



Annual Safety Review

for the Smart Columbus
Demonstration Program

December 5, 2019

Produced by City of Columbus

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Abstract

The safety reviews ensure compliance with the Safety Management Plan and identify opportunities to improve safety. The review panel include members of the Smart Columbus Project Management Office and project team (including vendors and testers), and although independent/third party staff was also considered to offer an objective opinion on the review. Safety reviews will be conducted either annually, prior to a project's launch, or when an incident occurs. This document compiles the Annual Review completed August-October 2019.

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Chapter 1. Safety Review for Smart Columbus Projects

1.1 INTRODUCTION

Safety reviews are conducted either annually, prior to a project's launch, or when an incident occurs. When safety reviews are conducted, the reviewers will ensure that:

- Appropriate technical experts and team members are present
- Improvement opportunities are discussed and/or identified
- Review outcomes are communicated to the Smart Columbus Project Management Office (PMO) and project team members
- Follow up is completed with project team regarding actions that arise from reviews
- Ongoing operations are monitored for compliance with the Safety Management Plan (SMP)

For the 2019 annual safety review, the projects were categorized into three different phases as listed below.

- Deployment phase
- Pre-installation phase
- Design phase

Separate agendas were developed for all three phases listed above, attached in **Appendix A**, for the annual safety review meetings.

1.1.1. Deployment Phase

For 2019 annual safety reviews, four Smart Columbus projects (Smart Columbus Operating System (Operating System), Multimodal Trip Planning Assistance/Common Payment System (MMTPA/CPS), Mobility Assistance for People with Cognitive Disabilities (MAPCD) and Prenatal Trip Assistance (PTA)) were in deployment phase. **Table 1** through **Table 4** includes safety reviews conducted for each of the projects listed above that were in the deployment phase.

Table 1: Smart Columbus Operating System

Operating System - Annual Safety Review	
Name of Reviewer: Andy Wolpert	Date of Review: 9-13-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.)	
Deployment Review	

Operating System - Annual Safety Review

Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.)

Annual Safety Review

Version of the Risk Assessment that was used during the review:

Revision: April 2019 - Quarterly Submission

Date: 4-1-2019

Version of the Risk Assessment that reflect the below changes:

Revision: Safety Management Plan – Final Report

Date: 11-7-2019

Review Notes:

The SMP has revisited anticipated safety risks and reevaluated Automotive Safety Integrity Level (ASIL) scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. Below listed are the new risks that were identified during the pre-deployment and deployment phase of the project by the project team.

Were there any new safety issues identified? (please select one) YES NO

If YES – Describe the issue and recommended mitigation action:

ID #2:

Risk: Person has access to Personal Identifiable Information (PII) stored in the Operating System.

Mitigation: No PII is provided to the Operating System and this makes a rare/never risk of occurrence. Data received will be anonymized by the Operating System team prior to transmission to the Operating System. The Deidentification Policy and Data Curation process outlines how data ingested into the Operating System is stored and protected.

Review Notes:

Were there any safety issues identified as obsolete? (please select one) YES NO

Below listed risk was part of the Operating System risk assessment but during the safety reviews, it was determined that the risk is more relevant to projects that are developing applications and collecting data from the users. It is for this reason this risk is listed as obsolete for this project.

If YES – Describe the issue and mitigation action:

Risk: Malicious functionality: active monitoring of the traveler causes hacking of traveler account/activity.

Mitigation: Work with the developer and third-party developers to restrict the permissions requested by the app to only what is necessary for functionality. Development of the app along with vendor will provide visibility and customization allowing for more exposure of code base and how it functions.

Operating System - Annual Safety Review

Review Notes:

During the safety review, mitigation strategies were revised based on the input from the Operating System project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy.

Were there any mitigation strategies listed for identified safety issues modified?

(please select one) YES NO

If **YES** – Describe the issue and mitigation action:

ID #1:

Risk: Unauthorized person has access to restricted data.

Mitigation updated to reflect data anonymization and data curation process.

Text added to the Mitigation: Data will be deidentified prior to transmission to the Operating System. Deidentification Policy and Data Curation process outlines how data ingested into the Operating System is stored and protected.

ID #3:

Risk: Vulnerabilities of data transmission and storage.

Mitigation updated to include data storage and protection process followed and what kind of information is stored in the Operating System.

Text added to the Mitigation: No PII, Protected Health Information (PHI), or Payment Card Industry (PCI) data is provided to the Operating System and this makes a rare/never risk of occurrence. Project team to work with vendors to deidentify data prior to transmission to the Operating System. Smart Columbus Data Privacy Plan (DPP) Chapter 5: Security Controls describes in detail how data collected will be stored and protected and the steps that will be taken when there is a data breach.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

For the annual safety review meeting of MMTPA/CPS project, the agenda developed for projects under deployment was used for the review. MMTPA is under deployment phase but was only a soft launch and outreach about the application will be held once the CPS part of the application is ready for deployment. Currently, CPS is under design phase and will be combined with the MMTPA for a full launch. For the review meeting of these projects, vendors developing the application were also included for their input for any risks associated with the project's deployment.

Table 2: Multimodal Trip Planning Application/Common Payment System

Multimodal Trip Planning Application/Common Payment System - Annual Safety Review	
Name of Reviewer: Andy Wolpert	Date of Review: 9-26-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Deployment Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect the below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes: The SMP has revisited anticipated safety risks and reevaluated ASIL scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. Below listed are the new risks that were identified during the pre-deployment and deployment phase of the project by the project team. Were there any new safety issues identified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <u>If YES – Describe the issue and recommended mitigation:</u> <u>ID #66:</u> Risk: Traveler cannot access PayNearMe stores to load Common Payment System (CPS) account. Mitigation: MMTPA/CPS will show a map with the PayNearMe stores near the location of the traveler with the store hours. Traveler will have information to the store hours to choose to load his or her CPS account <u>ID #67:</u> Risk: Traveler/driver assault when booked through the MMTPA. Mitigation: Traveler/driver can call 911 when there is a safety concern. Traveler can also leave the location and shout for help.	
Review Notes: Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A	

Multimodal Trip Planning Application/Common Payment System - Annual Safety Review

If **YES** – Describe recommended mitigation action: N/A

Review Notes:

During the safety review, mitigation strategies were revised based on the input from the MMTPA/CPS project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy.

Were there any mitigation strategies listed for identified safety issues modified?

(please select one) YES NO

If **YES** – Describe the issue and recommended mitigation:

ID #59:

Risk: A traveler cannot plan his or her entire trip origin-destination (including First Mile/Last Mile (FM/LM) options)) due to system-unrelated event, such as a traffic incident or other emergency event.

Mitigation revised about the app having contact information of Central Ohio Transportation Authority (COTA) customer care.

Text deleted from the Mitigation: Signage at the site will be able to provide contact information to other transportation modes.

ID #60:

Risk: Planned travel modes are not readily available to users within a reasonable amount of time.

Mitigation revised about the app having contact information of COTA customer care and modes being able to select only based on the availability.

Text deleted from the Mitigation: Emergency call button available for passengers. Signage at the site will be able to provide contact information to other transportation modes.

ID #61:

Risk: Failure mode of the application results in the complete systemic disruption of the user's ability to access the transportation modes or complete the trip.

Mitigation revised to include customer care information availability.

Text added to the Mitigation: App will offer a customer care number to COTA when not able to reach the central system.

ID #62:

Risk: Maintenance mode occurs when the system is operating in Backup mode to restore, repair, or replace system components.

Mitigation revised to include no-fail design of the architecture.

Text added to the Mitigation: Architecture is a no-fail system. Proper notification will be given to potential users in advance of the event when the system is offline.

ID #63:

Risk: Traveler is focused on the phone, not his or her surroundings (distraction). If headphones are in use, may not hear traffic or roadway noise as needed.

Mitigation updated to include road safety measures that will be taken by the City and added one-time warning to the application when users sign up.

Multimodal Trip Planning Application/Common Payment System - Annual Safety Review

Text added to the Mitigation: City of Columbus (COC) to work with the outreach team to include the road safety mitigation strategies before the launch of the application. A one-time pop-up screen with warnings and instructions that includes driving behavior will be presented to the traveler.

ID #64:

Risk: Malicious activity: active monitoring of the traveler causes hacking of traveler account/activity.

Mitigation updated to include vendor being PCI complaint and reference to standards and measures followed for data protection.

Text added to the Mitigation: Vendor security documents lists the security measures for the data collected through this application. Smart Columbus DPP Section 5.3: Security Controls describes the standards that will be taken to protect and secure the confidentiality of PII collected. Bytemark is a PCI Level 1 vendor and their card processing system are complaint with PCI Data Security Standards.

ID #65:

Risk: Vulnerabilities for data transmission and storage.

Mitigation updated to include vendor being PCI complaint and reference to standards and measures followed for data protection.

Text added to the Mitigation: Vendor security documents lists the security measures for the data collected through this application. Smart Columbus DPP Section 5.3: Security Controls describes the standards that will be taken to protect and secure the confidentiality of PII collected. Bytemark is a PCI Level 1 vendor and their card processing system is complaint with PCI Data Security Standards.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

Table 3: Mobility Assistance for People with Cognitive Disabilities

Mobility Assistance for People with Cognitive Disabilities - Annual Safety Review	
Name of Reviewer: Andy Wolpert	Date of Review: 9-16-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Deployment Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect the below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes: Were there any new safety issues identified? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: The SMP has revisited anticipated safety risks and reevaluated ASIL scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. During the safety review, mitigation strategies were revised based on the input from the MAPCD project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy. Were there any mitigation strategies listed for identified safety issues modified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <u>If YES – Describe the issue and mitigation action:</u> <u>ID #68:</u> Risk: Application provides inaccurate, incomplete, or incorrect walking instructions to the traveler with cognitive disabilities. Mitigation revised to include training information and contact feature provided to the traveler. Revised Mitigation: Traveler can contact his/her caregiver using the 'contact' feature within the	

Mobility Assistance for People with Cognitive Disabilities - Annual Safety Review

application when needing assistance. For travelers with severe disabilities, coach may accompany the traveler on the trip (decided by multiple stakeholders in advance of the trip being planned) until the traveler is able to travel independently. Safety training and COTA Transportation Training includes who and what to ask for help when lost getting to the destination (Store worker, manager, police officer, COTA bus driver). Goal of the training process is to have failures occur and be resolved prior to real-world use.

ID #69:

Risk: Application is not updated with current pedestrian and traffic information that will impact route provided to the traveler.

Mitigation reworded based on the training provided to the traveler and the scenarios used to train the travelers.

Text added to the Mitigation: Safety training includes who and what to ask for help when lost getting to the destination (Store worker, manager, police officer, COTA bus driver). Goal of the training process is to have failures occur and be resolved prior to real-world use.

Text deleted from the Mitigation: Training provided to the traveler will include all safety risk scenarios and how to react to these scenarios.

ID #70:

Risk: Application freezes or shuts down and the traveler cannot access it.

Mitigation reworded based on the training provided to the traveler and the scenarios used to train the travelers.

Text added to the Mitigation: Safety training includes who and what to ask for help when lost getting to the destination (Store worker, manager, police officer, COTA bus driver). Goal of the training process is to have failures occur and be resolved prior to real-world use.

Text deleted from the Mitigation: Training provided to the traveler will include all safety risk scenarios and how to react to these scenarios.

ID #71:

Risk: Traveler selects incorrect route when departing his or her location.

Mitigation updated to include training process and extensive training provided to the travelers until they are ready to travel independently.

Text added to the Mitigation: Goal of the training process is to have failures occur and be resolved prior to real-world use. Destinations in the app are preprogrammed and should be safe so while the traveler may be at the wrong one it should be familiar and friendly to the user.

ID #73:

Risk: Traveler is lost and caregiver is not updated with the latest information of the traveler location.

Mitigation updated to include information only related to this risk.

Text deleted from the Mitigation: Work with the developer to restrict the permissions requested by the application to only what is necessary for functionality.

ID #74:

Risk: Traveler is focused on the phone, not his or her surroundings (distraction). If headphones are in use, may not hear traffic or roadway noise as needed.

Mitigation updated to different levels of training provided to the traveler and proficiency needed before traveling independently.

Mobility Assistance for People with Cognitive Disabilities - Annual Safety Review

Revised mitigation: Application includes visual and audio cues; Safety training, COTA transportation training, smartphone training and application training will be conducted with the participants before travelers can go out on the route. These trainings provided to the travelers discuss distraction due to their mobile phone. Travelers will also be required to take multiple quizzes through the training process until they have 80% proficiency.

ID #75:

Risk: Traveler leaves the phone in the transit vehicle when he or she departs.

mitigation reworded to include information related to training provided to the travelers to make them familiar to these situations.

Revised Mitigation: Safety training and COTA transportation training includes who and what to ask for help when lost getting to the destination (store worker, manager, police officer, COTA bus driver). For travelers with severe disabilities, coach may accompany the traveler on his or her trip until the traveler is able to travel independently.

ID #76:

Risk: Application cannot accommodate changes to route/vehicle (if a vehicle breaks down mid route, and a traveler must change buses).

Mitigation: Mitigation revised to include information about training that will be provided to the travelers on how to handle unfamiliar situations.

Text added: Traveler can contact the caregiver with any unfamiliar situations using "contact" button within the app. Safety training and COTA transportation training includes what and who to ask for help when lost getting to the destination (store worker, manager, police officer, COTA bus driver). A travel coach may be accompanied with the traveler until the traveler is able to travel independently.

ID #77:

Risk: Traveler's phone does not have enough battery to provide instructions throughout the entire trip.

Mitigation revised to include information on safety training provided to the travelers.

Revised Mitigation: Safety training provided to the traveler will include all the safety scenarios when leaving the house including checking the battery level and charging the phone overnight. Training also includes what and who to ask for help when lost getting to the destination (store worker, manager, police officer).

ID #80:

Risk: Non-Americans with Disabilities Act (ADA) compliant crosswalks or curb ramps, or no sidewalks in the step by step navigation.

Mitigation reworded to include how training provided to the travelers help them with these unfamiliar situations.

Text revised and added: A travel coach will be accompanied with the traveler until the traveler is able to travel independently.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Mobility Assistance for People with Cognitive Disabilities - Annual Safety Review

Name (please print)

Signature

Date

Source: City of Columbus

Table 4: Prenatal Trip Assistance

Prenatal Trip Assistance - Annual Safety Review	
Name of Reviewer: Andy Wolpert	Date of Review: 9-18-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Deployment Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect the below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes: Were there any new safety issues identified? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: The SMP has revisited anticipated safety risks and reevaluated ASIL scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. During the safety review, mitigation strategies were revised based on the input from the PTA project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy. Were there any mitigation strategies listed for identified safety issues modified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <u>If YES – Describe the issue and mitigation action:</u> <u>ID #82:</u> Risk: Trip scheduled by the prenatal traveler is cancelled and the prenatal traveler is not informed about the cancellation of her ride. Mitigation revised to include notifications provided to the traveler in these scenarios and automatic request for another ride.	

Prenatal Trip Assistance - Annual Safety Review

Revised Mitigation: The system will automatically request another ride for the traveler. The traveler will receive text or phone call about the new ride scheduled. The traveler can also schedule a ride through the call center or through the app and get a last-minute pickup.

ID #83:

Risk: Trip scheduled by the prenatal traveler for her doctor visit is late for the pickup.

Mitigation revised to remove information related to vendor responses and notifications received by the medical office in these situations.

Text deleted from the Mitigation: Notification to the medical office will be sent about the late arrival of the prenatal traveler. Check vendor responses.

ID #85:

Risk: Malicious functionality: Active monitoring of the traveler causes hacking of traveler account/activity.

Revised Mitigation: Application design restricts the permissions requested to only what is necessary for functionality. Development of the app along with the vendor will provide visibility and customization allowing for more exposure of code base and how it functions. Make only services available to the user that are related to this project. Vendor security documents lists the security measures for the data collected through this application. Smart Columbus DPP Section 5.3: Security Controls describes the standards that will be taken to protect and secure the confidentiality of PII collected.

ID #86:

Risk: Vulnerabilities for data transmission and storage.

Mitigation updated to include references for information on how data is collected and stored.

Text added to the Mitigation: All parties to collect, transmit and store PTA data have received the Data Management Plan (DMP) and DPP. Data is also governed in the Institutional Review Board (IRB) research study and Informed Consent Document.

ID #87:

Risk: When the prenatal traveler doesn't have access to a mobile phone and won't be updated when her ride back from the doctor visit is late or cancelled.

Mitigation revised to include training provided to the travelers.

Text deleted from the Mitigation: Training will be provided to the prenatal traveler how to react to different situations and how to contact call center when she does not have access to her mobile.

ID #88:

Risk: Pregnant woman feels more stressed while trying to use the app.

Mitigation updated to include information related to training provided to the travelers.

Text added to the Mitigation: User guide and training are provided for each participant. User guide is provided in paper form and is also available in app and on the web. Retraining is available for travelers.

ID #89:

Risk: The ride arrived for the prenatal traveler pickup is less user friendly and doesn't follow safety standards while driving the prenatal traveler.

Mitigation updated to include scheduling as needed when safety standards are not followed by the ride.

Prenatal Trip Assistance - Annual Safety Review

Text added to the Mitigation: Prenatal traveler will be able to cancel the ride at any point of time she feels unsafe and schedule a new ride. Prenatal traveler will be able to provide feedback for the ride. Mobility providers will also provide defensive driving course to the drivers.

ID #90:

Risk: Car seats are provided by vendor upon request and the car seat is not installed properly and the child is injured.

Mitigation revised to include information related to safety features and vendor user guide.

Revised Mitigation: Training will be provided to all the vendor drivers regarding all the safety features and driver will also be trained with different installation procedures for three different car seats that are provided as per the program. Car Seat User Guides, which includes installation procedure and troubleshooting, are also provided to the drivers as part of the training.

ID #91:

Risk: The car seats provided to the vendor might have bed bugs and lice.

Mitigation revised to include reference to vendor sanitation policy.

Revised Mitigation: Kaizen Interior Sanitation Policy is in place to ensure each stakeholder understands the service standards. Carriers (drivers) will ensure their vehicle(s), and any needed additional equipment, have been properly cleaned and sanitized prior to provided services. Appropriate cleaning solution and supplies will be provided to clean any unsanitary object(s), seat(s) or piece(s) of equipment.

ID #92:

Risk: Traveler enters incorrect destination when planning a trip.

Revised Mitigation: Application design restricts destinations to preapproved locations for selection. Training materials will also cover proper planning of a trip and reviewing information before booking. If wrong trip is executed, passenger can contact call center for assistance in planning an alternative and get a last-minute pickup.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

1.1.2. Pre-Installation Phase

For 2019 annual safety reviews, two Smart Columbus projects (Connected Electric Autonomous Vehicles (CEAV) and Smart Mobility Hubs (SMH)) were in pre-installation phase. **Table 5** and **Table 6** includes safety reviews conducted for each of the projects listed above that were in the pre-installation phase.

Table 5: Connected Electric Autonomous Vehicles

Connected Electric Autonomous Vehicles - Annual Safety Review	
Name of Reviewer: Jeff Kupko	Date of Review: 10-4-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Pre-Installation Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect the below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes: Were there any new safety issues identified? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: The SMP has revisited anticipated safety risks and reevaluated ASIL scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. During the safety review, mitigation strategies were revised based on the input from the CEAV project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, text included for mitigation strategies for each of the risks below only reflect the text that was added or deleted from the already identified mitigation strategy. Were there any mitigation strategies listed for identified safety issues modified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	

Connected Electric Autonomous Vehicles - Annual Safety Review

If **YES** – Describe the issue and recommended mitigation:

ID #25:

Risk statement is updated to include the AV operating speed. Changed the speed of AV from 35 mph to 15 mph.

Risk: Automated Vehicles (AVs) operating at low speed (slower than 15 mph) with vehicles at higher speeds (exceeding the posted speed limit).

No change in Mitigation for this risk

Mitigation: Traffic calming measures, speed enforcement, AV informational signage, and route design on the sections of roads that AVs will be operating will help with the speed control. Also work with the vendor to have CEAVs travel as close to the speed limit as the technology allows for safe operation.

ID #26:

Risk: Sudden stop of the AV because it encounters an unanticipated obstacle.

Mitigation updated to include signage installation and additional safety measures passengers can follow during these situations.

Text added to Mitigation: Passengers to hold onto rails. Signage installation on the routes about the AV operations will be installed.

ID #27:

Risk statement updated to say pedestrians instead of all VRUs.

Risk: Pedestrians go into the path of an oncoming AV.

Mitigation updated to included different testing methods and scenarios that will be tested before real time operation of CEAVs. Outreach information is also added to the mitigation.

Text added to Mitigation: CEAV Test Plan to cover all the test cases related to testing for reaction to VRUs. Testing will also include objects that are below knee height. Educating the public about the operation of AVs on roadways will be included as part of the outreach.

ID #28:

Risk: Passenger may not be fully boarded or alighted when AV begins to move.

Mitigation updated to include vendor user guide information in these scenarios.

Revised Mitigation: EasyMile User Guide ensures that the vehicle does not move until the door is fully shut and vehicle operator training will also emphasize to make sure the door is fully closed before initiating the stop departure; door sensors should be aware of complete closure. Operator will always be present when the AV is in operation and permits the vehicle to leave the station when passengers are fully boarded or alighted.

ID #30:

Risk: Passenger alighting may not accommodate an entire loading/unloading (for multi-passenger parties, ADA customers, etc.).

Mitigation updated to include vendor user guide information in these scenarios.

Revised Mitigation: EasyMile User Guide ensures that the vehicle does not move until the door is fully shut and vehicle operator training will also emphasize to make sure the door is fully closed before initiating the stop departure; door sensors should be aware of complete closure. Operator will always be present when the AV is in operation and permits the vehicle to leave the station when

Connected Electric Autonomous Vehicles - Annual Safety Review

passengers are fully boarded or alighted.

ID #31:

Risk: Slower speed and unpredictable operations of bike and scooter traffic, and any other shared mobility device along the AV route may cause dangerous interactions with the AV.

Mitigation revised to include testing scenarios used for CEAV before real time operations.

Revised Mitigation: Scooter is a new mode that may interact with an AV – testing for reaction to VRUs of all types will be thoroughly vetted. CEAV Test Plan to cover all of the test cases related to testing for reaction to VRUs. Testing will also include objects that are below knee height. Operator will be present at all times when the AV is in operations and Operator training will include measures to handle operating the vehicle during these situations.

ID #32:

Risk: Stopped operation of an AV could create an impediment in the roadway.

Mitigation revised to include vendor user guide information in these scenarios and testing that will be performed.

Revised Mitigation: SOP and EasyMile User Guide will cover training for first responders and CEAV operators on how to handle emergency situations. Operator will always be present when the AV is in operation. Operator training should include measures to handle operating the vehicle as it makes a sudden stop for any maintenance reasons. Testing for this risk will be performed under closed course to minimize interaction with public. Hazard lights initiated for programmed stops before stopping. Outreach will be conducted to communities with route information and vehicle operations.

ID #33:

Risk: An AV operating in manual mode and the operator may not notice Vulnerable Road Users (VRUs) (bikes, scooters and pedestrians) taking advantage of the AV.

Mitigation updated to include other safety measures that will be taken when vehicle is operating in manual mode.

Text added to Mitigation: Safety chain will be active even when the vehicle is in manual mode. This information is contained in the EasyMile User Guide.

ID #34:

Risk: There is a danger of the public taking advantage of (or having a false sense of security around) AV safety protocols and slow down operations.

Mitigation revised to include vendor user guide information.

Revised Mitigation: SOP, education and outreach will be implemented throughout the operational period of the AVs. The EasyMile User Guide will cover this aspect for the operators of the shuttles.

ID #35:

Risk: Latency and high network traffic creating issues/problems in connectivity/communications with other road users and infrastructure.

Mitigation updated to include CEAV route specifications and CV messages.

Text added to Mitigation: Shuttle route does not cross any signalized intersections so the vehicle will only be receiving SPaT messages, not using them for navigational purposes.

ID #36:

Risk: No certification, testing, and rating systems for safe pre-deployment evaluation methods for these shuttles currently exist.

Connected Electric Autonomous Vehicles - Annual Safety Review

Mitigation updated to include projects that will be referred for this project.

Text added to Mitigation: The CEAV Test plan for the Scioto Mile deployed in Columbus, OH and MnDOT Autonomous Bus Pilot Project deployments will be referred to before deploying CEAVs in the Linden area.

ID #37:

Risk: CEAV operator not trained to handle emergency or real-time situations.

Mitigation revised to include training provided to the CEAV operators.

Revised Mitigation: Training and certification for AV operator included in the EasyMile User Guide. Training includes how to handle emergency situations. Training will be thorough and precise to handle the situations. Operators will be trained before they start operating CEAV.

ID #38:

Risk: CEAV operator is distracted and unable to handle emergency or real-time situations.

Mitigation revised to include training provided to the CEAV operators.

Revised Mitigation: Operator training and operating procedures will account for potential vehicle operator distraction. These guidelines will also be addressed in the SOP and EasyMile User Guide. Training includes proper operation of the vehicle which leaves no free handles to use a cell phone.

ID #39:

Risk: Road conditions and construction projects (lane closures, lane assignment, detours) may affect the CEAV route impacting the AV’s ability to understand current roadway assignment.

Mitigation updated to include vendor user guide training information that will be provided to the operators.

Text added to Mitigation: EasyMile User Guide provides guidance on CEAV operations on route with road closures and detours. Manual operating speed is much slower than programmed speed of roads.

ID #41:

Risk: Law enforcement and emergency responders not trained to handle emergency situations with the AVs.

Mitigation updated to include outreach information to emergency responders.

Text added to Mitigation: CEAV communications and outreach plan will include training of emergency responders before deploying CEAVs in the Linden area.

ID #42:

Risk: Flat tire or some kind of AV maintenance failure that a non-AV can experience.

Mitigation revised to include vendor training that will be provided to the CEAV operators.

Revised Mitigation: Operator should always be monitoring vehicle response to surroundings, and the training will include how to react to different situations. Operator will also be trained to intervene in vehicle operations as necessary. Daily maintenance checks will also occur.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

Connected Electric Autonomous Vehicles - Annual Safety Review

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

Table 6: Smart Mobility Hubs

Smart Mobility Hubs - Annual Safety Review	
Name of Reviewer: Jeff Kupko	Date of Review: 9-23-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Pre-Installation Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect the below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes:	
Were there any new safety issues identified? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
<u>If YES – Describe the issue:</u> N/A	
<u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes:	
Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
<u>If YES – Describe the issue:</u> N/A	
<u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes:	
The SMP has revisited anticipated safety risks and reevaluated ASIL scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project.	
During the safety review, mitigation strategies were revised based on the input from the SMH project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, text included for mitigation strategies for each of the risks below only reflect the text that was added or deleted from the already identified mitigation strategy.	
Were there any mitigation strategies listed for identified safety issues modified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
<u>If YES – Describe the issue and recommended mitigation:</u>	
<u>ID #45:</u>	
Risk: Over activation of call button (false alarms).	
Mitigation updated to remove unrelated references for kiosk information.	
Text deleted from the Mitigation: Information about the kiosks will also be available in the Smart	

Smart Mobility Hubs - Annual Safety Review

Columbus website. In any emergency the travelers are requested to call 911.

ID #46:

Risk: Responding late to the emergency calls from the hub location.

Mitigation revised about stakeholders that will be used for safety information around the SMH locations.

Revised Mitigation: Voice over IP channel is opened with the emergency dispatch during the time the passenger is waiting for help to arrive. Capital Crossroads shares safety information with stakeholders affecting the area.

ID #47:

Risk: Emergency call button does not respond at the mobility hubs.

Mitigation updated to include references to location where users can find more information about the amenities provided at the SMH sites.

Text added to the Mitigation: Timing and parameters to the test will be discussed in the Operations and Maintenance (O&M) plan which will be drafted and posted on the Smart Columbus website. Passengers can also call 911 through their phone in an emergency situation.

ID #48:

Risk: Transit delay at the hub locations.

Mitigation revised to include other options for help in an emergency.

Revised Mitigation: Kiosk should be able to offer alternate transportation options including calling taxi or other transportation. Camera and emergency call button available for passengers to alert officials in an emergency situation when waiting for the ride. Passengers can also call 911 through their phone.

ID #49:

Risk: Additional modes of transportation and increased passenger traffic may result in higher conflict interactions (motor vehicle to motor vehicle).

Mitigation updated to include communication and outreach information.

Text added to the Mitigation: Educate the public with all the services provided at the hub location. Communications, strategies, and content will be finalized before the hubs are open to the public.

ID #50:

Risk: Additional modes of transportation and increased pedestrian traffic may result in higher conflict interactions (motor vehicle to VRU).

Mitigation updated to include communication and outreach information.

Text added to the Mitigation: Educate the public with all the services provided at the hub location. Communications, strategies, and content will be finalized before the hubs are open to the public.

ID #51:

Risk: Additional modes of transportation and increased pedestrian traffic may result in higher conflict interactions (VRU to VRU).

Mitigation updated to include communication and outreach information.

Text added to the Mitigation: Educate the public with all the services provided at the hub location. Communications, strategies and content will be finalized before the hubs are open to the public.

Smart Mobility Hubs - Annual Safety Review

ID #52:

Risk: Unattended devices (like scooters, bikes) left on site blocking ramp and can pose tripping hazard.

Mitigation updated to include other options that will be available to park bikes and scooters.

Text added to the Mitigation: Traditional bike racks and CoGo bike racks are also accessible at the hub sites. The agreements between the property owners and mobility providers will outline asset management responsibilities.

ID #53:

Risk: Planned maintenance mode occurs when the system is operating in Backup mode to restore, repair, or replace system components.

Mitigation updated to include identification of the no-fail architecture design.

Revised Mitigation: These are planned events. Architecture is a no-fail system and updates occur during off-peak hours to minimally impact users. Regular updates occur with minimal interruption.

ID #54:

Risk: Failure mode of the kiosk resulting in the complete systemic disruption of the user’s ability to plan or complete the trip.

Mitigation revised to include up-to-date information of what is available at the SMH sites.

Text deleted from the Mitigation: SMH Site will be able to offer alternate transportation options for calling taxi or other transport.

ID #56:

Risk: Passenger at St. Stephens cannot access kiosk (off hours – lobby locked).

Mitigation updated to include outreach information about the lobby hours.

Text added to Mitigation: Outreach plan will include the lobby hours that can be posted by the building. When the need for trip assistance outside the business hours at the lobby, a customer care number could be posted on the SMH signage that will redirect to the pivot app.

ID #57:

Risk: Planned travel modes are not readily available to users within a reasonable amount of time as shown by the kiosks.

Mitigation updated to include mitigation that are relevant to this risk.

Text deleted: Emergency call button available for passengers.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If **YES** – What was the issue identified? N/A

If **YES** – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)	Signature	Date
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Source: City of Columbus

1.1.3. Design Phase

For 2019 annual safety reviews, two Smart Columbus projects (Connected Vehicle Environment (CVE), and Event Parking Management (EPM)) were in design phase. **Table 7** through **Table 8** includes safety reviews conducted for each of the projects listed above that were in the design phase.

Table 7: Connected Vehicle Environment

Connected Vehicle Environment - Annual Safety Review	
Name of Reviewer: Ryan Bollo	Date of Review: 9-17-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Design Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review: Revision: April 2019 - Quarterly Submission Date: 4-1-2019	
Version of the Risk Assessment that reflect below changes: Revision: Safety Management Plan – Final Report Date: 11-7-2019	
Review Notes: The SMP has revisited anticipated safety risks and reevaluated Automotive Safety Integrity Level (ASIL) scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. Below listed are the new risks that were identified during the design phase of the project by the project team. Were there any new safety issues identified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <u>If YES – Describe the issue and the recommended mitigation action:</u> <u>ID #24:</u> Risk: Signal changed to flash mode either manually or due to cabinet error and is not communicated to RSUs. Mitigation: Vehicle operator training to include awareness to these unusual situations. However, these are warning systems only and the vehicle operator is still in control of the vehicle and must assess the situation and react appropriately.	
Review Notes: Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO <u>If YES – Describe the issue:</u> N/A <u>If YES – Describe recommended mitigation action:</u> N/A	
Review Notes: During the safety review, mitigation strategies were revised based on the input from the Operating System	

Connected Vehicle Environment - Annual Safety Review

project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy.

Were there any mitigation strategies listed for identified safety issues modified?

(please select one) YES NO

If YES – Describe the issue and the mitigation action:

ID #5:

Risk: The CVE system is hacked into and unauthorized personnel have access to traffic control system.

Mitigation updated to include information about RSUs and CVE network location.

Text added to the Mitigation: RSUs will also have access control. CVE network will reside outside of traffic signal system.

ID #6:

Risk: The CVE system is hacked into and unauthorized personnel have access to the data.

Mitigation updated to include references to process and standards followed to protect data collected and stored.

Text added to the Mitigation: Smart Columbus DPP Chapter 5: Security Controls describes in detail how PII collected will be stored and protected and the steps that will be taken when there is a data breach.

ID #7:

Risk: OBU is hacked and provides false warnings to the driver.

Mitigation updated regarding able to block malicious actors and instructions that will be included in the Informed Consent Document.

Text deleted from the Mitigation: SCMS will protect block malicious actors. Informed Consent Document lays out operator control as primary.

ID #8:

Risk: Vehicle operator gets distracted by the device information or gets confused with the warnings given by the CV.

Mitigation updated to include vendor information and the type and frequency of the alerts provided to the traveler.

Text added to the Mitigation: Siemens and Brandmotion will coordinate with the COC with the frequency and type of alerts that will be received by the driver. Human Machine Interface (HMI) for private vehicles is Head-Up Display (HUD) which is designed to keep eyes on the road.

ID #9:

Risk: Miscommunication between the Road-side Unit (RSU) and OBU because of radio interference issues, reduced power, capacity exceeded, or occlusion.

Mitigation revised to include only information related to this risk.

Text deleted from the Mitigation: CEAV will alert Operator if signal confirmation is not received.

ID #10:

Risk: Vehicle position not as accurate as needed for the successful operation of the application.

Connected Vehicle Environment - Annual Safety Review

Mitigation updated related to alternate approaches that will be considered to provide accurate vehicle position information

Text deleted from the Mitigation: alternate approaches can be considered to the extent feasible.

ID #11:

Risk: Incorrect information (MAP not updated) provided to the equipped vehicles concerning lane assignment and function.

References added to the mitigation about updating MAP policies.

Text added to the Mitigation: MAP update policies will be included in the O&M plan.

ID #13:

Risk: Miscommunication of the device due to improper installation (for example, antenna position) causes incorrect/inaccurate warnings to the vehicle operator.

Mitigation revised to include quality checks that will be performed and verified before vehicles are operated in real-time.

Text added to the Mitigation: Device and installation checklist will be completed before the vehicle is operated in real-time. Installation manager verifies the completion of checklist and completed checklist is archived.

ID #14:

Risk: System power outage and RSU does not send or receive the necessary information to the operator.

Mitigation revised related to backup power supplies to signals and updated to include the health monitoring system that will be available.

Text added to the Mitigation: Kapsch health monitoring system will be available. RSUs will be communicating with one other and can identify if there is a disconnect with other RSUs.

ID #15:

Risk: Device installed in the vehicle becomes in-operable (e.g. tampering, not installed properly).

Mitigation revised to include quality checks that will be performed and verified before vehicles are operated in real-time.

Text added to the Mitigation: Device calibration and installation checklist will be completed before the vehicle is operated in real-time. Installation managers verifies the completion of checklist and completed checklist is archived.

ID #16:

Risk: Vehicle operator lacks sufficient training to adequately understand and interpret alerts.

Mitigation updated to include vendor information and the type and frequency of the alerts provided to the traveler.

Text added to the Mitigation: Vehicle Operators will receive training both in person and through videos based on the vehicle types. Siemens and Brandmotion will coordinate with COC with the frequency and type of alerts that will be received by the drivers. Newsletters will be provided to the vehicle operator throughout the deployment period.

ID #18:

Risk: Important safety/warning messages given by the system ignored by the operator (due to number of alerts, etc.)

Connected Vehicle Environment - Annual Safety Review

Mitigation updated to include vendor information and the type and frequency of the alerts provided to the traveler.

Text added to the Mitigation: Siemens and Brandmotion will coordinate with COC with the frequency and type of alerts that will be received by the drivers. The project team will have training types (training videos and in person training) based on the driver type (Light Duty Vehicles (LDV) and preemption) and the videos will be provided to the fleet operators through the training gateway.

ID #20:

Risk: Time of the school zone is wrong in the system and the device does not give accurate warnings.

Mitigation updated on how school zone timing information will feed into CVE system.

Text added to the Mitigation: School Zone warning is a cloud hosted system. The data of the school zone timings will be live and will automatically provide current signal timings to the CVE system.

ID #22:

Risk: A misconception by the participant results in the participant believing the system takes control of the vehicle in case of a hazard.

Mitigation updated to include outreach efforts.

Text added to the Mitigation: Marketing and recruiting materials will include this information and will be conveyed to the participant during the training process.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If YES – What was the issue identified? N/A

If YES – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

Table 8: Event Parking Management

Event Parking Management - Annual Safety Review	
Name of Reviewer: Ryan Bollo	Date of Review: 10-7-2019
What type of review was it? (Deployment Review, Pre-Installation Review, Pre-Deployment Review, Design Review, etc.) Design Review	
Purpose of the review: (Annual Safety Review, Periodic/Random Check, Post-Incident Review etc.) Annual Safety Review	
Version of the Risk Assessment that was used during the review:	
Revision: April 2019 - Quarterly Submission	Date: 4-1-2019
Version of the Risk Assessment that reflect the below changes:	
Revision: Safety Management Plan – Final Report	Date: 11-7-2019
Review Notes:	
<p>The SMP has revisited anticipated safety risks and reevaluated Automotive Safety Integrity Level (ASIL) scores and mitigation strategies to reflect more up-to-date understanding of potential safety difficulties and strategies based on the vendors selected to deploy the project. Below listed are the new risks that were identified during the pre-deployment and deployment phase of the project by the project team.</p> <p>Were there any new safety issues identified? (please select one) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p><u>If YES – Describe the issue and recommended mitigation action:</u></p> <p><u>ID #94:</u> Risk: Driver distraction when navigating to the parking spot through the app. Mitigation: The app should not cause a risk to the drivers. The application developed shall be able to send the destination to a driver’s preferred navigation app. All interactions should only be for stopped vehicles.</p> <p><u>ID #97:</u> Risk: Driver not able to access his/her car when parked in a garage after garage operation hours. Mitigation: Traveler will be presented with the terms of service before he or she starts using the app. Traveler will be responsible for any actions related to parking his or her car. Traveler will be responsible to check the hours and other information about the parking space. ParkMobile will have information about the parking operations in the app. Towing information will also posted at the parking facility.</p>	
Review Notes:	
<p>Were there any safety issues identified as obsolete? (please select one) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p><u>If YES – Describe the issue:</u> N/A</p> <p><u>If YES – Describe recommended mitigation action:</u> N/A</p>	
Review Notes:	
During the safety review, mitigation strategies were revised based on the input from the Operating System	

Event Parking Management - Annual Safety Review

project team. Only the risks and mitigation strategies that were modified during the safety review meeting are listed below. Also, below listed text for mitigation strategies for each of the risks only reflect the text that was added or deleted from the already identified mitigation strategy.

Were there any mitigation strategies listed for identified safety issues modified?

(please select one) YES NO

If YES – Describe the issue and mitigation actions:

ID #93:

Risk: Driver distraction from paying attention to the app while driving to find the parking location.

Revised Mitigation: The app should not cause a risk to the drivers. All interactions should only be for stopped vehicles.

ID #95:

Risk: Malicious functionality: active monitoring of the traveler causes hacking of traveler account/activity.

Revised Mitigation: Application design restricts the permissions requested only what is necessary for functionality. Development of the app along with vendor will provide visibility and customization allowing for more exposure of code base and how it functions. Make only services available to the user that are related to this project. Vendor security documents lists the security measures for the data collected through this application. Smart Columbus DPP Section 5.3: Security Controls describes the standards that will be taken to protect and secure the confidentiality of PII collected. ParkMobile is also a PCI Level 1 vendor.

ID #96:

Risk: Vulnerabilities for data transmission and storage.

Mitigation revised to include references to process and standards followed to protect the data collected and vendor being PCI compliant.

Text added to the Mitigation: Smart Columbus DPP Section 5.3: Security Controls describes the standards that will be taken to protect and secure the confidentiality of PII collected. ParkMobile is also a PCI Level 1 vendor.

Were any new safety issues identified that should be included on the risk register for future reviews? (please select one) YES NO

If YES – What was the issue identified? N/A

If YES – Has the Safety Manager been contacted to include the risk? N/A

(please select one) YES NO

Name (please print)

Signature

Date

Source: City of Columbus

Appendix A. Safety Review Agendas

A.1 AGENDA FOR PROJECTS IN DEPLOYMENT PHASE

For 2019 annual safety reviews, for the projects that are in the deployment phase, the agenda below was used for the safety review meeting. Four Smart Columbus projects (MAPCD, PTA, OS and MMTPA) were in deployment phase.

- Walkthrough of each risk and mitigation strategy listed in the SMP (prioritize the risks with higher ASIL scores)
 1. Identify risks and mitigation strategies that are obsolete (closed or resolved).
 2. Identify changes to the mitigation strategies (additional strategies planned/implemented, changes and/or additions to policies, procedures, training etc., strategies removed or classified as obsolete).
 3. Identify new risks and mitigation strategies.
 4. Identifying/referencing where policies are documented.
- Verification that safety requirements (mitigation strategies) are carried through as-built documents
 1. Design (engineering documentation: System Requirements and Specifications (SyRS), Interface Control Document (ICD) and System Design Document (SDD)).
 2. Installation documents.
 3. Testing (including test plan/requirements test matrix, Requirements Traceability Matrix).
 4. Policies/procedures such as end user agreements, recruiting materials, research protocol, user training materials
 - Including validation that user training (where specified) is planned or has been conducted and is listed under mitigation strategies
- Operations and Maintenance Plan
 1. Ensure all safety related practices are put into effect. This would include training and inspections.
 2. Monitor any anomalies, near-misses, or crashes that occur.
 - Each project team will also identify certain staff to ensure that the elements of the risk response plan are implemented and documented.
 - Periodic equipment, software, and process checks during operation.
 - Reporting and follow up procedures for near-misses or events
 3. Verification of safety requirements performed and documented as part of the SyRS check list of requirements.
 4. Establish processes/procedures and communicate to project teams and stakeholders.
- Update Risk Assessment spreadsheet
- Verify new requirements/ policies/procedures are carried through as-built documents.

- Complete safety review template for the reviewed project.
- Other action items identified during the review meeting

A.2 AGENDA FOR PROJECTS IN PRE-INSTALLATION PHASE

For 2019 annual safety reviews, for the projects that are in the pre-installation phase, the agenda below was used for the safety review meeting. Two Smart Columbus projects (CEAV and SMH) were in pre-installation phase.

- Walkthrough of each risk and mitigation strategy listed in the SMP (prioritize the risks with higher ASIL scores)
 1. Identify risks and mitigation strategies that are obsolete (closed or resolved).
 2. Identify new risks and mitigation strategies.
 3. Identify areas for improvement.
 - Identify changes to the mitigation strategies (additional strategies planned/implemented, changes and/or additions to policies, procedures, training etc., strategies removed or classified as obsolete).
- Verification that safety requirements (mitigation strategies) are carried through
 1. Procurement Specs (Request for Proposals and/or contracts)
 2. Device certification
 3. Design (engineering documentation: SyRS, ICD and SDD)
 4. Installation documents
 5. Testing (including test plan)
- Operations and Maintenance Plan
 1. Ensure all safety related practices are put into effect. This would include training and inspections.
 2. Monitor any anomalies, near-misses, or crashes that occur.
 - Each project team will also identify certain staff to ensure that the elements of the risk response plan are implemented and documented.
 - Periodic equipment, software, and process checks during operation.
 - Reporting and follow up procedures for near-misses or events
 3. Verification of safety requirements performed and documented as part of the SyRS check list of requirements.
 4. Establish processes/procedures and communicate to project teams and stakeholders.
- Update Risk Assessment spreadsheet
- Verify new requirements/ policies/procedures are carried through as-built documents.
- Complete safety review template for the reviewed project.
- Other action items identified during the review meeting

A.3 AGENDA FOR PROJECTS IN DESIGN PHASE

For 2019 annual safety reviews, for the projects that are in the design phase, the agenda below was used for the safety review meeting. Three Smart Columbus projects (CPS, CVE and EPM) were in design phase.

- Review each risk and mitigation strategy listed in the SMP (prioritize the risks with higher ASIL scores)
 1. Identify new risks and/or mitigation strategies
 2. Identify areas for improvement.
 - Identify changes to the mitigation strategies (additional strategies planned/implemented, changes and/or additions to policies, procedures, training etc., strategies removed or classified as obsolete).
- Verify that safety management requirements are carried through
 1. Design (engineering documentation: SyRS, ICD and SDD).
 2. Test Plan
 3. Procurement specs
- Update Risk Assessment spreadsheet
- Verify new requirements/policies/procedures are carried through engineering documents.
- Complete safety review template for the reviewed project.
- Other action items identified during the review meeting.

Appendix B. Acronyms

Table 9 contains project specific acronyms used throughout this document.

Table 9: Acronym List

Abbreviation/Acronym	Definition
ADA	Americans with Disabilities Act
ASIL	Automotive Safety Integrity Level
AV	Automated Vehicle
CEAV	Connected Electric Autonomous Vehicles
COC	City of Columbus
ConOps	Concept of Operations
COTA	Central Ohio Transit Authority
CPS	Common Payment System
CV	Connected Vehicle
CVE	Connected Vehicle Environment
DMP	Data Management Plan for the Smart Columbus Demonstration Program
DPP	Data Privacy Plan for the Smart Columbus Demonstration Program
EPM	Event Parking Management
FMLM	First Mile/Last Mile
GPS	Global Positioning System
HMI	Human Machine Interface
HUD	Heads Up Display
ICD	Interface Control Document
ICE	In Case of Emergency
IRB	Institutional Review Board
LDV	Light Duty Vehicles
MAPCD	Mobility Assistance for People with Cognitive Disabilities
MMPA	Multimodal Trip Planning Application
OBU	On-board Unit
Operating System	Smart Columbus Operating System
O&M	Operations and Maintenance
PCI	Payment Card Industry
PHI	Protected Health Information

Appendix A. Safety Review Agendas

Abbreviation/Acronym	Definition
PII	Personally Identifiable Information
PTA	Prenatal Trip Assistance
PMO	Program Management Office
RCTM	Radio Technical Commission for Maritime Services
RSU	Roadside Unit
SCMS	Security Credential Management System
SDD	System Design Document
SMH	Smart Mobility Hub
SMP	Safety Management Plan
SOP	Standard Operating Procedures
SyRS	System Requirements and Specifications
TMC	Traffic Management Center
VRU	Vulnerable Road User

Source: City of Columbus



THE CITY OF
COLUMBUS^{*}
ANDREW J. GINTHER, MAYOR