traveler cannot purchase parking meter time when restricted parking times are in effect.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1907-V01: The EPMCS shall not allow purchase of parking meter time when restricted parking periods are in effect.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP019-V01	System	Demonstration	Parking reservation	Verify that traveler can pay for the reservation of parking space without a CPS account.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' tab. 2. Select the parking space and choose the date and duration of parking. 3. Traveler can enter credit or debit card information by clicking 'Add Payment Method' or select existing payment method. 4. Click 'Reserve Your Spot' to reserve a parking space.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to enter credit or debit card information and pay for the selected parking without having a CPS account.</p> <p><u>Post-condition:</u> Traveler pays for the parking reservation without a CPS account.</p>	Travelers pays for the parking space using a credit/debit card.	Travelers	EPM-UN016-V01	EPM-FN1940-V01: The PARKAPP shall allow a traveler to provide a payment without requiring use of a CPS account.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP020-V01	System	Demonstration	Parking reservation	Verify the PARKAPP provides confirmation of a parking reservation to the traveler.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case ID: EPM-MAP019-V01 to reserve parking. 2. If payment is successful, a digital receipt of the reservation is displayed on the screen along with the amount paid and method of payment used and the reservation code. 3. Click 'Activity' and click 'Upcoming' on top to view upcoming parking reservations along with reservation codes.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be presented with a confirmation code and a receipt of payment with an email confirmation after reserving parking through the ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler shows the parking reservation confirmation code shown on the ParkColumbus app account at the parking facility to park his/her vehicle.</p>	Parking reservation confirmation code along with an email confirmation of payment is provided to the traveler after reserving a parking place through PARKAPP.	Travelers	EPM-UN006-V01 EPM-UN021-V01	<p>EPM-FN1914-V01: The EPMCS shall provide a response to the PARKAPP of a confirmed reservation.</p> <p>EPM-FN1915-V01: The confirmation response provided to the PARKAPP shall include a reservation confirmation code.</p> <p>EPM-FN1917-V01: The confirmation response provided to the PARKAPP shall include notice of payment completion and amount.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP021-V01	System	Demonstration	Payment	Verify that travelers can pay for the parking on the PARKAPP without redirecting to another web page.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP019-V01 to reserve parking. 2. Traveler is on the ParkColumbus app from start to finish of the parking reservation.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to enter credit or debit card information and pay for the selected parking without redirecting to a different webpage.</p> <p><u>Post-condition:</u> Traveler is still in the ParkColumbus app.</p>	Traveler completes the purchase of parking space within the PARKAPP without redirecting to another webpage.	Travelers	EPM-UN031-V01	EPM-FN1980-V01: Travelers shall be able to pay instantly without being redirected away from the PARKAPP to complete a transaction.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP022-V01	System	Demonstration	Parking reservation	Verify the PARKAPP does not provide reservation confirmation code if payment for parking reservation is not complete.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP019-V01 to reserve parking. 2. If payment is unsuccessful, the traveler is redirected to the checkout page and an error message is displayed on the screen.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should receive an error upon an unsuccessful payment. 2. Payment method used should not be charged with the parking reservation amount when the reservation is unsuccessful.</p> <p><u>Post-condition:</u> Payment was not successful and traveler is on checkout page.</p>	Payment error message is displayed on the PARKAPP when the payment for parking reservation is not complete.	Travelers	EPM-UN006-V01 EPM-UN021-V01	EPM-FN1916-V01: The EPMCS shall not provide a reservation confirmation code if payment is not complete.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP023-V01	System	Demonstration	Parking reservation	Verify that PARKAPP provides paid status of parking reservation to the traveler in real-time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP019-V01 to reserve parking. 2. If payment is successful, digital receipt of the reservation is displayed on the screen along with amount paid and method of payment used and reservation code. 3. Click 'Activity' and click 'Upcoming' on top to view upcoming parking reservations along with reservation codes in real-time. 4. An email confirmation with the paid status of the parking reservation should be received within two minutes of the reservation if selected in Notification Settings.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to view his/her upcoming parking reservations on their ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler shows the parking reservation confirmation code shown on the ParkColumbus app account at the parking facility to park his/her vehicle.</p>	Traveler receives email confirmation with the paid status of the parking reservation within two minutes after reserving a parking space through PARKAPP on their Apple device.	Travelers	EPM-UN031-V01	EPM-FN1921-V01: The EPMCS shall communicate the paid status of reservations to the PARKAPP in real-time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP024-V01	System	Demonstration	Parking reservation	Verify that PARKAPP allows travelers to select and pay only for selected period of time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure – Scenario A (for reservation):</u> 1. Follow steps listed under EPM-MAP019-V01 to reserve parking. 2. Traveler is able to select date and time before reserving a parking location.</p> <p><u>Procedure – Scenario B (for metered parking):</u> 1. Click 'Park' to select parking facility. 2. Select a zone to park. 3. Enter duration by the hour and minute or can select maximum parking time. 4. Click "Proceed to Checkout.' 5. On the next page, select payment method and click 'Start Parking.'</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to select date and time while reserving for parking and pay for only the selected duration.</p> <p><u>Post-condition:</u> Traveler pays only for the selected period of time and should receive an email confirmation upon successful payment.</p>	Traveler selects the date and time to park and pays only for the selected time.	Travelers	EPM-UN031-V01	EPM-FN1922-V01: The PARKAPP shall allow travelers to pay for a specific period of parking time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP025-V01	System	Demonstration	Parking reservation	Verify that PARKAPP allows travelers to pre-pay for the parking meters before the enforcement time up to the allowable timeframe.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> (City of Columbus parking meters enforcement time is 8 a.m. to 10 p.m. Pre-payment is only allowed 2 hours before the enforcement time. This test should be performed between 6 a.m. and 8 a.m.)</p> <ol style="list-style-type: none">1. Click 'Park' to select parking facility.2. Select a zone for which the enforcement time has not started.3. Enter duration by the hour and minute or can select maximum parking time.4. Click 'Proceed to Checkout.'5. On the next page, select payment method and click 'Start Parking.' <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able select the duration and pre-pay for that time before the enforcement time of the parking meter.</p> <p><u>Post-condition:</u> Traveler should receive an email confirmation when the payment is successful.</p>	Traveler pre-pays for the parking meter before the enforcement time within the allowable timeframe which is 2 hours in Columbus, Ohio.	Travelers	EPM-UN031-V01	EPM-FN1977-V01: The EPMCS shall allow pre-payment of parking up to the allowable timeframe prior to paid parking operational hours.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP026-V01	System	Demonstration	Parking reservation	Verify that PARKAPP does not allow travelers to reserve on-street parking.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Park' to select parking meter zone. 2. Select a zone to park. 3. Verify that time cannot be reserved in the future.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should not be able to select a future date when reserving on-street parking.</p> <p><u>Post-condition:</u> Traveler can select the parking duration and pay for on-street parking through ParkColumbus app.</p>	Traveler will not be able to select future date and time for on-street parking through PARKAPP on their Apple device.	Travelers	EPM-UN003-V01 EPM-UN006-V01	EPM-FN3267-V00: The EPMCS shall not allow the reservation of on-street parking.
EPM-MAP027-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP allows travelers to configure notifications and alerts on their account.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the preferred type of notification (email, text, or push notification) of parking reservation.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to select notification type in the ParkColumbus app settings.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	Traveler configures notifications and alerts on the PARKAPP installed on the Apple device.	Travelers	EPM-UN015-V01 EPM-FN1901-V01 EPM-FN1902-V01 EPM-FN1903-V01 EPM-FN1904-V01	EPM-FN1941-V01: The PARKAPP shall provide the traveler the capability to configure notifications and alerts.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP028-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of reservation confirmation based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <ol style="list-style-type: none">Follow steps listed for test case ID: EPM-MAP027-V01 to select preferred notifications.Set the notification alert for time remaining to 5 minutes.Follow steps listed under EPM-MAP019-V01 to reserve parking for the same day and to start within 10 mins of booking.Verify that notification is received 5 minutes before the parking reservation time starts. <p><u>Pass Criteria:</u> Verification by four independent iOS testers:</p> <ol style="list-style-type: none">Traveler should be able to select notification type (email, text, or push notifications) in the ParkColumbus app settings.Traveler should receive notification about the parking reservation. <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of the reservation confirmation for the zone parking based on the notifications and alerts selected (Text, email or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1901-V01: The PARKAPP shall be capable of notifying travelers via text, email, or push notification of reservation confirmation.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP029-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of changes to existing booking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case ID: EPM-MAP027-V01 to select preferred notifications. 2. Follow steps listed under EPM-MAP019-V01 to reserve parking for the next day. 3. Click 'Activity' and select 'Upcoming.' 4. Under 'Upcoming,' select the parking reservation for cancellation. 5. Click 'Cancel Reservation' and select 'Yes' to confirm cancellation. 6. Note: Reservations cannot be cancelled less than 3 hours before the reserved time.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Should be able to cancel reservation that does not start for 3 hours. 3. Under 'Activity' and 'History,' the cancelled parking reservation should say "Cancelled.'</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of changes made to the existing reservation based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1902-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of changes to an existing reservation.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP030-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of warnings of expiration of paid parking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the type of notification (email, text or push notification) of parking reservation. Set the notification alert for time remaining to 5 minutes. 3. Click 'Park' and select a parking zone to book a parking meter. 4. Book a meter for 10 minutes and wait 5 minutes to verify that a notification of the parking expiring is received.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Traveler should receive warning notification for expiration of paid parking session as per the preferences chosen.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of warnings of expiration of paid parking based on the notifications and alerts selected (Text, email or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1903-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of warnings of expiration of paid parking session.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP031-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of expiration of paid parking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the preferred type of notification (email, text, or push notification) of parking reservation. Set the notification alert for time remaining to 5 minutes. 3. Click 'Park' and select a parking zone to book a parking meter. 4. Book a meter for 10 minutes and wait 5 minutes to verify that a notification of the parking expiring is received.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Traveler should receive notification for expired paid parking session as per the preferences selected.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference for the expiration of paid parking session.</p>	PARKAPP provides notifications of expiration of paid parking based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1904-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of expiration of paid parking session.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP032-V01	System	Demonstration	Event parking	Verify that travelers can enter event access code when booking parking associated with that event.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Select start time and end time and click 'Find Parking.' 3. Locate and select a parking option displayed on the screen with a ticket symbol and select the event. Example: 2020 Columbus Marathon - October 18, 2020. 4. Click on 2020 Columbus Marathon. 5. Click on "Have Access Code?" 6. Enter Access Code into the open text box. 7. Click on "Apply". 8. Several parking options are displayed on the map.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler is able to enter an access code for the 2020 Columbus Marathon. 2. Multiple parking options are displayed on the screen that allow parking during the select event.</p> <p><u>Post-condition:</u> Traveler selects the one of the parking options displayed to reserve for the 2020 Columbus Marathon.</p>	Traveler enters an event access code when reserving parking space for an event.	Travelers	EPM-UN001-V01	<p>EPM-FN3272-V00: The PARKAPP shall provide the ability for travelers to enter an access code associated with an event.</p> <p>EPM-FN3273-V01: The PARKAPP provides travelers access to more parking options after entering event access code associated with that event.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP033-V01	Integration	Demonstration	Event parking	Verify that PARKAPP provides travelers the same discounted ticket prices offered at the stadiums.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under Test Case ID: EPM-MAP032 to select an event and enter access code. 2. Check the prices listed for the same event on the website at 'https://arenadistrict.clickandpark.com/.' 3. Prices should match both listed on the event website and on the ParkColumbus app.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Prices should match for the Marathon event between ParkColumbus app and event website.</p> <p><u>Post-condition:</u> Traveler books for the event parking through the ParkColumbus app.</p>	PARKAPP on an Apple device provides same discounted prices for event parking as offered at the stadiums.	Travelers	EPM-UN001-V01	EPM-FN3275-V00: Event parking packages shall mirror the ticket packages offered discounted rates at stadiums and/or arenas.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP034-V01	System	Demonstration	User accounts	Verify that PARKAPP provides travelers access to transaction log consisting of a history of paid parking transactions, locations, and time and date for only past 12 months of parking reservations.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. On the landing page, traveler clicks 'History' to view 12 months of transactions including the history of paid parking transactions, locations, time and date.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: 1. Traveler should be able to view transaction history for up to 12 months on his/her ParkColumbus app account. 2. Transactions viewed should be only for the past 12 months and not beyond 12 months.</p> <p><u>Post-condition:</u> Transaction made for the past 12 months is displayed on the screen.</p>	PARKAPP provides access to paid parking transactions, locations and date and time of reservation for the past 12 months of parking reservations.	Travelers	EPM-UN015-V01	<p>EPM-FN1942-V01: The PARKAPP shall provide travelers with access to a transaction log consisting of a history of paid parking transactions, locations, and time and date.</p> <p>EPM-FN1943-V01: The transaction log shall be limited to prior 12 months of transactions.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP035-V01	System	Demonstration	User feedback	Verify that PARKAPP provide travelers customer care contact information for any complaints.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAP019-V01 to reserve parking. 2. Click 'Activity' and select any parking reservation from 'Active,' 'Upcoming' or 'History'. 3. Select the parking session for which there is a parking complaint. 4. Scroll down to the end and click 'Call ParkMobile Customer Service' to call customer care or click 'Submit Support Request' to submit an online request.</p> <p><u>Pass Criteria:</u> Verification by four independent iOS testers: traveler should be able to call customer care or submit an online request.</p> <p><u>Post-condition:</u> Traveler talks to the customer care to resolve parking issues.</p>	PARKAPP provides access to ParkMobile customer care (phone number and online request support) to contact with parking issues.	Travelers	EPM-UN012-V01	EPM-FN1951-V03: The PARKAPP shall provide the traveler the ability to contact the customer care with complaints.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP036-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to search for parking options by frequently/preferred traveled locations.	<p>Pre-condition: ParkColumbus app is open on the target device and the traveler is logged in.</p> <p>Procedure: 1. Click 'Activity' and select 'History.' 2. Select a booked zone. 3. Click 'Favorite This Zone.' 4. Add nickname (optional) and click 'Save' to add the zone to list of favorites. 5. Click 'Park' to begin searching for the parking options. 6. Click 'Enter Zone Number.' 7. Click on 'Favorites' or 'Recent' which show zones that are used frequently. 8. Select a zone to star parking transaction.</p> <p>Pass Criteria: Verification by four independent iOS testers: traveler should be able to select favorite zone or recent zone to filter parking options.</p> <p>Post-condition: Frequently and recently traveled locations are displayed on the account.</p>	Traveler can select parking options using favorites and recent for zone parking on the PARKAPP.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3096-V02: The PARKAPP shall allow travelers to filter available parking spaces based preferred/frequently traveled addresses or locations.

Source: City of Columbus

5.1.2.2. Test Cases for the Android Mobile App

The essential test cases planned for the Android mobile app are the same as those tested within the Apple mobile app. These cases are separated because Android and Apple are separate platforms and under the hood are completely separate software packages. It is altogether possible for a case to pass on one platform and fail on other. Testers will be able to track each case uniquely via its identifier in order to capture results and report any defects as appropriate.

Table 10: ParkColumbus Mobile App Test Cases for Android Software

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN001-V01	System	Demonstration	Geolocation information	Verify that PARKAPP requests consent from the travelers before accessing the geolocation information or contact info.	<p><u>Pre-condition:</u> The ParkColumbus app is installed on the target device.</p> <p><u>Procedure:</u> 1. Open ParkColumbus app. 2. A message is displayed about using 'Location Services' to find nearby parking locations. 3. Click 'GOT IT.' 4. Pop-up appears on the screen asking to allow ParkColumbus to access device location. 'Deny,' and 'Allow.' 5. Click 'Allow' to search nearby parking locations. 6. For more information, click 'More' located on the bottom right corner of the screen and click 'Privacy Policy'. 7. A webpage with Privacy Policy opens up which lists what data will be collected from the traveler along with accessing with geolocation data. 8. Traveler will need to accept the terms of use and privacy policy to create an account to sign up.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler will need to give location permission when they use the app for the first time. 2. Travelers will also need to accept Terms of Use and Privacy Policy while creating an account.</p> <p><u>Post-condition:</u> Traveler location information is accurate on the app after the permission to access geolocation is given by the traveler.</p>	Consent is requested to access traveler's location when using the app on the Android device.	Travelers	EPM-UN028-V01	EPM-FN1947-V01: The PARKAPP shall obtain affirmative express consent from the traveler before accessing geolocation information or contact info.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN002-V01	System	Demonstration	Geolocation information	Verify that PARKAPP uses GPS of traveler's smartphone to determine current location to search for parking options.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed for EPM-MAN001-V01 to allow tracking location. 2. Click 'Park' or 'Reserve.' 3. Traveler location shown on the map should be accurate to the traveler's current location.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler location shown on the map should be accurate to the traveler's location.</p> <p><u>Post-condition:</u> Traveler's current location is accurate on the app.</p>	Current location shown in the app should match with traveler's current location.	Travelers	EPM-UN008-V01	EPM-FN1946-V01: The PARKAPP shall use the GPS device of the traveler's smartphone to determine current location to search for parking options.
EPM-MAN003-V01	System	Demonstration	Multi-language	Verify that default language is English on the PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Default language should be English on the ParkColumbus app when travelers opens the app on their device and when they login.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: Language displayed when ParkColumbus app is opened should be English.</p> <p><u>Post-condition:</u> N/A</p>	English is the default language within the app.	Travelers	EPM-UN005-V01	EPM-FN1955-V01: The PARKAPP shall default to English language user interface.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN004-V01	System	Inspection	Contact feature	Verify that PARKAPP provides link to City's 311 webpage which has email and telephone number to City's 311 system.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Locate and click "More" on bottom right corner of the screen and open. 2. Locate "Visit 311 Columbus Site". 3. Click on "Visit 311 Columbus Site" to navigate to City of Columbus 311 webpage for contact information.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: ParkColumbus app should navigate traveler to City of Columbus 311 webpage and traveler should be able to find contact information to 311.</p> <p><u>Post-condition:</u> Traveler has navigated away from the ParkColumbus app and is on the 311 webpage.</p>	Link to City's 311 webpage is available in the app on an Android device.	Travelers	EPM-UN013-V01	EPM-FN1952-V02: The PARKAPP shall provide link to the City's 311 webpage.
EPM-MAN005-V01	System	Demonstration	View	Verify that PARKAPP supports mobile portrait mode on Android devices.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Ensure phone screen settings are set to auto-rotate. 2. Change mobile view to landscape. 3. ParkColumbus app to remain in portrait mode.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: ParkColumbus app screen should remain in portrait mode.</p> <p><u>Post-condition:</u> ParkColumbus app is open and is in portrait mode.</p>	Only portrait mode is supported by the app on an Android device.	Travelers	EPM-UN008-V01	EPM-FN1957-V01: The PARKAPP shall support mobile portrait mode (form factor).

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN006-V01	System	Demonstration	Search options	Verify that traveler is able to search for parking options without creating an account on the PARKAPP.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Park' or 'Reserve' tab. 2. Choose duration of parking time to search for parking options.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to search for parking options without creating an account.</p> <p><u>Post-condition:</u> Traveler will need to login or create an account to park or reserve the selected parking option.</p>	Able to search for parking options without creating an account on the PARKAPP.	Travelers	EPM-UN014-V01	EPM-FN2109-V01: Travelers shall not be required to create a profile to search for parking options.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN007-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to filter parking spaces that are ADA accessible.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Click 'Filter' located on top right corner of the screen. 3. Toggles to select 'Handicap Accessible' under filter options and clicks 'Done.' 4. Parking options displayed on the map should be handicap accessible. 5. From the results shown on the map, click on a parking facility, and scroll down to the amenities to confirm ADA parking is listed under amenities.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: Parking options displayed on the map should be handicap accessible and should be in accordance with standards for accessible design as determined by the ADA.</p> <p><u>Post-condition:</u> Traveler can login to his/her account, apply filters and reserve for the parking.</p>	PARKAPP on the Android device allows to filter parking options that are ADA accessible.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	<p>EPM-FN1900-V02: The EPMCS shall provide access to ADA accessible parking spaces in accordance with standards for accessible design as determined by the ADA.</p> <p>EPM-FN3094-V02: The PARKAPP shall allow travelers to filter available parking spaces based on ADA compliance.</p>

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EPM-MAN008-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to filter parking options based on the availability of EV charging.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Click 'Filter' located on top right corner of the screen. 3. Toggle to select 'EV Charging Available' under filter options and clicks 'Done.' 4. Parking options displayed on the map have EV charging infrastructure to charge EVs.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: Parking options displayed on the map have EV charging facility.</p> <p><u>Post-condition:</u> Map shows all the parking options which have EV charging facility.</p>	PARKAPP on an Android device allows travelers to filter parking locations that have EV charging facility.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3095-V02: The PARKAPP shall allow travelers to filter available parking spaces based on availability of EV charging.
EPM-MAN009-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to search for parking options by entering a street address.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to begin searching for the parking options. 2. Under 'Search Location' tab, travelers enters street address to find parking in that area.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to enter any street address to search parking options in that location.</p> <p><u>Post-condition:</u> Parking availability options around the searched address are displayed on the screen.</p>	Search for parking on the PARKAPP on an Android device by entering a street address.	Travelers	EPM-UN008-V01	EPM-FN1948-V01: The PARKAPP shall provide the traveler the ability to search for parking options by entering a street address.

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EPM-MAN010-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to enter their email address when creating a profile.	<p><u>Pre-condition:</u> ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. Click 'Create an Account' to create a profile with ParkColumbus app. 3. Enter email address and password. 4. Accept terms and conditions and privacy policy and click 'Sign In.' 5. On the next page, enter vehicle license plate number, State or Province and Nickname. 6. Click 'Done.'</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: When creating a profile, travelers should be able to provide their email address.</p> <p><u>Post-condition:</u> Travelers should be able to use email address to log in to their account.</p>	Travelers enter email address when creating a profile with PARKAPP on their Android device.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1927-V01: Creating a profile in the EPMCS shall require submission of traveler's email address.

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EPM-MAN011-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to enter their mobile number in their profile.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN010-V01 to create an account 2. After creating an account, click 'Settings' and click 'Account Settings' to edit account information. 3. Under 'Account Settings,' traveler enters mobile number and clicks 'Save'.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should receive an email notification about the changes made to the account.</p> <p><u>Post-condition:</u> Traveler is logged in and the mobile number is added to his/her account.</p>	Travelers add mobile number to their PARKAPP profile.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1930-V02: Creating a profile in the EPMCS should include the option of providing a traveler's mobile number.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN012-V01	System	Demonstration	User accounts	Verify the traveler can create and store profile information in the PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN010-V01 to create an account. 2. After creating an account, click 'Settings' and click 'Account Settings' to edit account information. 3. Under 'Account Settings,' traveler can edit account information and save it to the account in real-time.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should be able to log in to the ParkColumbus app account. 2. Traveler should receive an email notification about creating and editing account information with ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler successfully creates an account and is logged into the ParkColumbus app.</p>	Travelers create EPM profile on the PARKAPP installed on their Android device and have access to their profile information.	Travelers	EPM-UN015-V01 EPM-FN1926-V01 EPM-FN1927-V01 EPM-FN1928-V01 EPM-FN1929-V01 EPM-FN1930-V01 EPM-FN1932-V01 EPM-FN1934-V01 EPM-FN1935-V01 EPM-FN1936-V01 EPM-FN1937-V01	EPM-FN1925-V01: The PARKAPP shall allow travelers to create a profile in the EPMCS to store profile information and mobile application settings.
EPM-MAN013-V01	System	Demonstration	User accounts	Verify that travelers can log in to their PARKAPP account with their login information.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. On the landing page, click 'Sign In' and enter email address or mobile number and password to log in to the ParkColumbus app account.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to log in to their ParkColumbus app account with their login information.</p> <p><u>Post-condition:</u> Traveler is logged in to the ParkColumbus app.</p>	Travelers log in to their PARKAPP with their login information.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1937-V01: Travelers shall have access to manage their profiles in the EPMCS by correctly entering their login information.

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EPM-MAN014-V01	System	Demonstration	Navigation	Verify that PARKAPP links to traveler's map-based navigation to direct the traveler to the designated parking location.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Select start time and end time and click 'Find Parking.' 3. Select one of the parking options displayed on the map. 4. On the next page, traveler selects 'Directions' to get the route to the parking location from current location. 5. When 'Directions' is clicked, traveler's map-based navigation app opens with the route information.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: ParkColumbus app should be able to open the target device map-based navigation system when travelers requests directions to the selected parking location.</p> <p><u>Post-condition:</u> Traveler has navigated from the ParkColumbus app and is on his/her map-based navigation page.</p>	PARKAPP is linked to the traveler's map based to navigation on their Android device to provide directions to designated parking location.	Travelers	EPM-UN008-V01	EPM-FN1964-V01: The PARKAPP shall include the ability to link to map-based navigation on the traveler's smartphone to direct the traveler to the designated parking location.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN015-V01	System	Demonstration	Geolocation information	Verify that location of the traveler is updated in real-time in PARKAPP.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed in EPM-MAN014-V01 to begin navigating to the reserved parking location. 2. Travel few blocks to make sure current location is updated on the map in real-time.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: ParkColumbus app should be able to update current location of the map in real-time.</p> <p><u>Post-condition:</u> Current location is updated on the map in real-time.</p>	Location of the traveler in the PARKAPP is the current location of the traveler when navigating to the parking reservation.	Travelers	EPM-UN008-V01	EPM-FN1965-V01: Map-based navigation shall use the GPS device of the traveler's smartphone to update the location of the traveler on the map in real-time.
EPM-MAN016-V01	System	Demonstration	Parking availability	Verify PARKAPP allows travelers to purchase additional parking meter time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. Selects the duration and pays for the parking either by adding a payment method or using the existing payment method.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to extend the parking meter time through the ParkColumbus App.</p> <p><u>Post-condition:</u> Traveler should get a notification of successful payment.</p>	Traveler extend parking meter time through PARKAPP on their Android device.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1906-V01 EPM-FN1907-V01	EPM-FN1905-V01: The EPMCS shall allow purchase of additional parking meter time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN017-V01	System	Demonstration	Parking availability	Verify that PARKAPP will not allow travelers to purchase additional parking time past the maximum time allowed within mobile pay zones.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. Selects the duration. 4. Traveler will not be able to select duration more than the permitted time at that parking meter.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should not be able to extend the parking meter time through ParkColumbus app for more than the maximum parking meter limit.</p> <p><u>Post-condition:</u> Traveler should get a notification of successful payment.</p>	Traveler cannot extend parking meter time through the PARKAPP past the maximum time allowed.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1906-V02: The EPMCS shall not allow purchase of additional parking meter time past the maximum time allowed within mobile pay zones.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN018-V01	System	Demonstration	Parking availability	Verify that PARKAPP will not allow travelers to purchase parking time when restricted parking times are in effect.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' and select the active parking session under 'Active.' 2. Click 'Extend' to extend parking duration. 3. If there are any restrictions at the parking meter, traveler will not be able to purchase or extend the parking meter time.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should not be able to purchase or extend the parking meter duration when parking restrictions are in place or are coming up during the requested time period.</p> <p><u>Post-condition:</u> Traveler will need to select a different parking location due to parking restrictions at the current parking location.</p>	Traveler cannot purchase parking meter time when restricted parking times are in effect.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1907-V01: The EPMCS shall not allow purchase of parking meter time when restricted parking periods are in effect.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN019-V01	System	Demonstration	Parking reservation	Verify that traveler can pay for the reservation of parking space without a CPS account.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' tab. 2. Select the parking space and choose the date and duration of parking. 3. Traveler can enter credit or debit card information by clicking 'Add Payment Method' or select existing payment method. 4. Click 'Reserve Your Spot' to reserve a parking space.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to enter credit or debit card information and pay for the selected parking without having a CPS account.</p> <p><u>Post-condition:</u> Traveler pays for the parking reservation without a CPS account.</p>	Travelers pays for the parking space using a credit/debit card.	Travelers	EPM-UN016-V01	EPM-FN1940-V01: The PARKAPP shall allow a traveler to provide a payment without requiring use of a CPS account.

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EPM-MAN020-V01	System	Demonstration	Parking reservation	Verify the PARKAPP provides confirmation of a parking reservation to the traveler.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case ID: EPM-MAN019-V01 to reserve parking. 2. If payment is successful, a digital receipt of the reservation is displayed on the screen along with the amount paid and method of payment used and the reservation code. 3. Click 'Activity' and click 'Upcoming' on top to view upcoming parking reservations along with reservation codes.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be presented with a confirmation code and a receipt of payment with an email confirmation after reserving parking through the ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler shows the parking reservation confirmation code shown on the ParkColumbus app account at the parking facility to park his/her vehicle.</p>	Parking reservation confirmation code along with an email confirmation of payment is provided to the traveler after reserving a parking place through PARKAPP.	Travelers	EPM-UN006-V01 EPM-UN021-V01	<p>EPM-FN1914-V01: The EPMCS shall provide a response to the PARKAPP of a confirmed reservation.</p> <p>EPM-FN1915-V01: The confirmation response provided to the PARKAPP shall include a reservation confirmation code.</p> <p>EPM-FN1917-V01: The confirmation response provided to the PARKAPP shall include notice of payment completion and amount.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN021-V01	System	Demonstration	Payment	Verify that travelers can pay for the parking on the PARKAPP without redirecting to another web page.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN019-V01 to reserve parking. 2. Traveler is on the ParkColumbus app from start to finish of the parking reservation.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to enter credit or debit card information and pay for the selected parking without redirecting to a different webpage.</p> <p><u>Post-condition:</u> Traveler is still in the ParkColumbus app.</p>	Traveler completes the purchase of parking space within the PARKAPP without redirecting to another webpage.	Travelers	EPM-UN031-V01	EPM-FN1980-V01: Travelers shall be able to pay instantly without being redirected away from the PARKAPP to complete a transaction.

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EPM-MAN022-V01	System	Demonstration	Parking reservation	Verify the PARKAPP does not provide reservation confirmation code if payment for parking reservation is not complete.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN019-V01 to reserve parking. 2. If payment is unsuccessful, the traveler is redirected to the checkout page and an error message is displayed on the screen.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should receive an error upon an unsuccessful payment. 2. Payment method used should not be charged with the parking reservation amount when the reservation is unsuccessful.</p> <p><u>Post-condition:</u> Payment was not successful and traveler is on checkout page.</p>	Payment error message is displayed on the PARKAPP when the payment for parking reservation is not complete.	Travelers	EPM-UN006-V01 EPM-UN021-V01	EPM-FN1916-V01: The EPMCS shall not provide a reservation confirmation code if payment is not complete.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN023-V01	System	Demonstration	Parking reservation	Verify that PARKAPP provides paid status of parking reservation to the traveler in real-time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN019-V01 to reserve parking. 2. If payment is successful, digital receipt of the reservation is displayed on the screen along with amount paid and method of payment used and reservation code. 3. Click 'Activity' and click 'Upcoming' on top to view upcoming parking reservations along with reservation codes in real-time. 4. An email confirmation with the paid status of the parking reservation should be received within two minutes of the reservation.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to view his/her upcoming parking reservations on their ParkColumbus app.</p> <p><u>Post-condition:</u> Traveler shows the parking reservation confirmation code shown on the ParkColumbus app account at the parking facility to park his/her vehicle.</p>	Traveler receives email confirmation with the paid status of the parking reservation within two minutes after reserving a parking space through PARKAPP on their Android device.	Travelers	EPM-UN031-V01	EPM-FN1921-V01: The EPMCS shall communicate the paid status of reservations to the PARKAPP in real-time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN024-V01	System	Demonstration	Parking reservation	Verify that PARKAPP allows travelers to select and pay only for selected period of time.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure – Scenario A (for reservation):</u> 1. Follow steps listed under EPM-MAN019-V01 to reserve parking. 2. Traveler is able to select date and time before reserving a parking location.</p> <p><u>Procedure – Scenario B (for metered parking):</u> 1. Click 'Park' to select parking facility. 2. Select a zone to park. 3. Enter duration by the hour and minute or can select maximum parking time. 4. Click "Proceed to Checkout.' 5. On the next page, select payment method and click 'Start Parking.'</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to select date and time while reserving for parking and pay for only the selected duration.</p> <p><u>Post-condition:</u> Traveler pays only for the selected period of time and should receive an email confirmation upon successful payment.</p>	Traveler selects the date and time to park and pays only for the selected time.	Travelers	EPM-UN031-V01	EPM-FN1922-V01: The PARKAPP shall allow travelers to pay for a specific period of parking time.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN025-V01	System	Demonstration	Parking reservation	Verify that PARKAPP allows travelers to pre-pay for the parking meters before the enforcement time up to the allowable timeframe.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> (City of Columbus parking meters enforcement time is 8 a.m. to 10 p.m. Pre-payment is only allowed 2 hr before the enforcement time. This test should be performed between 6 a.m. and 8 a.m.)</p> <ol style="list-style-type: none">1. Click 'Park' to select parking facility.2. Select a zone for which the enforcement time has not started.3. Enter duration by the hour and minute or can select maximum parking time.4. Click 'Proceed to Checkout.'5. On the next page, select payment method and click 'Start Parking.' <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able select the duration and pre-pay for that time before the enforcement time of the parking meter.</p> <p><u>Post-condition:</u> Traveler should receive an email confirmation when the payment is successful.</p>	Traveler pre-pay for the parking meter before the enforcement time within the allowable timeframe which is 2 hr in Columbus, Ohio.	Travelers	EPM-UN031-V01	EPM-FN1977-V01: The EPMCS shall allow pre-payment of parking up to the allowable timeframe prior to paid parking operational hours.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN026-V01	System	Demonstration	Parking reservation	Verify that PARKAPP does not allow travelers to reserve on-street parking.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Park' to select parking meter zone. 2. Select a zone to park. 3. Verify that time cannot be reserved in the future.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should not be able to select a future date when reserving on-street parking.</p> <p><u>Post-condition:</u> Traveler can select the parking duration and pay for on-street parking through ParkColumbus app.</p>	Traveler will not be able to select future date and time for on-street parking through PARKAPP on their Android device.	Travelers	EPM-UN003-V01 EPM-UN006-V01	EPM-FN3267-V00: The EPMCS shall not allow the reservation of on-street parking.
EPM-MAN027-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP allows travelers to configure notifications and alerts on their account.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the preferred type of notification (email, text, or push notification) of parking reservation.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to select notification type in the ParkColumbus app settings.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	Traveler configures notifications and alerts on the PARKAPP installed on the Android device.	Travelers	EPM-UN015-V01 EPM-FN1901-V01 EPM-FN1902-V01 EPM-FN1903-V01 EPM-FN1904-V01	EPM-FN1941-V01: The PARKAPP shall provide the traveler the capability to configure notifications and alerts.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN028-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of reservation confirmation for the zone parking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case ID: EPM-MAN027-V01 to select preferred notifications. 2. Set the notification alert for time remaining to 5 minutes. 3. Follow steps listed under EPM-MAN019-V01 to reserve parking for the same day and to start within 10 mins of booking. 4. Verify that notification is received 5 mins before the parking reservation time starts.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should be able to select notification type (email, text, or push notifications) in the ParkColumbus app settings. 2. Traveler should receive notification about the parking reservation.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of the reservation confirmation for the zone parking based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1901-V01: The PARKAPP shall be capable of notifying travelers via text, email, or push notification of reservation confirmation.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN029-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of changes to existing booking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Follow steps listed for test case ID: EPM-MAN027-V01 to select preferred notifications. 2. Follow steps listed under EPM-MAN019-V01 to reserve parking for the next day. 3. Click 'Activity' and select 'Upcoming.' 4. Under 'Upcoming,' select the parking reservation for cancellation. 5. Click 'Cancel Reservation' and select 'Yes' to confirm cancellation. 6. Note: Reservations cannot be cancelled less than 3 hours before the reserved time.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Should be able to cancel reservation that does not start for 3 hr. 3. Under 'Activity' and 'History,' the cancelled parking reservation should say 'Cancelled.'</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of changes made to the existing reservation based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1902-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of changes to an existing reservation.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN030-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of warnings of expiration of paid parking based on preference selected (text, email, or push notifications).	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the type of notification (email, text, or push notification) of parking reservation. Set the notification alert for time remaining to 5 minutes. 3. Click 'Park' and select a parking zone to book a parking meter. 4. Book a meter for 10 minutes and wait 5 minutes to verify that a notification of the parking expiring is received.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Traveler should receive warning notification for expiration of paid parking session as per the preferences chosen.</p> <p><u>Post-condition:</u> Receive notifications based on the traveler's preference.</p>	PARKAPP provides notifications of warnings of expiration of paid parking based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1903-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of warnings of expiration of paid parking session.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN031-V01	System	Demonstration	Notifications and alerts	Verify that PARKAPP provides notifications to travelers of expiration of paid parking based on preference selected (text, email, or push notifications).	<p>Pre-condition: The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p>Procedure: 1. Click 'Settings' to select 'Notifications' under 'Profile.' 2. Select the preferred type of notification (email, text, or push notification) of parking reservation. Set the notification alert for time remaining to 5 minutes. 3. Click 'Park' and select a parking zone to book a parking meter. 4. Book a meter for 10 minutes and wait 5 minutes to verify that a notification of the parking expiring is received.</p> <p>Pass Criteria: Verification by four independent Android testers: 1. Traveler should be able to select notification type in the ParkColumbus app settings. 2. Traveler should receive notification for expired paid parking session as per the preferences selected.</p> <p>Post-condition: Receive notifications based on the traveler's preference for the expiration of paid parking session</p>	PARKAPP provides notifications of expiration of paid parking based on the notifications and alerts selected (text, email, or push notifications).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1904-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of expiration of paid parking session.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN032-V01	System	Demonstration	Event parking	Verify that travelers can enter event access code when booking parking associated with that event.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Select start time and end time and click 'Find Parking.' 3. Locate and select a parking option displayed on the screen with a ticket symbol and select the event. Example: 2020 Columbus Marathon - October 18, 2020. 4. Click on 2020 Columbus Marathon. 5. Click on "Have Access Code?" 6. Enter Access Code into the open text box. 7. Click on "Apply". 8. Several parking options are displayed on the map.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler is able to enter an access code for the 2020 Columbus Marathon. 2. Multiple parking options are displayed on the screen that allow parking during the select event.</p> <p><u>Post-condition:</u> Traveler selects the one of the parking options displayed to reserve for the 2020 Columbus Marathon.</p>	Traveler enters an event access code when reserving parking space for an event.	Travelers	EPM-UN001-V01	<p>EPM-FN3272-V00: The PARKAPP shall provide the ability for travelers to enter an access code associated with an event.</p> <p>EPM-FN3273-V01: The PARKAPP provides travelers access to more parking options after entering event access code associated with that event.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN033-V01	Integration	Demonstration	Event parking	Verify that PARKAPP provides travelers the same discounted ticket prices offered at the stadiums.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Reserve' to start parking reservation. 2. Select start time and end time and click 'Find Parking.' 3. Locate and select a parking option displayed on the screen with a ticket symbol and select the package. Example: 2020 Columbus Marathon - October 18, 2020. 4. Select parking location to park for the event. 5. Check the prices listed for the same event on the website at 'https://arenadistrict.clickandpark.com/.' 6. Prices should match both listed on the event website and on the ParkColumbus app.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Prices should match for the Marathon event between ParkColumbus app and event website.</p> <p><u>Post-condition:</u> Traveler books for the event parking through the ParkColumbus app.</p>	PARKAPP on an Android device has same discounted prices for event parking as offered at the stadiums.	Travelers	EPM-UN001-V01	EPM-FN3275-V00: Event parking packages shall mirror the ticket packages offered discounted rates at stadiums and/or arenas.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN034-V01	System	Demonstration	User accounts	Verify that PARKAPP provides travelers access to transaction log consisting of a history of paid parking transactions, locations, and time and date for only past 12 months of parking reservations.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device and the traveler is logged in.</p> <p><u>Procedure:</u> 1. Click 'Activity' located on the bottom left corner of the screen. 2. On the landing page, traveler clicks 'History' to view 12 months of transactions including the history of paid parking transactions, locations, time and date.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: 1. Traveler should be able to view transaction history for up to 12 months on his/her ParkColumbus app account. 2. Transactions viewed should be only for the past 12 months and not beyond 12 months.</p> <p><u>Post-condition:</u> Transaction made for the past 12 months is displayed on the screen.</p>	PARKAPP provides access to paid parking transactions, locations and date and time of reservation for the past 12 months of parking reservations.	Travelers	EPM-UN015-V01	<p>EPM-FN1942-V01: The PARKAPP shall provide travelers with access to a transaction log consisting of a history of paid parking transactions, locations, and time and date.</p> <p>EPM-FN1943-V01: The transaction log shall be limited to prior 12 months of transactions.</p>

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN035-V01	System	Demonstration	User feedback	Verify that PARKAPP provide travelers customer care contact information for any complaints.	<p><u>Pre-condition:</u> The ParkColumbus app is open on the target device.</p> <p><u>Procedure:</u> 1. Follow steps listed under EPM-MAN019-V01 to reserve parking. 2. Click 'Activity' and select any parking reservation from 'Active,' 'Upcoming' or 'History'. 3. Select the parking session for which there is a parking complaint. 4. Scroll down to the end and click 'Call ParkMobile Customer Service' to call customer care or click 'Submit Support Request' to submit an online request.</p> <p><u>Pass Criteria:</u> Verification by four independent Android testers: traveler should be able to call customer care or submit an online request.</p> <p><u>Post-condition:</u> Traveler talks to the customer care to resolve parking issues.</p>	PARKAPP provides access to ParkMobile customer care (phone number and online request support) to contact with parking issues.	Travelers	EPM-UN012-V01	EPM-FN1951-V03: The PARKAPP shall provide the traveler the ability to contact the customer care with complaints.

TEST CASE ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN036-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to search for parking options by frequently/preferred traveled locations.	<p>Pre-condition: ParkColumbus app is open on the target device and the traveler is logged in.</p> <p>Procedure: 1. Click 'Activity' and select 'History.' 2. Select a booked zone. 3. Click 'Favorite This Zone.' 4. Add nickname (optional) and click 'Save' to add the zone to list of favorites. 5. Click 'Park' to begin searching for the parking options. 6. Click 'Enter Zone Number.' 7. Click on 'Favorites' or 'Recent' which show zones that are used frequently. 8. Select a zone to star parking transaction.</p> <p>Pass Criteria: Verification by four independent Android testers: traveler should be able to select favorite zone or recent zone to filter parking options.</p> <p>Post-condition: Frequently and recently traveled locations are displayed on the account.</p>	Traveler can select parking options using favorites and recent for zone parking on the PARKAPP.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3096-V02: The PARKAPP shall allow travelers to filter available parking spaces based preferred/frequently traveled addresses or locations.

Source: City of Columbus

5.1.3. Parking Operator Test Cases

The OPAAP (Parking Operator Application) is a back-end application for the gated parking facility system (GFAC) and ungated parking facility system (UFAC) (parking operators to update the parking facility, reservations and payment information which is reflected in the EPMCS). The test cases shown in **Table 11** are planned for the parking operator application.

Table 11: OPAPP Test Cases

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-OPE001-V01	Integration	Demonstration	Data	Verify that ungated parking facility system (UFAC) parking operators have access to EPMCS through OPAPP.	<p>Pre-condition: UFAC parking operators have access to OPAPP.</p> <p>Procedure: 1. UFAC parking operators log in to the OPAPP account. 2. UFAC parking operators click 'Manage Profile' to access their parking facility information. 3. UFAC operators receive all the parking reservations data, transaction data and pricing information in their OPAPP account.</p> <p>Pass Criteria: Verification by four independent testers: UFAC parking operators log in to their OPAPP account and has access to their parking account information.</p> <p>Post-condition: ParkColumbus web and app is updated with parking information made in OPAPP.</p>	UFAC parking operators can log in to the OPAPP.	Parking Operator, Technical	EPM-UN021-V01	EPM-FN1972-V01: UFAC parking operators shall be able to interface with the EPMCS through the OPAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-OPE002-V01	System	Demonstration	Parking Information	Verify that UFAC parking operators can enter the parking rates and schedules in real-time through the OPAPP.	<p>Pre-condition: UFAC parking operators are logged into their OPAPP account.</p> <p>Procedure: 1. UFAC parking operators Click 'Manage Policies' and select parking facility 2. Select the zone to enter parking rates and schedules. 2. Enter parking rates and schedules for the selected parking facility and click 'Publish.'</p> <p>Pass Criteria: Verification by four independent testers: 1. UFAC parking operator have access to OPAPP account. 2. UFAC parking operator can enter, modify and save parking rates and schedules in OPAPP in real-time. 3. Technical tester to confirm the parking rates are reflected in the PARKAPP. 4. Parking rates should be updated in EPMCS within two minutes of updating in the OPAPP.</p> <p>Post-condition: ParkColumbus web and app is updated with parking information made in OPAPP.</p>	UFAC parking operator enter parking rates information through OPAPP and update EPMCS in real-time.	Parking Operator, Technical	EPM-UN020-V01	EPM-FN1973-V01: UFAC parking operators shall be able to enter and modify event rates and schedules in real-time through the OPAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-OPE003-V01	System	Demonstration	Event Information	Verify that UFAC parking operators can create "to be determined" events for events with no information yet available.	<p>Pre-condition: UFAC parking operators are logged into their OPAPP account.</p> <p>Procedure: 1. UFAC parking operators create a new event and enter 'To be determined' for event information. 2. Click 'Publish' to publish this information to ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: Parking Operator has access to update event information when available to ParkColumbus app and web through EPMCS.</p> <p>Post-condition: ParkColumbus web and app is updated with event parking information made in OPAPP.</p>	UFAC parking operator logs in to OPAPP and create events and name 'to be determined' when information not available.	Parking Operator, Technical	EPM-UN018-V01	EPM-FN3270-V00: The EPMCS shall provide the ability for Parking Operators to create "to be determined" events where date and time are unknown, or date is known but time has yet to be announced.
EPM-OPE004-V01	System	Demonstration	Event Information	Verify that UFAC parking operators can modify "to be determined" events to enter known information of the events.	<p>Pre-condition: UFAC parking operators are logged into their OPAPP account.</p> <p>Procedure: 1. UFAC parking operators edit event information. 2. Click 'Publish' to publish this information to ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: Parking Operator has access to update event information when available to ParkColumbus app and web through EPMCS.</p> <p>Post-condition: ParkColumbus web and app is updated with event parking information made in OPAPP.</p>	UFAC parking operator logs in to OPAPP and modifies event information.	Parking Operator, Technical	EPM-UN018-V01	EPM-FN3271-V00: The EPMCS shall provide the ability for Parking Operators to modify "to be determined" events when date/time becomes known.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-OPE005-V01	Integration	Demonstration	Data updates	Verify that there is no system downtime updating PARKAPP and PARKWEB when EPMCS is modified via the OPAPP.	<p>Pre-condition: Parking operators have access to OPAPP. The ParkColumbus app is open on the target device.</p> <p>Procedure: 1. Parking operators make changes to the parking reservations for a parking facility through OPAPP. 2. Parking operators save changes to the modifications to the OPAPP. 3. Traveler opens the ParkColumbus app. 4. Click 'Reserve' and locate the parking facility for which changes were made in the OPAPP. 5. Make sure changes are reflected in the ParkColumbus app and web to the parking facility match the changes in the OPAPP within two minutes of the update.</p> <p>Pass Criteria: Verification by four independent testers: Confirm the changes made in the OPAPP are reflected in the ParkColumbus app and web within two minutes.</p> <p>Post-condition: ParkColumbus app and web is updated with parking reservations information made through OPAPP.</p>	Parking information is updated in OPAPP and PARKAPP and PARKWEB is updated within two minutes of updating the data.	Parking Operator, Traveler	EPM-UN020-V01 EPM-UN021-V01	EPM-FN1923-V01: The EPMCS shall update the PARKAPP without any system downtime or data latency when data is entered or modified in the EPMCS via the OPAPP.

Source: City of Columbus

5.1.4. Policy, Compliance and Administration

In addition to the web portal and mobile apps, the EPM central system will also be tested from the view of the system administrator and other administrator-related functions common during service operations. The EPMCS will also be tested for policies and compliance followed for the parking reservations and payment. For testing the following test cases, which involve security access to application central system, is coordinated with the vendor. Vendor will be live and on-call screensharing with the testing team to go through each test case and each step of the test procedure to test the administration related requirements. The following test cases are planned for administrative access.

Table 12: Test Cases for Policy, Compliance and Administration

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM001-V01	System	Demonstration	Administrative Access	Verify authorized individuals at the City have permit to close any traveler profile from EPMCS due to inactivity or abuse of policies.	<p>Pre-condition: EPMCS administrator has access to secured EPMCS administrative account and is logged in.</p> <p>Procedure: 1. To close any travelers account, City administration call the ParkMobile administrator. 2. ParkMobile administrator will look into the traveler's profile and make sure there is inactivity or abuse of policies listed to the account. 3. Only ParkMobile administrator has access to close any travelers profile.</p> <p>Pass Criteria: Verification by four independent testers: ParkMobile administrator can close or block any traveler's account due to prolonged inactivity or abuse of policies.</p> <p>Post-condition: Traveler will be notified about closing or blocking of the account.</p>	Authorized individuals from City of Columbus have access to close traveler's profile from EPMCS.	Technical Testers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1936-V01: The EPMCS shall permit authorized individuals at the City to close any traveler profile (e.g., due to prolonged inactivity or abuse of policies).
EPM-ADM002-V01	System	Demonstration	Administrative Access	Verify that authorized individuals at City have a secure administrative account to the EPMCS.	<p>Pre-condition: ParkMobile sends link to EPMCS portal to the City of Columbus authorized user along with username and temporary password to log in.</p> <p>Procedure: 1. Authorized user at the City opens the link to the EPMCS portal. 2. Logs in with provided username and temporary password. 2. Landing page requests the authorized user to create a new password. 4. When creating a password, password must contain a minimum of few characters making it a secure access. 5. Agree to terms and conditions.</p> <p>Pass Criteria: Verification by four independent testers: City of Columbus authorized individual should create a new password once authorization is provided.</p> <p>Post-condition: City of Columbus has a secure administrative account to the EPMCS.</p>	Authorized individuals at City of Columbus will access EPMCS and log in to their account with their secure login information.	Technical Testers	EPM-UN030-V01	EPM-FN3097-V01: The EPMCS shall provide a secure administrative account for authorized individuals at the City.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM003-V01	System	Demonstration	Administrative Access	Verify authorized individuals have permit to block any parking providers from EPMCS due to abuse of policies.	<p>Pre-condition: EPMCS administrator has access to the EPMCS administrative account.</p> <p>Procedure: To close any parking provider's account, City administration call the ParkMobile administrator. 2. ParkMobile administrator will look into the parking operators' profile and make sure abuse of policies listed to the account. 3. Only ParkMobile administrator has access to close or block any parking provider's profile.</p> <p>Pass Criteria: Verification by four independent testers: ParkMobile administrator can close or block any parking provider from using the EPM system due to abuse of policies.</p> <p>Post-condition: Parking provider will be notified of closing or blocking of the account.</p>	Authorized individuals from City of Columbus have access to block parking providers from EPMCS.	Technical Testers	EPM-UN030-V01	EPM-FN3098-V01: The EPMCS shall allow the administrative account to block any parking provider from using the EPM system due to abuse of policies.
EPM-ADM004-V01	System	Demonstration	Parking facility information	Verify that EPMCS provides parking facility location information to the PARKAPP and PARKWEB.	<p>Pre-condition: EPMCS administrator is logged into EPMCS administrative account.</p> <p>Procedure: 1. Parking facility location information is available through an API and is integrated into the EPMCS. 2. Backend EPMCS system is updated with new API with any changes to location information.</p> <p>Pass Criteria: Verification by four independent testers: 1. Parking facility location information is available through an API and is integrated into the EPMCS. 2. EPMCS is integrated into the ParkColumbus web and ParkColumbus app to update off-street parking facility location information with no system downtime.</p> <p>Post-Condition: ParkColumbus app and web is updated with the parking location restriction information.</p>	Authorized individuals update parking facility information within EPMCS to update parking information in PARKAPP and PARKWEB.	Technical Testers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN004-V01 EPM-UN008-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1893-V01: The EPMCS shall provide parking facility location information to the PARKAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM005-V01	System	Demonstration	Parking facility information	Verify that EPMCS provides parking facility hours of operation to the PARKAPP.	<p>Pre-condition: EPMCS administrator is logged into EPMCS administrative account.</p> <p>Procedure: 1. Click 'Manage Policies.' 2. Under search tab, enter the zone number or parking address and hit 'Enter.' 3. Click on the parking location to open the settings and price zone information. 4. Edit pricing and parking restriction information and timings. 5. Click 'Publish' to update parking information to the ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: 1. EPMCS is integrated into the ParkColumbus web and ParkColumbus app to update off-street parking facility hours of operation information with no system downtime.</p> <p>Post-Condition: ParkColumbus app and web is updated with the new parking hours for the selected facility.</p>	Authorized individuals update parking facility hours of operation within EPMCS to update parking information in PARKAPP and PARKWEB.	Technical Testers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1894-V01: The EPMCS shall provide parking facility hours of operation to the PARKAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM006-V01	System	Demonstration	Pricing	Verify that EPMCS allows City of Columbus admin to modify parking meter pricing based on demand.	<p>Pre-condition: City of Columbus administrator has access to EPMCS administrative account.</p> <p>Procedure: 1. Click 'Manage Policies.' 2. The landing page shows the all the parking zones. 3. Under search bar, enter the policy or location name, address or zone number. 4. Selected the Zone, click 'Create Rate.' 5. Enter name of the new rate and click 'continue.' 6. On the next step, select rate type: Charge by the 'day,' 'hour' or 'minute.' 7. Select the price increment by each day, hour or by minute. 8. Enter days and hours and click 'Publish' to publish information to the ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: City of Columbus has access to set parking meter prices in the EPMCS based on the demand for parking at that location.</p> <p>Post-condition: New rates for the selected parking facility are published on the ParkColumbus app and web set the by the City of Columbus administrator.</p>	Authorized individuals update parking meter pricing based on demand within EPMCS.	Technical Testers	EPM-UN022-V01	EPM-FN1924-V01: The City shall have the ability to set demand-based pricing for meters in the EPMCS, allowing rates to be increased or decreased based on demand for parking.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM007-V01	System	Demonstration	Policy and Compliance	Verify that PARKAPP and PARKWEB provide the ability to reserve parking in accordance with the policies of individual facilities.	<p>Pre-condition: EPMCS administrator has access to administrative account.</p> <p>Procedure: 1. Click 'Manage Policies.' 2. The tab provides overview of all accounts included in the portfolio. 3. Click on an account, to edit policy information, event rates and recurring prices. 4. Click 'Publish' to update the information to the ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: 1. EPMCS administrator confirms that Terms and Conditions and Privacy Policies are presented to the user. 2. Confirm that those policies are in accordance with the policies of individual facilities.</p> <p>Post-condition: EPMCS provides policies for different parking facilities to the ParkColumbus app and web for travelers to follow when reserving and parking at the parking facilities.</p>	Authorized individuals have access to parking facility policies to edit in accordance with the policies of individual parking facilities.	Technical Testers	EPM-UN006-V01	EPM-FN1966-V01: The PARKAPP shall provide the ability to reserve parking in accordance with the policies of individual facilities.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM008-V01	System	Demonstration	Policy and Compliance	Verify that ParkColumbus app and ParkColumbus web provides parking in accordance with the policies of individual facilities, parking rates, and payment methods.	<p>Pre-condition: EPMCS system administrator has access to administrative account.</p> <p>Procedure: 1. Click 'Manage Policies.' 2. The tab provides overview of all accounts included in the portfolio. 3. Click on an account, to edit policy information, event rates and recurring prices. 4. Click 'Publish' to update the information to the ParkColumbus app and web.</p> <p>Pass Criteria: Verification by four independent testers: EPMCS administrator has access to edit and update policies of individual facilities, parking rates, and payment methods and upload it to the ParkColumbus app and web.</p> <p>Post-condition: Policy information is update as per the individual parking facilities in the EPMCS.</p>	Authorized individuals have access to EPMCS admin account to update policies in accordance with the policies of individual facilities, parking rates, and payment methods.	Technical Testers	EPM-UN006-V01	EPM-FN1967-V01: The PARKAPP shall allow travelers to pay for parking in accordance with the policies of individual facilities, parking rates, and payment methods.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TEST PROCEDURE	METRIC	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM009-V01	System	Demonstration	Data storage	Verify that EPMCS is capable of storing and retrieving of data from PARKAPP and PARKWEB.	<p>Pre-condition: EPMCS system administrator has access to EPMCS administrative account.</p> <p>Procedure: 1. Click 'Financial Reporting' or 'Operational Reporting.' 2. Administrator will be able to retrieve data for approved transactions for all accounts either by filtering payment methods used or by filtering approved transactions through financial reporting. 3. Administrator will be able to retrieve data for recent performance, transactions stats, and historical performance for the last 12 months. 4. A report will be generated based on the filter selection. 5. The displayed data can be exported to a spreadsheet for storing and performance measure purposes.</p> <p>Pass Criteria: Verification by four independent testers (iOS, Android, and Web): EPMCS administrator has access to financial and operational reports and can the reports can be retrieved and stored through EPMCS.</p> <p>Post-condition: Financial and Operational reports are displayed on the screen.</p>	Authorized individual logs into the EPMCS account and accesses stored data and is also able to retrieve stored data.	Technical Testers	EPM-UN019-V01	EPM-FN1920-V01: The EPMCS shall provide data storage and retrieval for the PARKAPP.

Source: City of Columbus

5.2. RELEASE 3 TEST CASES

Below listed are the test cases that are in Release 3 which are still under development. These test cases will be tested in an agile process. The requirements that are under development require integration to external systems such as the CPS, Operating System, or include the implementation of the predictive analytics solution for parking availability. Test procedures, metrics and pass criteria for these test cases will be written when the features and functionality is available. The schedule for testing and integration of Release 3 requirements is shown in **Table 4**.

Table 13: Release 3 Test Cases

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB001-V01	Integration	Demonstration	Common Payment System	Verify that PARKWEB displays the dollar amount of available funds in the traveler's CPS account.	Travelers	EPM-UN031-V01	EPM-FN1968-V01: The PARKAPP shall display the dollar amount of available funds in the traveler's CPS account.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB002-V01	Integration	Demonstration	Common Payment System	Verify that payment will be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.	Technical Testers	EPM-UN031-V01 EPM-CN1675-V01	EPM-FN1978-V01: Payment shall be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.
EPM-WEB003-V01	Integration	Demonstration	Common Payment System	Verify that PARKWEB provides travelers access to CPS to make payments.	Technical Testers	EPM-UN031-V01	EPM-FN1979-V01: The PARKAPP shall provide travelers with access to CPS landing pages to make payments.
EPM-WEB004-V01	System	Demonstration	Common Payment System	Verify that PARKAPP provides travelers access to CPS to manage CPS accounts.	Technical Testers	EPM-UN031-V01	EPM-FN1981-V01: The PARKAPP shall provide travelers with access to CPS landing pages to manage CPS accounts.
EPM-WEB005-V01	System	Demonstration	Fleet account	Verify that traveler is able to add a fleet account on a single account.	Travelers	During contract negotiations, ParkMobile made the City aware of this capability. This capability and option for including it in EPM was discussed with both the EPM and CPS project teams, who identified utility and potential value for the users of the application. As such it has been included in the features to be tested.	EPM-FN3274-V00: The EPMCS shall provide the ability for travelers to create a fleet account to manage multiple user profiles on a single account.
EPM-WEB006-V01	System	Test	Common Payment System	Verify that only one CPS account is associated with one fleet account.	Technical Testers	During contract negotiations, ParkMobile made the City aware of this capability. This capability and option for including it in EPM was discussed with both the EPM and CPS project teams, who identified utility and potential value for the users of the application. As such it has been included in the features to be tested.	EPM-FN3268-V00: A fleet account may be associated to a single CPS account.
EPM-WEB007-V01	System	Demonstration	Multi-language	Verify that traveler has option to choose Spanish or English as the language of choice.	Travelers	EPM-UN005-V01	EPM-FN1956-V02: The PARKAPP shall provide the traveler with the option of changing all text in the user interface from English to Spanish, and vice versa (images will remain the same regardless of language choice).

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB008-V01	System	Demonstration	Loading zones	Verify that PARKWEB provides travelers loading zone locations, hours, and restrictions.	TRAVELERS	EPM-UN004-V01	EPM-FN1961-V01: The PARKAPP shall display loading zone locations, hours, and restrictions.
EPM-WEB009-V01	System	Demonstration	Parking availability	Verify that PARKWEB provides interactive map with parking options in real-time to the travelers.	Travelers	EPM-UN002-V01	EPM-FN1963-V01: The PARKAPP shall provide an interactive map display showing real-time parking options.
EPM-WEB010-V01	System	Demonstration	Parking availability	Verify that PARKWEB provides same access to real-time parking availability information for gated parking facility systems as the PARKAPP.	Travelers	EPM-UN005-V01	EPM-FN1971-V02: The PARKWEB shall provide the same access to real-time parking availability information for gated parking facility systems as the PARKAPP.
EPM-WEB011-V01	System	Test	Promotion Codes	Verify that PARKWEB provides local merchants parking options at discounted price.	Local Merchants	EPM-UN021-V01 EPM-FN3193-V01 EPM-FN3105-V01	EPM-FN1918-V01: The EPMCS shall allow local merchants to offer discounted parking options through the PARKAPP.
EPM-WEB012-V01	System	Test	Promotion Codes	Verify that PARKWEB allows travelers to reserve parking spaces that have discounted prices.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3105-V01: The PARKAPP shall provide travelers with the ability to activate discounted parking options.
EPM-WEB013-V01	System	Test	Promotion Codes	Verify that EPMCS can validate and provide PARKWEB confirmation of discounted parking reservation.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3193-V01: The EPMCS shall validate the discounted parking options and provide confirmation of validation to the PARKAPP.
EPM-WEB014-V01	System	Test	User accounts	Verify that two-factor authentication is required to create a profile in the EPMCS.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1928-V02: Creating a profile in the EPMCS shall require authentication.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB015-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to store favorite searches on their account for easy retrieval.	Travelers	EPM-UN015-V01	EPM-FN1944-V01: The PARKAPP shall provide travelers with the ability to store favorite searches for easy retrieval.
EPM-WEB016-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to select amenities at parking spaces to filter search option.	Travelers	EPM-UN015-V01 EPM-FN3094-V01 EPM-FN3095-V01 EPM-FN3096-V01	EPM-FN1945-V02: The PARKAPP shall provide travelers with the ability to select amenities that will be used to filter search results for parking options.
EPM-WEB017-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to search for parking options by selecting a parking meter zone or parking loading zone.	Travelers	EPM-UN008-V01	EPM-FN1949-V01: The PARKAPP shall provide the traveler the ability to search for parking options by selecting a parking meter zone or parking loading zone.
EPM-WEB018-V01	System	Demonstration	Search options	Verify the PARKWEB allows travelers to search for parking options by frequently traveled locations.	Travelers	EPM-FN1945-V01 EPM-UN015-V01	EPM-FN3096-V02: The PARKAPP shall allow travelers to filter available parking spaces based preferred/frequently traveled addresses or locations.
EPM-WEB019-V01	System	Demonstration	Search Options	Verify that PARKWEB allows travelers to get parking availability information without having an EPM profile.	Travelers	EPM-UN016-V01	EPM-FN1938-V02: travelers shall be able to use the PARKAPP to get parking availability information without having an EPM profile.
EPM-WEB020-V01	System	Demonstration	User feedback	Verify that PARKAPP allows traveler to submit user feedback.	Travelers	EPM-UN012-V01	EPM-FN1950-V01: The PARKAPP shall provide the traveler the ability to submit user feedback.
EPM-WEB021-V01	System	Demonstration	Search options	Verify the PARKWEB allows travelers to search for metered parking spaces (including on-street EV and ADA metered spaces).	Travelers	EPM-UN003-V01	EPM-FN1959-V01: The PARKAPP shall allow requests for locating metered parking spaces (including on-street EV and ADA metered spaces).

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB022-V01	System	Demonstration	Search options	Verify that PARKWEB allows travelers to filter parking options by parking garages, lots, and streets.	Travelers	EPM-UN002-V01	EPM-FN1962-V01: The PARKAPP shall provide the ability to filter by any combination of garages, lots, and streets.
EPM-WEB023-V01	System	Demonstration	Parking availability	Verify PARKWEB allows travelers to purchase additional parking meter time.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1906-V01 EPM-FN1907-V01	EPM-FN1905-V01: The EPMCS shall allow purchase of additional parking meter time.
EPM-WEB024-V01	System	Demonstration	Parking availability	Verify that PARKWEB will not allow travelers to purchase additional parking time past the maximum time allowed within mobile pay zones.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1906-V02: The EPMCS shall not allow purchase of additional parking meter time past the maximum time allowed within mobile pay zones.
EPM-WEB025-V01	System	Demonstration	Parking availability	Verify that PARKWEB will not allow travelers to purchase of parking time while restricted parking times are in effect.	Travelers	EPM-UN006-V01 EPM-UN010-V01 EPM-UN011-V01 EPM-FN1905-V01	EPM-FN1907-V01: The EPMCS shall not allow purchase of parking meter time when restricted parking periods are in effect.
EPM-WEB026-V01	System	Demonstration	Parking reservation	Verify that PARKWEB allows travelers to select and pay only for selected period of time for zone parking.	Travelers	EPM-UN031-V01	EPM-FN1922-V01: The PARKAPP shall allow travelers to pay for a specific period of parking time.
EPM-WEB027-V01	System	Demonstration	Parking reservation	Verify that PARKWEB allows travelers to pre-pay for the parking meters before the enforcement time up to the allowable timeframe.	Travelers	EPM-UN031-V01	EPM-FN1977-V01: The EPMCS shall allow pre-payment of parking up to the allowable timeframe prior to paid parking operational hours.
EPM-WEB028-V01	System	Demonstration	Parking reservation	Verify that PARKWEB does not allow travelers to reserve on-street parking.	Travelers	EPM-UN003-V01 EPM-UN006-V01	EPM-FN3267-V00: The EPMCS shall not allow the reservation of on-street parking.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-WEB029-V01	System	Demonstration	Notifications and alerts	Verify that PARKWEB allows travelers to configure notifications and alerts on their account.	Travelers	EPM-UN015-V01 EPM-FN1901-V01 EPM-FN1902-V01 EPM-FN1903-V01 EPM-FN1904-V01	EPM-FN1941-V01: The PARKAPP shall provide the traveler the capability to configure notifications and alerts.
EPM-WEB030-V01	System	Demonstration	Notifications and alerts	Verify that PARKWEB provides notifications to travelers of reservation confirmation based on preference selected (text or email).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1901-V01: The PARKAPP shall be capable of notifying travelers via text, email, or push notification of reservation confirmation.
EPM-WEB031-V01	System	Demonstration	Notifications and alerts	Verify that PARKWEB provides notifications to travelers of changes to existing booking based on preference selected (text or email).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1902-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of changes to an existing reservation.
EPM-WEB032-V01	System	Demonstration	Notifications and alerts	Verify that PARKWEB provides notifications to travelers of warnings of expiration of paid parking based on preference selected (text or email).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1903-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of warnings of expiration of paid parking session.
EPM-WEB033-V01	System	Demonstration	Notifications and alerts	Verify that PARKWEB provides notifications to travelers of expiration of paid parking based on preference selected (text or email).	Travelers	EPM-UN006-V01 EPM-FN1941-V01	EPM-FN1904-V01: The EPMCS shall be capable of notifying travelers via text, email, or push notification of expiration of paid parking session.
EPM-MAP001-V01	Integration	Demonstration	Common Payment System	Verify that PARKAPP displays the dollar amount of available funds in the traveler's CPS account.	Travelers	EPM-UN031-V01	EPM-FN1968-V01: The PARKAPP shall display the dollar amount of available funds in the traveler's CPS account.
EPM-MAP002-V01	Integration	Demonstration	Common Payment System	Verify that payment will be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.	Technical Testers	EPM-UN031-V01 EPM-CN1675-V01	EPM-FN1978-V01: Payment shall be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP003-V01	Integration	Demonstration	Common Payment System	Verify that PARKAPP provides travelers access to CPS to make payments.	Technical Testers	EPM-UN031-V01	EPM-FN1979-V01: The PARKAPP shall provide travelers with access to CPS landing pages to make payments.
EPM-MAP004-V01	System	Demonstration	Common Payment System	Verify that PARKAPP provides travelers access to CPS to manage CPS accounts.	Technical Testers	EPM-UN031-V01	EPM-FN1981-V01: The PARKAPP shall provide travelers with access to CPS landing pages to manage CPS accounts.
EPM-MAP005-V01	System	Demonstration	Multi-language	Verify that traveler has option to choose Spanish or English as the language of choice.	Travelers	EPM-UN005-V01	EPM-FN1956-V02: The PARKAPP shall provide the traveler with the option of changing all text in the user interface from English to Spanish, and vice versa (images will remain the same regardless of language choice).
EPM-MAP006-V01	System	Demonstration	Loading zone	Verify that PARKAPP provides travelers loading zone locations, hours, and restrictions.	Travelers	EPM-UN004-V01	EPM-FN1961-V01: The PARKAPP shall display loading zone locations, hours, and restrictions.
EPM-MAP007-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to create a guest account for a one-time reservation.	Travelers	EPM-UN016-V01	EPM-FN1939-V02: The PARKAPP shall provide travelers with the option of creating an EPM guest account (temporary account) to book a one-time reservation.
EPM-MAP008-V01	System	Demonstration	Parking availability	Verify that PARKAPP provides interactive map with parking options in real-time to the travelers.	Travelers	EPM-UN002-V01	EPM-FN1963-V01: The PARKAPP shall provide an interactive map display showing real-time parking options.
EPM-MAP009-V01	System	Demonstration	Parking availability	Verify that PARKWEB provides same access to real-time parking availability information for gated parking facility systems as the PARKAPP.	Travelers	EPM-UN005-V01	EPM-FN1971-V02: The PARKWEB shall provide the same access to real-time parking availability information for gated parking facility systems as the PARKAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP010-V01	System	Test	Promotion codes	Verify that PARKAPP provides local merchants parking options at discounted price.	Local Merchants	EPM-UN021-V01 EPM-FN3193-V01 EPM-FN3105-V01	EPM-FN1918-V01: The EPMCS shall allow local merchants to offer discounted parking options through the PARKAPP.
EPM-MAP011-V01	System	Test	Promotion codes	Verify that PARKAPP allows travelers to reserve parking spaces that have discounted prices.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3105-V01: The PARKAPP shall provide travelers with the ability to activate discounted parking options.
EPM-MAP012-V01	System	Test	Promotion codes	Verify that EPMCS can validate and provide PARKAPP confirmation of discounted parking reservation.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3193-V01: The EPMCS shall validate the discounted parking options and provide confirmation of validation to the PARKAPP.
EPM-MAP013-V01	System	Test	User accounts	Verify that two-factor authentication is required to create a profile in the EPMCS.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1928-V02: Creating a profile in the EPMCS shall require authentication.
EPM-MAP014-V01	System	Demonstration	Search Options	Verify that PARKAPP allows travelers to get parking availability information without having an EPM profile.	Travelers	EPM-UN016-V01	EPM-FN1938-V02: travelers shall be able to use the PARKAPP to get parking availability information without having an EPM profile.
EPM-MAP015-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to store favorite searches on their account for easy retrieval.	Travelers	EPM-UN015-V01	EPM-FN1944-V01: The PARKAPP shall provide travelers with the ability to store favorite searches for easy retrieval.
EPM-MAP016-V02	System	Demonstration	Search options	Verify that PARKAPP allows travelers to select amenities at parking spaces to filter search option.	Travelers	EPM-UN015-V01 EPM-FN3094-V01 EPM-FN3095-V01 EPM-FN3096-V01	EPM-FN1945-V02: The PARKAPP shall provide travelers with the ability to select amenities that will be used to filter search results for parking options.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAP017-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to search for parking options by selecting a parking meter zone or parking loading zone.	Travelers	EPM-UN008-V01	EPM-FN1949-V01: The PARKAPP shall provide the traveler the ability to search for parking options by selecting a parking meter zone or parking loading zone.
EPM-MAP018-V01	System	Demonstration	User feedback	Verify that PARKAPP allows traveler to submit user feedback.	Travelers	EPM-UN012-V01	EPM-FN1950-V01: The PARKAPP shall provide the traveler the ability to submit user feedback.
EPM-MAP019-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to search for metered parking spaces (including on-street EV and ADA metered spaces).	Travelers	EPM-UN003-V01	EPM-FN1959-V01: The PARKAPP shall allow requests for locating metered parking spaces (including on-street EV and ADA metered spaces).
EPM-MAP020-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to filter parking options by parking garages, lots, and streets.	Travelers	EPM-UN002-V01	EPM-FN1962-V01: The PARKAPP shall provide the ability to filter by any combination of garages, lots, and streets.
EPM-MAN001-V01	Integration	Demonstration	Common Payment System	Verify that PARKAPP displays the dollar amount of available funds in the traveler's CPS account.	Travelers	EPM-UN031-V01	EPM-FN1968-V01: The PARKAPP shall display the dollar amount of available funds in the traveler's CPS account.
EPM-MAN002-V01	Integration	Demonstration	Common Payment System	Verify that payment will be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.	Technical Testers	EPM-UN031-V01 EPM-CN1675-V01	EPM-FN1978-V01: Payment shall be held in reserve in the traveler's CPS account for the vehicle until the parking reservation goes into effect.
EPM-MAN003-V01	Integration	Demonstration	Common Payment System	Verify that PARKAPP provides travelers access to CPS to make payments.	Technical Testers	EPM-UN031-V01	EPM-FN1979-V01: The PARKAPP shall provide travelers with access to CPS landing pages to make payments.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN004-V01	System	Demonstration	Common Payment System	Verify that PARKAPP provides travelers access to CPS to manage CPS accounts.	Technical Testers	EPM-UN031-V01	EPM-FN1981-V01: The PARKAPP shall provide travelers with access to CPS landing pages to manage CPS accounts.
EPM-MAN005-V01	System	Demonstration	Multi-language	Verify that traveler has option to choose Spanish or English as the language of choice.	Travelers	EPM-UN005-V01	EPM-FN1956-V02: The PARKAPP shall provide the traveler with the option of changing all text in the user interface from English to Spanish, and vice versa (images will remain the same regardless of language choice).
EPM-MAN006-V01	System	Demonstration	Loading zone	Verify that PARKAPP provides travelers loading zone locations, hours, and restrictions.	Travelers	EPM-UN004-V01	EPM-FN1961-V01: The PARKAPP shall display loading zone locations, hours, and restrictions.
EPM-MAN007-V01	System	Demonstration	User accounts	Verify that PARKAPP allows travelers to create a guest account for a one-time reservation.	Travelers	EPM-UN016-V01	EPM-FN1939-V02: The PARKAPP shall provide travelers with the option of creating an EPM guest account (temporary account) to book a one-time reservation.
EPM-MAN008-V01	System	Demonstration	Parking availability	Verify that PARKAPP provides interactive map with parking options in real-time to the travelers.	Travelers	EPM-UN002-V01	EPM-FN1963-V01: The PARKAPP shall provide an interactive map display showing real-time parking options.
EPM-MAN009-V01	System	Demonstration	Parking availability	Verify that PARKWEB provides same access to real-time parking availability information for gated parking facility systems as the PARKAPP.	Travelers	EPM-UN005-V01	EPM-FN1971-V02: The PARKWEB shall provide the same access to real-time parking availability information for gated parking facility systems as the PARKAPP.
EPM-MAN010-V01	System	Test	Promotion codes	Verify that PARKAPP provides local merchants parking options at discounted price.	Local Merchants	EPM-UN021-V01 EPM-FN3193-V01 EPM-FN3105-V01	EPM-FN1918-V01: The EPMCS shall allow local merchants to offer discounted parking options through the PARKAPP.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN011-V01	System	Test	Promotion codes	Verify that PARKAPP allows travelers to reserve parking spaces that have discounted prices.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3105-V01: The PARKAPP shall provide travelers with the ability to activate discounted parking options.
EPM-MAN012-V01	System	Test	Promotion codes	Verify that EPMCS can validate and provide PARKAPP confirmation of discounted parking reservation.	Local Merchants	EPM-FN1918-V01 EPM-UN021-V01	EPM-FN3193-V01: The EPMCS shall validate the discounted parking options and provide confirmation of validation to the PARKAPP.
EPM-MAN013-V01	System	Test	User accounts	Verify that two-factor authentication is required to create a profile in the EPMCS.	Travelers	EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1928-V02: Creating a profile in the EPMCS shall require authentication.
EPM-MAN014-V01	System	Demonstration	Search Options	Verify that PARKAPP allows travelers to get parking availability information without having an EPM profile.	Travelers	EPM-UN016-V01	EPM-FN1938-V02: travelers shall be able to use the PARKAPP to get parking availability information without having an EPM profile.
EPM-MAN015-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to store favorite searches on their account for easy retrieval.	Travelers	EPM-UN015-V01	EPM-FN1944-V01: The PARKAPP shall provide travelers with the ability to store favorite searches for easy retrieval.
EPM-MAN016-V02	System	Demonstration	Search options	Verify that PARKAPP allows travelers to select amenities at parking spaces to filter search option.	Travelers	EPM-UN015-V01 EPM-FN3094-V01 EPM-FN3095-V01 EPM-FN3096-V01	EPM-FN1945-V02: The PARKAPP shall provide travelers with the ability to select amenities that will be used to filter search results for parking options.
EPM-MAN017-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to search for parking options by selecting a parking meter zone or parking loading zone.	Travelers	EPM-UN008-V01	EPM-FN1949-V01: The PARKAPP shall provide the traveler the ability to search for parking options by selecting a parking meter zone or parking loading zone.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-MAN018-V01	System	Demonstration	User feedback	Verify that PARKAPP allows traveler to submit user feedback.	Travelers	EPM-UN012-V01	EPM-FN1950-V01: The PARKAPP shall provide the traveler the ability to submit user feedback.
EPM-MAN019-V01	System	Demonstration	Search options	Verify the PARKAPP allows travelers to search for metered parking spaces (including on-street EV and ADA metered spaces).	Travelers	EPM-UN003-V01	EPM-FN1959-V01: The PARKAPP shall allow requests for locating metered parking spaces (including on-street EV and ADA metered spaces).
EPM-MAN020-V01	System	Demonstration	Search options	Verify that PARKAPP allows travelers to filter parking options by parking garages, lots, and streets.	Travelers	EPM-UN002-V01	EPM-FN1962-V01: The PARKAPP shall provide the ability to filter by any combination of garages, lots, and streets.
EPM-ADM001-V01	Integration	Test	Common Payment System	Verify that only one CPS account can be associated with the respective EPM account in the EPMCS to reconcile transactions.	Technical Testers	EPM-UN015-V01 EPM-UN031-V01 EPM-CN1675-V01 EPM-FN1925-V01	EPM-FN1934-V01: A profile in the EPMCS may be associated with exactly one CPS account to reconcile transactions with the respective account.
EPM-ADM002-V01	Integration	Test	Common Payment System	Verify that only one CPS account can be associated with the respective EPM account in the EPMCS to collect reporting data.	Technical Testers	EPM-UN031-V01 EPM-CN1675-V01 EPM-UN015-V01 EPM-FN1925-V01	EPM-FN1935-V01: A profile in the EPMCS may be associated with exactly one CPS account to collect reporting data.
EPM-ADM003-V01	Integration	Demonstration	Common Payment System	Verify that PARKAPP is integrated with CPS landing pages for payment processing and CPS account management.	Technical Testers	EPM-UN009-V01 EPM-UN031-V01	EPM-FN1969-V01: The PARKAPP shall integrate with CPS landing pages for payment processing and CPS account management.
EPM-ADM004-V01	Integration	Test	Common Payment System	Verify that EPMCS utilizes CPS to process payment transactions in real-time.	Technical Testers	EPM-UN031-V01 EPM-CN1675-V01	EPM-FN1976-V01: The EPMCS shall utilize the CPS to process payment transactions in real-time.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM005-V01	System	Demonstration	Data Integration	Verify that loading zone availability is integrated into PARKAPP and PARKWEB through EPMCS.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN004-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1898-V01: The EPMCS shall provide loading zone availability to the PARKAPP.
EPM-ADM006-V01	System	Inspection	Data Integration	Verify that EPMCS provides PARKAPP and PARKWEB a visual indicator showing the probability of finding an open loading zone parking spaces.	Travelers	EPM-UN004-V01 EPM-UN017-V01	EPM-FN1909-V02: The EPMCS shall provide a visual indicator showing the probability of finding an open loading zone parking space.
EPM-ADM007-V01	Integration	Demonstration	Payments	Verify that PARKAPP is capable of mobile device payments (Apple and Android devices).	Travelers	EPM-UN027-V01 EPM-UN031-V01	EPM-FN1982-V02: The EPMCS shall be capable of mobile device payments, if supported by the traveler's mobile device and the hardware used by the parking operator.
EPM-ADM008-V01	System	Demonstration	Search options	Verify that EPMCS provides information of electric vehicle charging stations and type of chargers to PARKAPP and PARKWEB.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1899-V01: The EPMCS shall provide the location of electric vehicle charging stations and type of chargers to the PARKAPP.
EPM-ADM009-V01	System	Demonstration	Parking availability	Verify that EPMCS provides off-street parking availability information at each parking facility to the PARKAPP and PARKWEB.	Technical Testers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1896-V02: The EPMCS shall provide off-street parking availability at each parking facility to the PARKAPP.
EPM-ADM010-V01	System	Demonstration	Parking availability	Verify that EPMCS provides number of parking spaces available at each gated facility to the PARKAPP.	Technical Testers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1897-V02: The EPMCS shall provide the number of parking spaces available at each gated parking facility to the PARKAPP.
EPM-ADM011-V01	System	Inspection	Parking availability	Verify the EPMCS provides PARKAPP and PARKWEB visual indicator showing the probability of finding open parking spaces by specified area.	Technical Testers	EPM-UN003-V01 EPM-UN017-V01	EPM-FN1908-V02: The EPMCS shall provide a visual indicator showing the probability of finding open parking meter spaces by specified area.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-ADM012-V01	System	Demonstration	Parking availability	Verify that EPMCS provides on-street parking availability information to the PARKAPP and PARKWEB.	Travelers	EPM-UN029-V01 EPM-UN030-V01	EPM-FN3266-V00: The EPMCS shall provide on-street parking availability to the PARKAPP
EPM-ADM013-V01	System	Demonstration	Parking facility information	Verify that EPMCS provides parking restrictions of each parking facility to the PARKAPP.	Travelers	EPM-UN001-V01 EPM-UN003-V01 EPM-UN020-V01 EPM-UN030-V01	EPM-FN1895-V01: The EPMCS shall provide parking restrictions at each parking facility to the PARKAPP.
EPM-ADM014-V01	System	Inspection	Policy and Compliance	Verify that applicable elements of the PARKWEB and PARKAPP comply with relevant accessibility requirements of Section 508 of the Rehabilitation Act of 1973.	Technical Testers	EPM-UN001-V01	EPM-FN1953-V02: Applicable elements of the PARKWEB and PARKAPP (specifically, the user interface) shall comply with relevant accessibility requirements of Section 508 of the Rehabilitation Act of 1973.
EPM-ADM015-V01	Integration	Inspection	Policy and Compliance	Verify that PARKWEB's user interface is AA compliant with the relevant sections of the WCAG 2.0 guidelines.	Technical Testers	EPM-UN001-V01	EPM-FN1954-V02: The PARKWEB's user interface shall provide AA compliance with the relevant sections of the WCAG 2.0 guidelines.
EPM-ADM016-V01	Integration	Demonstration	Operating System	Verify that predicted availability information integrated to EPMCS is based on data related to occupancy, traffic volume, availability, event days, desired geographic range, desired parking type (metered, surface lot), and probe vehicle data.	Technical Testers	EPM-UN003-V01 EPM-UN004-V01	EPM-FN1911-V02: The calculation of predicted availability shall be based on data related to occupancy, traffic volume, availability, event days, desired geographic range, desired parking type (metered, surface lot), and probe vehicle data.
EPM-ADM017-V01	System	Demonstration	Settings	Verify that PARKAPP and PARKWEB have same functionality.	Technical Tester, Traveler	EPM-UN001-V01 EPM-UN005-V01	EPM-FN1970-V01: The PARKWEB shall be available with the same functionality as the PARKAPP.
EPM-OPE001-V01	Integration	Demonstration	Parking Confirmation	Verify that parking operators at Gated Parking Facility System (GFAC) can confirm parking reservations from the EPMCS.	Parking Operator, Technical	EPM-UN006-V01 EPM-UN021-V01 EPM-UN018-V01 EPM-CN1675-V01	EPM-FN1912-V01: The GFAC shall confirm reservations with the EPMCS.

TEST ID	TEST TYPE	VERIFICATION METHOD	FEATURE	TEST OBJECTIVE	TESTER ROLE	USER NEEDS TRACEABILITY	REQUIREMENT TRACEABILITY
EPM-OPE002-V01	Integration	Demonstration	Parking Confirmation	Verify that parking operators at UFAC can confirm parking reservations from the EPMCS.	Parking Operator, Technical	EPM-UN006-V01 EPM-UN021-V01 EPM-UN018-V01 EPM-CN1675-V01	EPM-FN1913-V01: The UFAC shall confirm reservations with the EPMCS.
EPM-OPE003-V01	Integration	Demonstration	CPS	Verify that parking operator at UFAC can create and manage CPS provider accounts.	Parking Operator, Technical	EPM-UN020-V01	EPM-FN1974-V01: UFAC parking operators shall be able to create and manage CPS Provider accounts.
EPM-OPE004-V01	Integration	Demonstration	CPS	Verify that parking operator at GFAC can create and manage CPS provider accounts.	Parking Operator, Technical	EPM-CN1675-V01 EPM-UN020-V01	EPM-FN1975-V01: GFAC parking operators shall be able to create and manage CPS Provider accounts.

Source: City of Columbus

Appendix A. Test Result Summary

This appendix identifies the test results for each test scenario, a defect management tool, test metrics, exit criteria, and test results conclusions and sign-offs.

A.1. TEST RESULTS

A.1.1. EPM Test Case Report

This section identifies the test results for each of the test cases. The test cases will focus on the functionality of each essential function. All functions will be tested under the leadership of the system owner and test manager. The test manager will test each test case from the perspective of the traveler or parking operator. Throughout this process, any bugs, inconsistencies, errors, or the like that were detected were captured in the defect tool and reported to the development team. The development team modified, updated, and enhanced the software to address issues that occurred during testing.

Table 14 provides a detailed log of the final results of testing for each test case.

Table 14: Test Case Results Matrix

Test ID	Function	Test Objective	Test Procedure	Tester Role	Test Status	Date Run	Testing Comment

Source: City of Columbus

A.2. DEFECT MANAGEMENT TOOL

The defect tool will be used during testing to capture, track, monitor, and address anomalies observed during the testing period. For each entry, the development team will work to understand and reproduce (where possible) the defect, identify the root cause, summarize a response, and log the activities taken to resolve the issue. As outlined in **Section 3.6.2**, the defect tracker helps prioritize defects based on severity level (critical to low) and maintains traceability to the test ID and status. The status field provides a simplified view of the states a defect passes through as it moves toward resolution and closure. A defect can have the following status values:

- **Opened** – Indicates the defect has been logged and reported for correction.
- **Re-opened** – Indicates a defect was once closed and then re-opened for modification.
- **Closed** – Indicates a potential defect was received, reviewed, and determined to be not a defect (e.g., it was a duplicate entry or a request for enhancement). In these cases, no corrective action is taken, and the development team provides an explanation and closes out the defect ticket.
- **Canceled** – Indicates a scenario or test case for which the defect derived was canceled and therefore the defect is canceled by default.
- **Resolved** – Indicates a defect has been successfully reviewed and verified, and that a resolution was implemented to solve the problem; the resolution date (when the defect was corrected) is provided.
- **Returned** – Indicates the defect was returned to the tester for additional information.
- **Deferred** – Indicates the defect was designated for correction later.

When a conflict arises between a design element that is tied to a requirement and the software product, the development manager will coordinate with the test manager to determine whether a change to the system design and/or requirement is appropriate. The test manager carefully reviews all requests to make a change that might affect the system design and requirements. All change requests will be captured in the change logger tool.

Table 15 provides an overview of the defects captured and closed or resolved during testing.

Table 15: Defect Management Matrix

Defect No.	Defect Description	Severity	Defect Status	Test ID	Date Found	Assigned To	Resolution Description	Date Resolved	Comments

Source: City of Columbus

A.3. TEST SUMMARY

This section identifies the test summary resulting from executing the Test Plan.

Table 16: Test Cases Planned or Executed

Test Cases Planned	Test Cases Executed	Test Cases Passed	Test Cases Failed
0	0	0	0

Source: City of Columbus

Table 17: Defect Matrix, Open or Closed

Defect in Release	Open	Closed	Canceled	Resolved	Deferred
R1	0	0	0	0	0
R2	0	0	0	0	0
R3	0	0	0	0	0

Source: City of Columbus

Table 18: Defect Matrix Priorities

Defect in Release	High	Medium	Low	Total
R1	0	0	0	0
R2	0	0	0	0
R3	0	0	0	0

Source: City of Columbus

A.4. OUTSTANDING ISSUES

This section discusses any open defects the project is tracking, along with the reason the defects remain open.

Table 19: Outstanding Issues

Defect ID	Defect Description	Severity	Defect Status	Notes

Source: City of Columbus

A.5. CHANGE REQUEST LOG

This section documents the change requests (CRs) that have been captured, evaluated, and instantiated throughout the testing life cycle.

Table 20: Change Request Log

CR ID	Description	Justification	Defect ID	Requirement	Status

Source: City of Columbus

A.6. EXIT CRITERIA

This section gives the conditions that were fulfilled so as to stop testing.

Table 21: Test Exit Criteria

Criteria	Met/Not Met
All planned test cases have been executed in Execution Tool	
Test cases achieve a 100% pass ratio (in relation to failures)	
All defects found have been recorded in the defect management tool	
All high-severity defects have been resolved and retested	
Outstanding issues have a plan and schedule for resolution	
MTP with Test Summary Report (this appendix) issued to stakeholders	

Source: City of Columbus

A.7. TEST ACCEPTANCE

This section confirms that the information being reported on this UAT is correct and grants permission for the project to move forward with the production deployment.

Table 22: Test Sign-offs

Role	Name	Date	Signature
Test manager	Sai Geetha Koganti		
Test technical lead	Amanda Ford		

Source: City of Columbus

Appendix B. Terminology and Conventions

B.1. NUMBERING CONVENTION

Each testing element contains a unique identifier for traceability and configuration management. Test cases and scenarios for all projects in the Smart Columbus program will follow the same convention, each representing an identifiable attribute of the traced metric. The convention is shown in **Figure 2**.

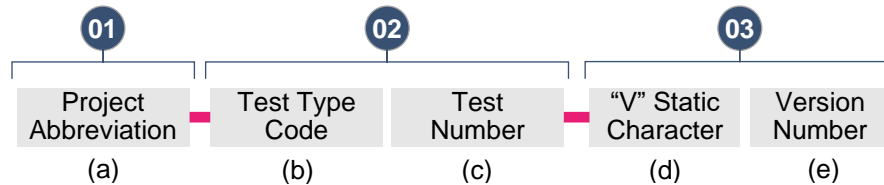


Figure 2: Numbering Convention

Source: City of Columbus

Table 23: Numbering Convention Definitions

Octet	Description	Data Type, Casing	Number of Characters or Digits
a. Project Abbreviation	The designated Smart Columbus project acronym (i.e., EPM).	String, upper case	Variable
b. Test Type Code	Three-letter variable used for each test case based on the EPM feature. ADM: Test cases for administration function MAP: Test cases for ParkColumbus Apple mobile application MAN: Test cases for ParkColumbus Android mobile application WEB: Test cases for ParkColumbus web portal OPE: Test cases for OPAPP	String, upper case	3
c. Test Number	An integer in a set of integers that increment by one, indicating the number of requirements established.	Integer	3
d. "V" Static Character	Static letter "V" represents the version for the particular test objective and procedure.	Character	1
e. Version Number	An integer in a set of integers that increments by one, indicating the number of revisions made to the test element being traced.	Integer	2

Source: City of Columbus

An example of a test case for the EPM project would be EPM-CPS001-V01.

1. “EPM” is the project abbreviation.
2. “CPS,” which stands for Common Payment System, is a feature of EPM.
3. “001” is the three-digit test number.
4. “V01” is the static “V” coupled with the two-digit version number.

Appendix C. Acronyms and Definitions

Table 24 contains project-specific acronyms used throughout this document.

Table 24: Acronym List

Abbreviation/Acronym	Definition
ADA	Americans with Disabilities Act
API	application programming interface
ConOps	Concept of Operations
CPS	[Smart Columbus] Common Payment System
CR	change request
DPP	Data Privacy Plan
EPM	Event Parking Management
EPMCS	Event Parking Management Central System
GFAC	gated parking facility system
GPS	global positioning system
ID	test identifier
IEEE	Institute of Electrical and Electronics Engineers
MMTPA	Multimodal Trip Planning Application
NFC	near-field communication
OPAPP	Parking Operator Application
Operating System	[Smart Columbus] Operating System
PR	performance requirement
RTM	Requirements Traceability Matrix
SLA	service-level agreement
SyRS	System Requirements
UAT	User Acceptance Testing
UFAC	ungated parking facility system

Source: City of Columbus

Appendix D. Glossary

Table 25 contains project-specific terms used throughout this document.

Table 25: Glossary

Term	Definition
311 Columbus Call Center	The City of Columbus Service Center, which is the single point of contact for requesting all non-emergency City services and is available to residents, City businesses, and visitors.
Agile	A method of project management characterized by the division of tasks into short phases of work and frequent reassessment and adaptation of plans.
Parking facility	Land or a structure used for light-duty vehicle parking.
Parking management system	A system intended to aggregate location, availability, payment information, and reservation capabilities across all public and private parking options.
Real-time data	Information delivered immediately after collection.
Test number	An integer in a set of integers that increment by one, indicating the number of tests established.
Travelers	The travelers (residents and visitors) in Columbus who will be interacting with the EPM system to view, plan, reserve, and navigate to desired parking.
Testing version number	An integer in a set of integers that increment by one, indicating the number of revisions made to a test case or scenario.
"V" static character	Static letter "V" represents the testing version number.

Source: City of Columbus



THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR