



Smart Mobility Hubs Operations and Maintenance Plan

for the Smart Columbus
Demonstration Program

FINAL REPORT | August 17, 2020

Produced by City of Columbus

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Acknowledgement of Support

This material is based upon work supported by the U.S. Department of Transportation under Agreement No. DTFH6116H00013.

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Acknowledgements

The Smart Columbus Program would like to thank the following entities for their valuable contributions to Smart Mobility Hubs project and their contributions to the Operations and Maintenance Plan.

IKE Smart City	Mobility Providers	Experience Columbus
St. Stephen's Community House	Columbus Metropolitan Library	Columbus State Community College
Central Ohio Transit Authority		

Abstract

The purpose of this Operations and Maintenance Plan is to explain operational and maintenance activities for the Smart Mobility Hubs project both during and after the pilot, funded as part of the Smart Columbus initiative. This document provides a comprehensive view of the Smart Mobility Hub environment, the roles and responsibilities that make it work, and the processes and procedures to maintain optimum functionality.

Table of Contents

- Executive Summary..... 1
- Chapter 1. Introduction..... 3
 - 1.1. Scope and Purpose 3**
 - 1.2. Organization..... 4**
 - 1.3. Project Description 4**
 - 1.4. Smart Mobility Hub System and its Components 5**
 - 1.4.1. Smart Mobility Hubs Facility 5
 - 1.5. System Users..... 9**
 - 1.6. Stakeholders 10**
 - 1.6.1. The City of Columbus..... 10
 - 1.6.2. Emergency Dispatch Centers 10
 - 1.6.3. Experience Columbus..... 10
 - 1.6.4. Interactive Kiosk Vendor 10
 - 1.6.5. Smart Mobility Hub Site Stakeholders..... 10
 - 1.6.6. Mobility Providers 12
 - 1.7. References 12**
- Chapter 2. Materials and Resources 15
 - 2.1. Personnel 15**
 - 2.2. Equipment, Software and Materials 18**
 - 2.2.1. Equipment 18
 - 2.2.2. Software..... 21
 - 2.2.3. Materials 21
 - 2.3. Data Collection and Privacy 21**
 - 2.3.1. Data Collection..... 21
 - 2.3.2. Access to Interactive Kiosk Data by Third Parties 22
 - 2.3.3. Interactive Kiosk Data Retention Policy 22
 - 2.3.4. Interactive Kiosk Data Security 22
- Chapter 3. Training 25
 - 3.1. Interactive Kiosk CEntral Management System Administrator Training 25**
 - 3.2. Interactive Kiosk Operations and Maintenance Training 25**
- Chapter 4. Operations..... 27
 - 4.1. Hours of Operation 27**
 - 4.2. Smart Mobility Hubs Technical Support 27**

4.3. Operating System Technical Support.....	27
4.4. Interaction and Coordination	27
4.5. Operational Activities	28
4.5.1. Smart Mobility Hubs Application Builder	28
4.5.2. Smart Columbus Operating System	29
Chapter 5. Maintenance.....	31
5.1. Preventative Maintenance Activities.....	31
5.2. Corrective Maintenance Activities.....	32
5.3. Data Ingestion to Operating System.....	33
5.3.1. Background on Data Template and Format	33
5.3.2. Maintenance of Data Ingestion to Operating System.....	33
Appendix A. Interactive Kiosk Daily Maintenance Checklist	35
Appendix B. Acronyms and Definitions	37
Appendix C. Glossary	39

List of Tables

Table 1: Smart Mobility Hubs System Stakeholder Responsibility Timeline	3
Table 2: Documents Related to Operations and Maintenance of the Smart Mobility Hub System.....	12
Table 3: Smart Mobility Hubs Personnel Involved During Grant Period	15
Table 4: Smart Mobility Hubs Personnel Post-Grant	17
Table 5: Monthly/Yearly Recurring and Support Costs During Pilot Period	19
Table 6: Monthly/Yearly Recurring and Support Costs After Pilot Period	20
Table 7: Interactive Kiosk User Options	28
Table 8: Interactive Kiosk Troubleshooting	29
Table 9: Preventative Maintenance Activities.....	31
Table 10: Corrective Maintenance Activities	32
Table 11: Maintenance of Data Ingestion to Operating System.....	33
Table 12: Acronym List.....	37
Table 13: Glossary	39

List of Figures

Figure 1: Smart Mobility Hubs High-Level Context Diagram	5
Figure 2: Smart Mobilty Hub Sign Installed at Metro Library - Linden Branch.....	6
Figure 3: Pedestal Mounted Interactive Kioks Deployed at Easton Transit Center	7
Figure 4: Ride-hailing Sign at Easton Transit Center.....	8
Figure 5: Dockless Device Zone at Metro Library - Linden Branch	9

Executive Summary

This Smart Mobility Hubs (SMH) Operations and Maintenance (O&M) Plan provides guidance of operations and maintenance of the SMH project. The Smart Columbus Smart Mobility Hub (SMH) project is one of eight projects in the Smart Columbus program and this project is committed to delivering solutions that help close the First Mile/Last Mile (FMLM) gap and is considered the future of consolidated transportation centers.

This O&M plan describes stakeholders involved (**Chapter 1**), materials and resources necessary (**Chapter 2**), training (**Chapter 3**), operational and maintenance activities (**Chapter 4** and **Chapter 5**) for the success of the project.

The intended audience is the Smart Columbus SMH project manager, City of Columbus, the USDOT, transportation and smart city researchers and those engaged in the deployment of Smart Columbus projects.

Chapter 1. Introduction

1.1. SCOPE AND PURPOSE

This document identifies the scope and purpose of the SMH Operations and Maintenance (O&M) Plan. It explains how operational and maintenance activities will be performed both during and after the pilot, funded as part of the Smart Columbus initiative. The following sections discuss the materials and resources, operational activities, maintenance tasks and routines taking place to operate and maintain the SMHs and other associated systems used to service its users. This document also specifies the stakeholders, such as agencies and departments within agencies, which rely on its successful operation. The purpose of this document is to provide a comprehensive view of the SMH project, the elements that make it work, and the processes and procedures for maintaining optimum functionality. **Table 1** provides a list of various SMH amenities and the organization that is responsible during and after the pilot period.

The goals of the SMH project are to:

- Provide physical access to comprehensive and multimodal trip planning
- Improving access to jobs, goods and services
- Improve customer satisfaction

The primary goals and expectations of SMH O&M plan are as follows:

- To keep the SMH system operational and to provide optimal service to users
- To provide access to troubleshooting tips and common user issues and how to resolve them
- To facilitate communications between the support teams and developers

Table 1: Smart Mobility Hubs System Stakeholder Responsibility Timeline

SMH Amenities	Organization	Responsibility period
Interactive Kiosks (IKs) O&M including ECB and Wi-Fi	IKE Smart City	During and after pilot period
IK-Central Management System (CMS) Administrator (Data collection and analysis)	IKE Smart City	During pilot period
	IKE Smart City	After pilot period
Smart Columbus Operating System (Operating System) Data Ingestion	City of Columbus	During pilot period
	TBD	After pilot period
Signage and Pavement Markings	City of Columbus	Pilot period and after pilot period*
	Site Stakeholders	After pilot period
Site Maintenance	Site Stakeholders	During and after pilot period
Mobility Infrastructure	Mobility Providers	During and after pilot period
Mobility Devices	Mobility Providers	During and after pilot period

*After pilot period, if in public right-of-way. TBD – To be determined.

Source: City of Columbus

This O&M plan provides insight into the types of activities that are necessary to keep the SMH system operational and should serve as a guide for addressing and resolving issues that come up regarding the SMH suite of applications and their integration with the Operating System.

1.2. ORGANIZATION

The SMH O&M is organized into the following chapters:

- **Chapter 1.** Introduction
- **Chapter 2.** Materials and Resources
- **Chapter 3.** Training
- **Chapter 4.** Operations
- **Chapter 5.** Maintenance

1.3. PROJECT DESCRIPTION

The Smart Columbus SMH project is one of eight projects in the Smart Columbus program and is designed to foster a community of connections and accessibility with increased mobility options and free, easy to use trip planning tools – these were just some of the needs captured through public outreach surveys with area residents. The SMH is committed to delivering solutions that help close the FMLM gap and is considered the future of consolidated transportation centers.

The project is scoped to deploy a number of transportation amenities at six different facilities (the “smart mobility hub” – i.e., SMH). Listed below are the six facilities where the transportation amenities will be deployed.

1. Columbus State Community College (CSCC)
2. Central Ohio Transit Authority (COTA) Linden Transit Center
3. St. Stephen’s Community House
4. Columbus Metropolitan Library – Linden Branch
5. COTA Northern Lights Park & Ride
6. COTA Easton Transit Center

These transportation amenities at the facilities listed above work together to deliver mobility as a service (MaaS). MaaS provides travelers with new and consolidated transportation options to move about the region using various modes, with a focus on empowering residents through information and technology, providing waiting areas with real-time transit information, microtransit connections for pedestrians, seamless transfer between modes, and local information on various points of interest to encourage city exploration. Individual SMH facilities vary in size, configuration, and available services since the goal of the sites is to incorporate amenities within existing physical constraints.

1.4. SMART MOBILITY HUB SYSTEM AND ITS COMPONENTS

Figure 1 shows the relationship between the SMH, Operating System, and new and existing systems. The SMH is the system of interest and establishes both a physical location for the traveler to access multimodal transportation options as well as Wi-Fi and an IK for travelers to access the Multi-modal Trip Planning Application (MMTPA) application referred to as Pivot ‘app’ for comprehensive trip planning tools. MMTPA is another Smart Columbus project. Trip data through the SMH facilities including preferred transportation mode and origin/destination will be collected through Pivot and, after proper de-identification, sent to the Operating System where the data will be available to users at the City of Columbus and third-parties for reports and analysis.

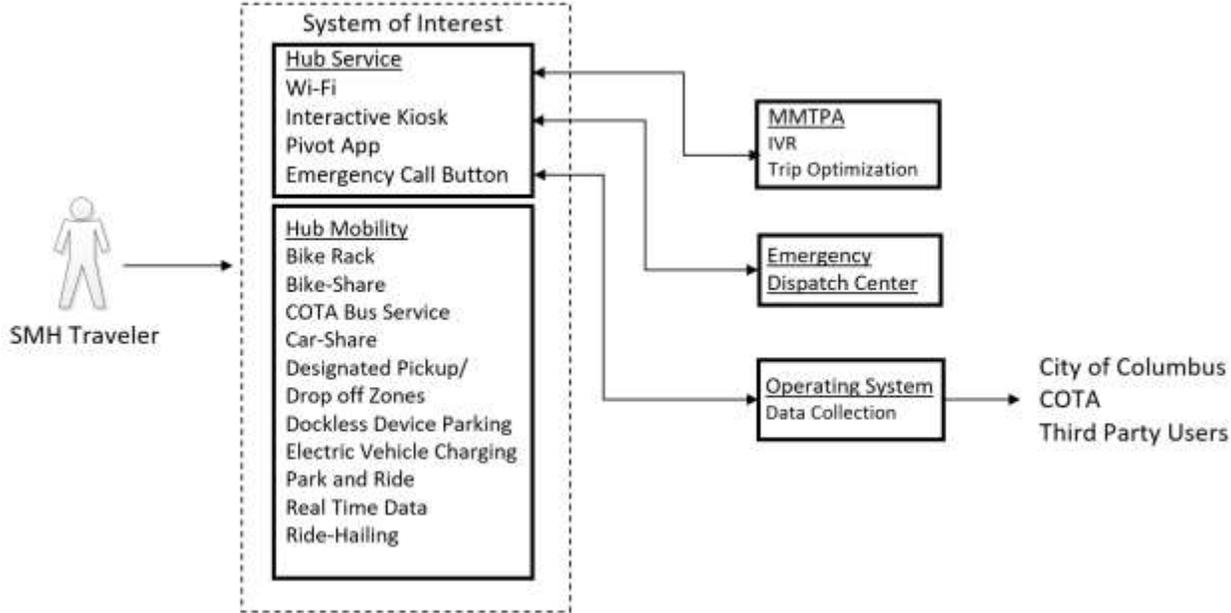


Figure 1: Smart Mobility Hubs High-Level Context Diagram

Source: City of Columbus

1.4.1. Smart Mobility Hubs Facility

The SMH Facility is the physical site that consolidates the amenities of the SMH system, which include the IK, real-time information displays, pick-up/drop-off areas and parking spaces for mobility providers and all other systems described in Figure 1. Figure 2 shows an SMH sign installed at Metro Library – Linden Branch SMH site. Individual SMH facilities vary in size, configuration and available services.



Figure 2: Smart Mobility Hub Sign Installed at Metro Library - Linden Branch

Source: City of Columbus

The following are descriptions of components available at an SMH facility.

1.4.1.1. INTERACTIVE KIOSK

Traveler IKs are installed on free standing pylons at all six SMH facilities. These IKs display real-time transit-related information and provide an embedded touch screen display to serve as a direct interface between travelers and the Pivot app, which gives the traveler the ability to plan trips using multimodal options available at the SMH facility or book available modes, along with additional information and instruction such as directing the traveler to a ride-hail pick-up location.

Figure 3 shows an IK currently in operation at Easton Transit Center.



Figure 3: Pedestal Mounted Interactive Kiosks Deployed at Easton Transit Center

Source: City of Columbus

1.4.1.2. WI-FI

SMH facilities have access to public Wi-Fi through the IK. The Wi-Fi allows a traveler to access the Pivot app and other transportation information on his or her personal wireless device. A personal wireless device such as a cell phone or tablet may be used at SMH facilities to access the Pivot app via public Wi-Fi or through a personal data plan. Additionally, trip confirmation codes and other trip information may be sent to the personal wireless device upon traveler request and used to gain access to ride-hailing or to unlock bikes at bike-sharing docks.

1.4.1.3. PARK AND RIDE

Designated parking spaces are available at select SMH locations and provide a traveler the option to park a personal vehicle at an SMH facility and utilize the SMH amenities to continue his or her trip using alternate modes of transportation.

1.4.1.4. ELECTRIC VEHICLE CHARGING

Electric vehicle (EV) charging stations are available at some SMH locations based on the electrification study by the City of Columbus, as funded through the Vulcan or through other grant programs. Although charging infrastructure will be installed through a separate project, it was included within the SMH

Concept of Operations¹ to ensure proper provisions, such as designated parking areas, were set aside during deployment of the SMH facilities. At the time of this publication, COTA Northern Lights Park & Ride SMH facility has EV charging stations installed.

1.4.1.5. EMERGENCY CALL BUTTON

An Emergency Call Button (ECB) with speakers and a microphone is available at all SMH through the IK for interactive communications to 911 customer service and emergency facilities. When the ECB is activated, notification of the help request is directly sent to the 911 emergency call center (ECC) in the proper jurisdiction. The press of the button will initiate an audio connection between the distressed traveler and an operator at the ECC.

1.4.1.6. DESIGNATED PASSENGER PICK-UP/DROP-OFF ZONES

Loading zones are available at all SMH locations in the form of pull off lanes and/or parking spaces located away from travel lanes that will allow safe transfer of passengers between modes of transportation. These zones will primarily be used for ride-hailing and are clearly marked with signage and pavement markings. **Figure 4** shows the ride-hailing sign installed at Easton Transit Center.



Figure 4: Ride-hailing Sign at Easton Transit Center

Source: City of Columbus

¹ <https://d2rfd3nxvhnf29.cloudfront.net/2020-03/SCC-B-SMH-ConOps-Update-Final-20191224.pdf>

1.4.1.7. DOCKLESS DEVICE ZONES

Given the rapid rise in dockless mobility options such as scooters and bikes, it is important to enable mobility while balancing safety and site organization. Designated zones, including pavement markings and signage, are provided for dockless device parking so devices are not left in the way of walking paths or access ramps. **Figure 5** shows the dockless device zone installed at Linden Metro Library SMH site.



Figure 5: Dockless Device Zone at Metro Library - Linden Branch

Source: City of Columbus

1.5. SYSTEM USERS

The following are the main entities interacting with the SMH system:

- Users (SMH Traveler)
 - Have access to IK and transportation amenities installed at the SMH sites.
 - Have access to the Pivot app for comprehensive trip planning available on the IKs at the SMH sites.
- IKE Smart City
 - Has read-write-execute access to the IK, its components and all of its connected interfaces.
- Operating System
 - Has access to an Application Programming Interface (API) from IKE Smart City for the data collected from the IKs at SMH sites.
 - Has access to an API from the Pivot app for the data collected from the SMH sites.
- City of Columbus
 - Has access to SMH sites for maintenance of the signage and pavement markings.
- Experience Columbus

- Has access to an API from IKE Smart City for the data collected from the IKs at SMH sites.
- Mobility Providers
 - Have access to SMH sites to deploy, operate and maintain mobility options.

For more information on information flows, see the System Architecture and Standards Plan (SASP)², which contains the physical, enterprise and communications views for SMH, including a table of all information flows.

1.6. STAKEHOLDERS

1.6.1. The City of Columbus

The City of Columbus has collaborated with SMH partners to identify the SMH sites, IKs and signage and pavement markings to implement the SMH. The City has executed a maintenance agreement with the kiosk vendor and Memoranda of Understanding (MOU) with the site stakeholders. The City will oversee the collaboration of data and IK deployment between the SMH and Pivot app developers.

1.6.2. Emergency Dispatch Centers

The emergency dispatch centers handle incoming 911 emergency calls and communications with first responders through Computer Aided Dispatch (CAD) systems. Additionally, the ECB, which are installed on IKs at the SMH facilities, will be directly connected to these dispatch centers so proper emergency personnel may be dispatched directly to the appropriate SMH location if a traveler activates the ECB.

1.6.3. Experience Columbus

Experience Columbus has contracted with a kiosk vendor to supply IKs in downtown Columbus and the Short North area (area just north of downtown surrounding High Street). Experience Columbus partnered with Smart Columbus and extended its contract to the six SMH sites to ensure a seamless resident and visitor experience when utilizing IKs in Columbus.

1.6.4. Interactive Kiosk Vendor

Through the Experience Columbus contract, IKE Smart City will be responsible for the deployment, integration, and O&M of the IKs at the six SMH sites.

1.6.5. Smart Mobility Hub Site Stakeholders

SMH site stakeholders will be responsible for the maintenance of the site around the SMH amenities based on their MOU with the City of Columbus. Site stakeholders also have contracts with IKE Smart City and with individual mobility providers for O&M of their site(s), where applicable.

² https://d2rfd3nxvhnf29.cloudfront.net/2020-06/SCC-B-SASP-UPDATED_4_9_2020%20-%20final.pdf

1.6.5.1. CENTRAL OHIO TRANSIT AUTHORITY

COTA provides access to existing transportation facilities along the Cleveland Avenue corridor to facilitate development of the proposed SMH solution and access to COTA CMAX and other transit routes, Park and Ride facilities, bike racks, and space for mobility providers to operate. It will also provide the transit related data to the Operating System for Pivot functionality.

COTA will be responsible for maintaining the following SMH sites:

- **Linden Transit Center** - The Linden Transit Center is a COTA facility located at Cleveland Avenue and Eleventh Avenue. The facility offers public Wi-Fi, real-time transit information displays, and features an IK where users can access the Pivot app and an ECB. Bike-sharing docks, a dockless parking zone, and reserved space for ride-hailing are also available at this location. This location is also a station for the automated shuttle, which is part of the Smart Columbus Connected Electric Autonomous Vehicle (CEAV) project.
- **Northern Lights Park and Ride** - The Northern Lights Park and Ride is a new COTA facility at the Northern Lights shopping center located on Cleveland Avenue. A separate COTA-led initiative installed Charging stations at this SMH site. This location includes an IK at which users can access the Pivot app, Wi-Fi and an ECB. The Northern Lights Park and Ride site also provides space for bike parking, dockless device parking, car and bike sharing, and ride-hailing.
- **Easton Transit Center** - The Easton Transit Center is near the intersection of Stelzer Road and Transit Drive and serves transit and FMLM needs of travelers accessing the Easton office, shopping, and residential areas. It is currently equipped with many of the SMH-defined services. An IK is installed at the transit center where users can access the Pivot app, Wi-Fi and an ECB. A bike-share docking station, bike racks and ride-hailing amenities are also available at the transit center.

1.6.5.2. COLUMBUS METROPOLITAN LIBRARY – LINDEN BRANCH

An IK is installed at the Columbus Metro Library – Linden Branch, located on Cleveland Avenue between Kenmore Road and Kohr Place. The IK installed at this site provides users access to Pivot app, Wi-Fi and an ECB. This location also provides bike-sharing docks, dockless device parking, and reserved car-sharing and ride-hailing parking spaces, which will help bridge the gap for pedestrians between the adjacent Linden Transit Center and Northern Lights Park and Ride facilities.

1.6.5.3. ST. STEPHEN'S COMMUNITY HOUSE

St. Stephen's Community House is located near the intersection of 17th and Joyce Avenues. An IK is installed in the lobby of St. Stephen's Community House, which provides users access to features such as the Pivot app, Wi-Fi and an ECB. This SMH site provides zones for dockless parking, bike-sharing, ride hailing pick-up/drop-off and car-sharing parking spaces. This location also is a station for the automated shuttle as part of the Smart Columbus CEAV project. The community house serves the Linden area residents in numerous ways, including programs to promote employment, social development, education, health care and child care.

1.6.5.4. COLUMBUS STATE COMMUNITY COLLEGE

CSCC attracts largely local commuter students and is a major employment center. COTA serves this site, which contains CMAX Bus Rapid Transit (BRT) stations. A considerable number of transit-users access this site, which offers public Wi-Fi and real-time transit information displays. An IK, bike-share infrastructure and other mobility infrastructure are installed in the right-of-way on Cleveland Avenue between Mt. Vernon Avenue and East Naghten Street. At the IK, users can access features such as the Pivot app, Wi-Fi, and an ECB. The site offers access to a dockless parking zone and car-share amenities at the southwest corner of Cleveland Avenue and Mt. Vernon Avenue.

CSCC is the only SMH site where all the SMH amenities are installed in the right-of-way. Therefore, CSCC is not responsible for the site maintenance around the SMH amenities.

1.6.6. Mobility Providers

There are several types of mobility providers that provide FMLM services to the SMH that will support COTA's fixed route service.

All amenities at CSCC are located within the right-of-way and mobility providers have executed contracts with the City of Columbus or the State of Ohio for operations, maintenance and use of premises. O&M of these amenities at this SMH site are discussed below. For the five other SMH locations, each mobility provider has executed a contract with the appropriate site stakeholder for the O&M of the area to be used or mobility infrastructure deployed at each SMH site where the amenity resides on the stakeholder property. The City of Columbus is not party to the contracts between mobility providers and site stakeholders. Therefore, the related O&M activities of the mobility providers at these five SMH sites are not discussed in this O&M plan.

1.7. REFERENCES

Table 2 provides the lists the documents that are related to the O&M of the SMH system.

Table 2: Documents Related to Operations and Maintenance of the Smart Mobility Hub System

Title	Revision	Publication Date
IKE Smart City Contract with Experience Columbus	Final	May 11, 2018
IKE Smart City Operation and Maintenance Agreement with City of Columbus	Final	December 14, 2018
Spin, 904 Lease with the City of Columbus	N/A	2019
Smart Columbus Demonstration Program Smart Mobility Hubs Construction and Installation Plans	Final	March 18, 2019
Motivate International (CoGo) Contract with the City of Columbus	Final	July 1, 2019
Smart Columbus Demonstration Program Data Management Plan	Final	August 22, 2019
IKE Smart City Agreement with various SMH Site Stakeholders	Final	September, 2019
Bird, 904 Lease with the City of Columbus	N/A	September, 2019
Lime, 904 Lease with the City of Columbus	N/A	September, 2019
Smart Columbus Demonstration Program Data Privacy Plan	Final	September 6, 2019
SMH Site Stakeholders Memorandum of Understanding (MOU) with the City of Columbus	Final	September 11, 2019
Smart Columbus Demonstration Program De-Identification Plan	Final	September 17, 2019
Smart Columbus Demonstration Program Smart Mobility Hubs Test Plan	Final	October 11, 2019

Title	Revision	Publication Date
Smart Columbus Demonstration Program Smart Mobility Hubs System Requirements	Final	November 15, 2018
Smart Columbus Demonstration Program Smart Mobility Hubs Concept of Operations	Final	December 27, 2019
Site Stakeholders Agreement with various Mobility Providers	Final	2020
Smart Columbus Demonstration Program System Architecture and Standards Plan	Final	February 25, 2020
Smart Columbus Demonstration Program Smart Mobility Hubs Test Report	Final	August 5, 2020

Source: City of Columbus

Chapter 2. Materials and Resources

This section identifies the equipment/materials used and personnel responsible for O&M of the SMH system. Several SMH elements are not managed by the City of Columbus, including IKs and mobility provider infrastructure elements. Therefore, only a high-level description is provided in this section. Materials and resources directly managed by the City of Columbus are covered in detail.

2.1. PERSONNEL

Table 3 lists personnel, their positions, key functions, and the percentage of time dedicated to SMH O&M, if not full time, as defined during the grant period. **Table 4** lists the same information but is focused on personnel who will be involved post-grant. At the end of the pilot period, each hub will continue to operate per the kiosk and mobility provider contracts that have been executed with each site stakeholder. These tables will be reviewed for any needed revisions based on a known change in a named individual and at the end of the pilot period.

Table 3: Smart Mobility Hubs Personnel Involved During Grant Period

Name	Role	Key Functions	Full time Equivalent (%)	Organization
Andy Wolpert	Project Owner	Product owner	5%	City of Columbus
Jeff Kupko	Project Manager, Safety Manager	Responsible to identify and report any safety incidents at the SMH sites and for overall project management.	10%	Michael Baker International
Andrew Volenik	Traffic Operations Manager	Maintenance of pavement markings and signage.	5%	City of Columbus
Anthoni Goble	Operating System Data Analyst	Responsible for creating the data structure/schema to import IK and Pivot data into the Operating System.	10%	Battelle
Jarred Olson	Operating System Technical Lead	Responsible for storing IK and Pivot data into the Operating System.	10%	Accenture
Scott Walker	Project Manager and IK-CMS Administrator	Product owner, project management.	20%	IKE Smart City

Name	Role	Key Functions	Full time Equivalent (%)	Organization
Brian McGurer	IK Operations and Maintenance Engineer	Responsible for operations and maintenance of the IKs at the SMH site and perform daily checks.	15%	IKE Smart City
Jaclyn Toopes	IK Customer Care Support Personnel	Responsible for addressing customer issues received through the customer care support.	30%	IKE Smart City
Chet Ridenour	CoGo O&M	Responsible for the maintenance of CoGo bikes and infrastructure at the SMH sites.	15%	CoGo (Lyft)
Katie Drown	O&M of Spin scooters	Responsible for the maintenance of Spin scooters bikes at the SMH sites.	15%	Spin
Sam Cooper*	O&M of Bird scooters	Responsible for the maintenance of Bird scooters bikes at the SMH sites.	15%	Bird
Crew Cypher	O&M of Lime scooters	Responsible for the maintenance of Lime scooters bikes at the SMH sites.	15%	Lime
Morgan Kauffman	O&M of Yellow Cab Fleet	Responsible for the maintenance of Yellow Cab taxis that access the SMH sites.	5%	Columbus Yellow Cab
Daniel Jamerson	O&M of EasyMile AV Shuttles	Responsible for the maintenance EasyMile shuttles that access the SMH sites.	10%	EasyMile
Timothy Smith	Site Maintenance	Responsible for maintenance of the site around SMH amenities.	10%	COTA
Tommy Ferguson	Site Maintenance	Responsible for maintenance of the site around SMH amenities.	10%	St. Stephen's Community House
Andrew Kistler	Site Maintenance	Responsible for maintenance of the site around SMH amenities.	10%	Columbus Metropolitan Library
Doug Wright	Site Maintenance	Member of SMH Project team.	5%	CSCC

*Contract with Bird is expected to be signed by September 2020

Source: City of Columbus

Table 4: Smart Mobility Hubs Personnel Post-Grant

Name	Role	Key Functions	Full time Equivalent (%)	Organization
Andy Wolpert	Project Owner	Product owner	5%	City of Columbus
Andrew Volenik	Traffic Operations Manager	Maintenance of pavement markings and signage located within the right-of-way.	5%	City of Columbus
TBD	Operating System Data Analyst	Responsible for updating the data structure/schema to import IK and Pivot data into the Operating System.	10%	TBD
TBD	Operating System Technical Lead	Responsible for storing IK and Pivot data into the Operating System.	10%	TBD
Scott Walker	IK Product Owner and IK-CMS Administrator	Product owner	20%	IKE Smart City
Brian McGurer	IK Operations and Maintenance Engineer	Responsible for maintenance of the IKs at the SMH site and perform daily checks.	15%	IKE Smart City
Jaclyn Toopes	IK Customer Care Support Personnel	Responsible for addressing customer issues received through the customer care support.	30%	IKE Smart City
Chet Ridenour	CoGo O&M	Responsible for the maintenance of CoGo bikes and infrastructure at the SMH sites.	15%	CoGo (Lyft)
Katie Drown	O&M of Spin scooters	Responsible for the maintenance of Spin scooters bikes at the SMH sites.	15%	Spin
Sam Cooper*	O&M of Bird scooters	Responsible for the maintenance of Bird scooters bikes at the SMH sites.	15%	Bird

Name	Role	Key Functions	Full time Equivalent (%)	Organization
Crew Cypher	O&M of Lime scooters	Responsible for the maintenance of Lime scooters bikes at the SMH sites.	15%	Lime
Morgan Kauffman	O&M of Yellow Cab Fleet	Responsible for the maintenance of Yellow Cab taxis that access the SMH sites.	5%	Columbus Yellow Cab
Timothy Smith	Site Maintenance	Responsible for maintenance of the site around SMH amenities, pavement markings and signage.	10%	COTA
Tommy Ferguson	Site Maintenance	Responsible for maintenance of the site around SMH amenities, pavement markings and signage.	10%	St. Stephen's Community House
Andrew Kistler	Site Maintenance	Responsible for maintenance of the site around SMH amenities, pavement markings and signage.	10%	Columbus Metropolitan Library
Doug Wright	Site Maintenance	Member of SMH Project team.	As needed	CSCC

TBD – To be determined

Source: City of Columbus

2.2. EQUIPMENT, SOFTWARE AND MATERIALS

This section discusses the operating equipment, software and other computing facilities used for operating the SMH system, sites and amenities.

2.2.1. Equipment

As part of the Smart Columbus SMH project, six IKs were installed at the SMH sites. The IKs provide users access to various apps including Smart Columbus' Pivot app. The other amenities installed as part of the IK includes an ECB, public Wi-Fi, bike- and car-share spaces, dockless devices parking spaces. Pavement markings and signage were also installed at all SMH sites to provide users dedicated areas and wayfinding to mobility options deployed at the SMH sites.

Table 5 and **Table 6** provide recurring costs and the party responsible for the cost related to the O&M of the project during and after the pilot period.

Table 5: Monthly/Yearly Recurring and Support Costs During Pilot Period

Maintenance of SMH Amenity	Cost to the City of Columbus	Responsible Party	Comments
IK including ECB and Wi-Fi	\$0*	IKE Smart City	
Pavement markings and signage maintenance costs at SMH sites			No O&M costs unless reinstalled due to damage.
<ul style="list-style-type: none"> CSCC 	\$0	City of Columbus	
<ul style="list-style-type: none"> Linden Transit Center 	\$0	City of Columbus	
<ul style="list-style-type: none"> St. Stephens Community House 	\$0	City of Columbus	
<ul style="list-style-type: none"> Metro Library – Linden Branch 	\$0	City of Columbus	
<ul style="list-style-type: none"> Northern Lights Park and Ride 	\$0	City of Columbus	
<ul style="list-style-type: none"> Easton Transit Center 	\$0	City of Columbus	
Bike-Share			
<ul style="list-style-type: none"> CoGo Infrastructure 	\$0	CoGo	

*IKE Smart City indicated a \$15,000 per year per kiosk O&M cost that is provided as part of the turn-key built in solution. Due to this reason, there are no O&M costs to the City of Columbus.

Source: City of Columbus, IKE Smart City

Table 6: Monthly/Yearly Recurring and Support Costs After Pilot Period

Maintenance of SMH Amenity	Cost to the responsible party	Responsible Party	Comments
IK including ECB and Wi-Fi	Not available	IKE Smart City	<p>Per vendor, cost information is considered confidential.</p> <p>End of life replacement is expected to be 10 years. Multiple components of IK will be replaced as needed over the years. Additional components of IK include:</p> <ul style="list-style-type: none"> • Monitors replaced at 5 years • Computers replaced at 5 years • Modem replaced at 5 years • Air Conditioners at 4 and 8 years, or twice in the 10 yr. lifespan • Security NVR (Network Video Recorder) at 5 years or once in the 10 yr. lifespan • Emergency call assembly at 5 years or once in the 10 yr. lifespan
<p>Pavement markings and signage maintenance costs at SMH sites. Cost below includes replacement of all signage and pavement markings at the SMH site.</p>			<p>Signage and pavement markings installed will be inspected and replaced as necessary or when damaged.</p>
<ul style="list-style-type: none"> • CSCC 	\$2,700	City of Columbus	Estimated cost every seven years.
<ul style="list-style-type: none"> • Linden Transit Center 	\$3,200	COTA	Estimated cost every seven years.
<ul style="list-style-type: none"> • St. Stephens Community House 	\$3,900	St. Stephen's Community House	Estimated cost every seven years.
<ul style="list-style-type: none"> • Metro Library – Linden Branch 	\$3,550	Columbus Metropolitan Library	Estimated cost every seven years.
<ul style="list-style-type: none"> • Northern Lights Park and Ride 	\$3,450	COTA	Estimated cost every seven years.
<ul style="list-style-type: none"> • Easton Transit Center 	\$1,700	COTA	Estimated cost every seven years.
Bike-Share			

Maintenance of SMH Amenity	Cost to the responsible party	Responsible Party	Comments
<ul style="list-style-type: none"> CoGo Infrastructure 	Not available	CoGo	Per vendor, cost information is considered confidential.

Source: City of Columbus, IKE Smart City

2.2.2. Software

No software licensing and support costs are required for the IK maintenance during or after the pilot period.

2.2.3. Materials

IKs and other supporting infrastructure installed at the sites are off-the-shelf products. Signage and pavement markings were designed and installed at the sites for easy navigation to the transportation mobility options provided at each site. **Table 5** and **Table 6** provide recurring and support cost information related to the project for these items. Beyond these items, no other materials are required for the SMH sites.

2.3. DATA COLLECTION AND PRIVACY

While the Data Privacy Plan³ (DPP) provides overarching guidance for every project on privacy and security controls for data, detailed information on privacy and security controls for SMH will be maintained in the Institutional Review Board (IRB) protocol and contracts with participating organizations, such as the kiosk provider, as needed. Data Security refers to the tools, policies, practices, and procedures used to protect data from being accessed, manipulated, destroyed or being leveraged by those with a malicious intent or are unauthorized to do so. Data privacy is the reasonable expectation that data of a sensitive nature will be kept confidential, sanitized and/or encrypted, and respectfully and responsibly maintained by all users, managers, and collectors of the data, while adhering to applicable laws and regulations, policies, and procedures.

2.3.1. Data Collection

2.3.1.1. INTERACTIVE KIOSKS AUTOMATICALLY COLLECTED INFORMATION

IKE Smart City makes its privacy policy available for the users on both the IKs installed at the SMH sites and on their website.⁴ Various features like public Wi-Fi, photo booth and ECB are available at the IK that are interactive features and will need information from the user. When connected to the IK Wi-Fi on a smart device, location information (SMH site) and time stamp of when the user is connected to the Wi-Fi is automatically collected at the IK. The ECB is equipped with its own video camera which records

³ https://d2rfd3nxvhnf29.cloudfront.net/2019-09/SCC-D-Data%20Privacy%20Plan-FINAL-20190906%5B1%5D_0.pdf

⁴ <https://www.ikesmartcity.com/documents/en/privacy-policy.html>

continuously. When the ECB is activated, location (SMH site), timestamp and length of the call is automatically collected. The IKE Smart City privacy policy describes in detail the types of information collected when using an IK and practices that are followed when collecting, using, maintaining, protecting, and disclosing that information.

2.3.1.2. SMART COLUMBUS OPERATING SYSTEM

The Smart Columbus DPP⁵ provides program-level oversight and guidance for the privacy and security controls for any data collected as part of the Smart Columbus Program and stored on the Operating System.

For the SMH project, IKE Smart City has created an API for Operating System to access IK usage information. Though other data is collected as mentioned above when using interactive features, only data that is needed for performance measurement of this project is collected through the API. The Operating System data includes dwell times, IK popularity (returning sessions), IK usage frequencies, and venue information. Data collected by the Operating System has a five year rolling retention period per the Smart Columbus record retention schedule.

2.3.2. Access to Interactive Kiosk Data by Third Parties

With respect to any interactive feature provided on the IK and operated by a third-party, the IK will only store the information that the user provided to perform the service requested. After that, the information will no longer be retained by IKE Smart City, but it may continue to be retained by the respective third-party who is the owner of that interactive feature, i.e. Smart Columbus Pivot. IKE Smart City will only share this information with that third-party, and will not share, sell or otherwise disclose this information to any other third parties. However, IKE Smart City does not exercise control over third parties, and users will be subjected to their policies and terms and conditions when engaging with any feature operated by a third-party. The IKE Smart City privacy policy, available on its website and on the IK at the SMH sites, describes what data collected through the IK is available for third parties.⁶

2.3.3. Interactive Kiosk Data Retention Policy

As per the IKE Smart City privacy policy, IK and Wi-Fi usage information that is automatically collected through the IK as described in section 2.3.1 will not be stored for more than 12 months. Video that is collected at the IK when accessing the ECB has a 14 day rolling window storage period. Any information collected from the user to access third-party interactive features at the IK will not be retained by IKE Smart City after the service requested is complete. This information may be stored by the third-party, i.e. Smart Columbus Pivot.

2.3.4. Interactive Kiosk Data Security

IKE Smart City provides physical, electronic, and procedural safeguards to protect information they process and maintain. IKE Smart City follow industry standard security measures like Transport Layer Security (TLS) encryption, and monitoring tools such as Open Source HIDS (host-based intrusion detection system)

⁵ https://d2rfd3nxvhnf29.cloudfront.net/2019-09/SCC-D-Data%20Privacy%20Plan-FINAL-20190906%5B1%5D_0.pdf

⁶ <https://www.ikesmartcity.com/documents/en/privacy-policy.html>

security system to prevent cyber-attacks. The IK system platform undergoes a third-party cyber security audit on an annual basis to detect and remediate any potential attack vectors.

Chapter 3. Training

As part of the SMH project, there will be no training provided to the users of the system. Therefore, this section only provides an overview of the assessment and training needed for O&M personnel, including off-site courses, on-site courses, and hands-on training on the system itself.

3.1. INTERACTIVE KIOSK CENTRAL MANAGEMENT SYSTEM ADMINISTRATOR TRAINING

The IK-CMS administrator (admin) is responsible for the data collected from the SMH sites. The IKE admin performs routine checks on the data collected to ensure there are no system and data receiving errors. The IK-CMS admin along with other IKE Smart City team go through the data collected through IK-CMS when any anomalies are reported within the system.

3.2. INTERACTIVE KIOSK OPERATIONS AND MAINTENANCE TRAINING

IK O&M personnel are provided a daily and weekly checklist to perform at each of the SMH sites. Training is provided to the personnel performing the checks to make sure all equipment is working accordingly.

Appendix A provides the daily checklist that will be used to perform routine checks at the IK.

Chapter 4. Operations

This section provides insight into the types of operational activities that are necessary to keep the SMH system operational and should serve as a guide for addressing and resolving issues that may arise regarding the SMH applications and integration with the Operating System.

4.1. HOURS OF OPERATION

The IKs and amenities installed at the SMH sites are always available except for the St. Stephen's Community House site where the IK will be available only during the St. Stephen's Community House operating hours (Monday through Friday 7am to 9pm). All other transportation mobility amenities installed at St. Stephen's Community House are available throughout the year.

4.2. SMART MOBILITY HUBS TECHNICAL SUPPORT

IKE Smart City technical support can be contacted using the toll-free number. This tech support is available 24/7 for kiosk issues, including emergencies. This support number is intended for City of Columbus and stakeholders, not the general public who may have general inquiries.

The phone number is: 1-833-624-0494. Once dialed, the caller is prompted with three options.

- **Option 1** – When Option 1 is selected, the call will be transferred to on-call staff. This option is intended for emergency responders or utility representatives to speak with somebody immediately.
- **Option 2** – When Option 2 is selected, the call will be transferred to on-call staff. This option is intended for the City of Columbus partners to speak with somebody immediately to report significant kiosk damage (broken glass, kiosk struck by a car, etc.).
- **Option 3** – When Option 3 is selected, the caller will be prompted to leave a voicemail. This voicemail will then show up as a ticket to be addressed during normal business hours. This option is intended for non-emergency messages that can be handled during normal business hours.

4.3. OPERATING SYSTEM TECHNICAL SUPPORT

Operating System technical support can be reached through the following URL:

<https://www.smartcolumbusos.com/contact-us>

The following information is required in the correspondence:

- Contact name and organization
- Email
- Subject (Tech Help/Request)
- Message
- Verification (reCAPTCHA)

4.4. INTERACTION AND COORDINATION

See Section 2.1 Personnel for SMH system responsibilities. Smart Columbus hosts a monthly meeting to review project updates, kiosk usage and system performance and other upcoming activities. This meeting includes Smart Columbus, site stakeholders and COTA.

4.5. OPERATIONAL ACTIVITIES

4.5.1. Smart Mobility Hubs Application Builder

This section provides a description of common operational activities and troubleshooting activities related to the IK.

4.5.1.1. INTERACTIVE KIOSK USER OPTIONS

Various options are available on the IK interface for users to access including American with Disability Act (ADA) accessible options. **Table 7** describes those user options available.

Table 7: Interactive Kiosk User Options

Option	Description
	User, upon arrival at the IK, will need to touch the screen to exit the stand-by screen and view the home screen.
	This icon is used to increase the font size on the IK for visibility purposes.
	This icon is used to lower the content on the IK screen for ADA users for easy accessibility of the IK options.
	ECB button is used to call and alert ECC officials in an emergency situation.
	This icon gives information on how to connect to the IK provided public Wi-Fi on a smartphone or smart device.
	Various apps including Pivot are provided on the kiosk to explore various activities, including food, events, and multimodal transportation options around the City.
	Provides current weather information.
	Clicking this icon will modify the display language on the IK.
	Clicking this icon will change the background of the IK home screen.

Source: City of Columbus

4.5.1.2. INTERACTIVE KIOSK TROUBLESHOOTING

IK troubleshooting provides recommendations to solve issues that may be encountered while using the IK. This table is expected to be updated periodically as new issues are identified and appropriate

recommendations for how to resolve are learned. **Table 8** provides the list of issues that maybe encountered with the IK. The IK troubleshooting will be handled by the IK-CMS admin.

Table 8: Interactive Kiosk Troubleshooting

Issue	Description
IK not responding	This issue is when the kiosk itself is out of service. This may be due to a power outage or when there is a crash where the kiosk is damaged. The IK-CMS admin will be notified when there is an error in the data transfer from the kiosk to the backend SMH system.
Call center customer care not reachable	This issue is when all of the customer care representatives are not available at the moment due to the call being made outside business hours or when the call center is experiencing a high call volume.
ECB not working	This issue is when the user is not able to connect to the ECC. This may be due to a power outage or when there is a crash where the kiosk is damaged. The IK-CMS admin will be notified when there is an error in the data transfer from the kiosk to the backend SMH system which will occur when there is a power issue.
Wi-Fi service is not available	This issue is when the user is not able to connect to the Wi-Fi provided at the kiosk due to a power outage or when the router has stopped working. The IK-CMS admin will be notified with an error message when there is a disconnection with the IK.
Apps not working	This issue is when the user is unable to open one or all apps provided on the kiosk. The IK-CMS admin is notified with an error message when there is a software or hardware glitch and cannot download and upload data from the kiosk to the backend system.

Source: IKE Smart City

4.5.2. Smart Columbus Operating System

4.5.2.1. ACCESS TO DATA

For the SMH project, IKE Smart City has created an API for the Operating System to ingest certain IK usage information for performance measurement purposes. Once retrieved, data will be made available for public access and will be used to assess performance measures.

4.5.2.2. INGESTING DATA

The Operating System team checks the validity of the data and generates statistics relative to the completeness of the dataset as it is ingested. This will provide a score that will be appended to the data page. The data provider will be contacted and asked to remediate any anomalies detected.

Chapter 5. Maintenance

The SMHs and deployed amenities are expected to be operational nearly 24 hours a day, seven days a week. Both during and after the demonstration period, maintenance activities are necessary to keep the system running. This section outlines various maintenance tasks, including preventative and corrective maintenance activities and other adjustments as needed. Depending on the activity and the SMH component, responsible parties maintaining the activity may change depending if it is during or after the demonstration period.

5.1. PREVENTATIVE MAINTENANCE ACTIVITIES

Preventative maintenance is maintenance activity routinely performed to lessen the likelihood of failure and to discover issues in a proactive manner to lessen their impact. IKE Smart City is responsible for performing preventative maintenance on the IKs and the City of Columbus is responsible for maintaining the signage and pavement markings installed at the SMH sites. Preventative maintenance activities for IKs and infrastructure are documented here. **Table 9** lists the preventive maintenance activities related to SMH.

Table 9: Preventative Maintenance Activities

Activity	Description	Frequency	Effort
Kiosks <ul style="list-style-type: none"> • Software <ul style="list-style-type: none"> ○ Apps • Hardware <ul style="list-style-type: none"> ○ ECB ○ Camera ○ Wi-Fi ○ IK surface 	IK field inspection and maintenance will be performed daily to make sure kiosks are working properly at all SMH locations. The SMH Test Plan and SMH Test Report capture the daily inspection and maintenance checklist used by IKE Smart City for inspection.	Daily	3 hours
Pavement markings and signage	The City of Columbus, during the pilot period, and site stakeholders, after the pilot period, will maintain pavement markings and signage installed on private property at the SMH sites. The City will maintain items installed in public right-of-way before and after the pilot period.	As needed	6 hours
EV Charging Stations	EV charging stations installed at the Northern Lights Park and Ride SMH site will be maintained by COTA who is the site owner for that site.	As needed	6-8 hours
CoGo Infrastructure	CoGo docking stations and bikes are deployed at multiple SMH sites. The O&M of the infrastructure will be conducted by CoGo.	As needed	5 hours

Source: City of Columbus, IKE Smart City

5.2. CORRECTIVE MAINTENANCE ACTIVITIES

Table 10 lists the corrective maintenance activities associated with addressing issues related to the SMH system or Operating System.

Table 10: Corrective Maintenance Activities

Activity	Description	Frequency	Effort
Apps on the IK not working	Some or all apps not working on the IK. Error is displayed when accessed. IKE Smart City is notified and will be responsible to respond accordingly.	Infrequent	1-8 hours
IK out of service	IK is out of service due to power outage or maintenance issues. IKE Smart City is notified and will be responsible to respond.	Infrequent	1-72 hours
ECB not working	Not able to activate and connect to the ECC when ECB is pushed. No audio response is received from ECC. IKE Smart City is notified and will be responsible to respond.	Infrequent	24-72 hours
Wi-Fi not available	Wi-Fi service is not available at SMH site due to power issues or equipment related issue. IKE Smart City is notified and will be responsible to respond.	Infrequent	8-72 hours
Operating System not available to receive data	An API is setup to access data from IKE Smart City to Operating System and an error is presented when trying to access the API. Any Operating System data ingestion error will be handled by IKE Smart City and Operating System team.	Infrequent	1-8 hours
Pavements markings or signage needs replacement	Pavement markings or signage installed at SMH sites need replacement. The City of Columbus will replace the signs and pavement markings as needed during the pilot period. SMH Site Stakeholders will be responsible for signs and pavements markings.	Infrequent	1-2 hours

Source: City of Columbus, IKE Smart City

5.3. DATA INGESTION TO OPERATING SYSTEM

5.3.1. Background on Data Template and Format

An API is setup for the Operating System team to access SMH data from IKE Smart City. Data is available in CSV and JSON formats for download and query. The query supports the full ANSI SQL syntax and only selects from the tables specified in the query. Various datasets are setup for different information including counters, dwell times, frequencies at the SMH sites.

5.3.2. Maintenance of Data Ingestion to Operating System

The IKE Smart City data transfer is through a RESTful API which is an HTTPs/TLS server. Data is uploaded with a POST method and received with a GET method. Data is posted on the server where the data in transit is encrypted via TSL. Data feed schema is defined by the Operating System team based on inputs from IKE. The Operating System team schedules ingestion jobs for various data feeds based on their update frequency. In case of any changes or updates to the data feed schema or endpoint, the Operating System team updates the data pipeline to reflect the changes. These data pipeline updates can take a level of effort of up to 6 hours. **Table 11** provides activities associated with updating data that is collected in the Operating System.

Table 11: Maintenance of Data Ingestion to Operating System

Activity	Description	Frequency	Effort
Update data structure/schema in Operating System	Data ingested into the Operating System has changed and requires updates to the existing data structure/schema.	As needed	6 hours

Source: City of Columbus

Appendix A. Interactive Kiosk Daily Maintenance Checklist

IKE Field Maintenance Checklist

Once a unit is set up and powered on, perform the following checks on both sides of the unit:

- Ad-loop is cycling through ads
- When tapped, unit transitions from the ad-loop to the dashboard correctly
- Time and weather are displaying correctly based on current location and time zone
- City specific application designs are displaying
- Unit returns to the ad-loop after 60 seconds of inactivity

Directory Listing Applications (Choose one of Eat and Drink, Shop, Stay, Activities, Parks & Outdoor, Museums & Culture, Social Services, Civic Resources)

- Listings appear correctly - Name, address, category, directions with time, images (if present otherwise category icon)
- Can filter results by category
- Can search by name / category
- Tapping the card flips to the detail view and the map zooms to show directions
- Detail view has appropriate content
- Tapping 'Get Directions / info' displays the texting keyboard and allows you to text the listing info to your phone
- Can pan the map and pinch to zoom in & out
- Clicking a pin on the map displays the detail card

Arcade

- Game starts and you can play

Get Around Application

- City specific transit map loads properly
- Bus stops load properly
- When a stop is tapped, screen zooms to focus on that stop, available modes load with route information.
- Tapping 'Get Directions / info' displays the texting keyboard and allows you to send the listing info to your phone
- Can pan the map and pinch to zoom in & out

Survey Says

- Question loads properly
- After selecting an answer, you can vote
- Tapping vote take me to the results screen

Photobooth

- Interface loads correctly
- Frames, filters, and stickers load and can be applied to photo
- Photos are taken

- Verify photo can be sent via text and correct photo is received

Hardware

- Wash glass face. Wash body of kiosk top to bottom.
- Remove Graffiti or other marks. If applicable, describe what graffiti was removed and where on kiosk it was located (example: spray paint on side, sticker on front base, etc.).
- Check for scratches or other damage (*how to repair?*)
- Pick up and dispose of debris or garbage
- Connect to IKE Free Wi-Fi and verify it is operational

Appendix B. Acronyms and Definitions

Table 12 provides project specific acronyms used throughout this document.

Table 12: Acronym List

Abbreviation/Acronym	Definition
Admin	Administrator
API	Application Programming Interface
App	Application
CMS	Central Management System
COTA	Central Ohio Transit Authority
CEAV	Connected Electric Autonomous Vehicle
CSCC	Columbus State Community College
ECB	Emergency Call Button
ECC	Emergency Call Center
EV	Electric Vehicle
FMLM	First Mile/Last Mile
HIDS	Host-based Intrusion Detection System
IK	Interactive Kiosk
IKE	Interactive Kiosk Environment
IP	Internet Protocol
MaaS	Mobility as a Service
MMPA	Multimodal Trip Planning Application
NVR	Network Video Recorder
O&M	Operations and Maintenance
Operating System	Smart Columbus Operating System
OSU	The Ohio State University
PaaS	Platform as a Service
PII	Personally Identifiable Information
SASP	Systems Architecture and Standards Plan
SMH	Smart Mobility Hub
TLS	Transport Layer Security

Source: City of Columbus

Appendix C. Glossary

Table 13 provides project specific terms used throughout this document.

Table 13: Glossary

Term	Definition
App	A software application
Data Privacy	The reasonable expectation that data of a sensitive nature will be kept confidential, sanitized and/or encrypted, and respectfully and responsibly maintained by all Users, managers and collectors of the data.
Data Retention	The continued storage of data for compliance or business reasons.
Data Security	The tools, policies, practices, and procedures used to protect data from being accessed, manipulated, or destroyed or being leveraged by those with a malicious intent or without authorization, as well as the corrective actions taken when data breaches are suspected or have been identified.
MaaS	Mobility as a Service refers to the shift in society from the use of mass-produced personal vehicles, which decentralizes human activities to a human-centric approach. Through the sharing of information, multiple modes of transportation are integrated and offered through a digital platform that provides FMLM mobility bookings across all modes, private and public.
reCAPTCHA	A free service from Google that helps protect websites from spam and abuse
Travelers	Travelers are users of the SMH who access amenities and utilize the features at SMH facilities to plan, begin, pass through, or complete their trips.
Third-Party	Organizations not affiliated with the Smart Columbus Program.

Source: City of Columbus



THE CITY OF
COLUMBUS
ANDREW J. GINTHER, MAYOR