MOD

MOBILITY ON DEMAND

MOBILITY ON DEMAND (MOD) SANDBOX DEMONSTRATIONS INDEPENDENT EVALUATION (IE)

LOS ANGELES COUNTY AND PUGET SOUND MOD FIRST AND LAST MILE PARTNERSHIP WITH VIA EVALUATION PLAN

U.S. Department of Transportation
Federal Transit Administration | ITS Joint Program Office

Front Cover Image: Via, December 2018

Produced by Booz Allen Hamilton
U.S. Department of Transportation
Federal Transit Administration
Office of the Assistant Secretary for Research and Technology, Intelligent Transportation Systems Joint Program Office

Notice

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA-JPO-18-698		

4. Title and Subtitle	5. Report Date
Mobility on Demand (MOD) Sandbox Demonstrations Independent Evaluation (IE) - Los Angeles County and Puget Sound MOD First and Last Mile Partnership With Via Evaluation Plan	December 2018
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Gustave Cordahi, Susan Shaheen, Elliot Martin, Mikaela Hoffman-Stapleton	

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Booz Allen Hamilton 8283 Greensboro Drive McLean, VA 22102 Transportation Sustainability Research Center - UC Berkeley 2150 Allston Way #280 Berkeley, CA 94704	11. Contract or Grant No. DTFH61-12-D-00041

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
U.S. Department of Transportation Federal Transit Administration Office of the Assistant Secretary for Research and Technology, ITS Joint Program Office 1200 New Jersey Avenue, SE Washington, DC 20590	Final Report
	14. Sponsoring Agency Code

15. Supplementary Notes

Steven Mortensen, FTA Task Manager
Robert Sheehan, ITS JPO Task Manager

16. Abstract

The Mobility on Demand (MOD) Sandbox Demonstration Program provides a venue through which integrated MOD concepts and solutions – supported through local partnerships – are demonstrated in real-world settings. For each of the 11 MOD Sandbox Demonstration projects, the MOD Sandbox Independent Evaluation includes an analysis of project impacts from performance measures provided by the project partners, as well as an assessment of the business models used.

This report constitutes the Evaluation Plan for the Los Angeles County and Puget Sound MOD First and Last Mile Partnership Demonstration Sandbox project. It includes the following chapters: project overview; evaluation approach and process; evaluation schedule and management; and data collection and analysis plan.

17. Keywords	18. Distribution Statement
Mobility on demand, MOD, sandbox, shared mobility, mobility as a service, independent evaluation, transit	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
		64	

Table of Contents

List of Tables

List of Figures

Chapter 1. Project Overview

This chapter gives a brief introduction to the Los Angeles County and Puget Sound (PS) Mobility on Demand (MOD) Sandbox project that will be evaluated through this independent evaluation (IE).

Introduction

This pilot is a joint project between the Los Angeles County Metropolitan Transportation Authority (LA Metro), the lead applicant, and King County Metro (KCM) and Sound Transit (ST) in the PS region. Both regions are implementing major transit expansions and are interested in improving options for people to access regional transit.

Project Scope

Through a partnership-driven approach, LA Metro, KCM, ST, and Via (an on-demand transportation network company or TNC) will work together to develop, deploy, and analyze two analogous pilot programs designed to test the viability of transit agency-TNC partnerships to deliver equitable first- and last-mile access to the transit network.

Three transit stations were selected in the Los Angeles region, and four stations were selected in the PS region for the pilot. Pilot locations were selected with strong consideration for equity, geographic diversity, current first and last mile access, potential trip generators, operational density, and current available transit service. Areas were also evaluated to determine where there is currently untapped demand, such as employment centers that are challenging to reach with the existing network.

Upon pilot launch, customers will be able to request subsidized Via rides to or from the participating transit stations, within a specified radius of the transit station during specified times of the day. In the Los Angeles region, the selected stations are North Hollywood (Red Line Station in the City of Los Angeles), El Monte (Silver Line Station in the City of El Monte), and Artesia (Blue Line Station in the City of Compton). In the PS region, the selected stations are Tukwila International Boulevard Station, Othello Station, Columbia City Station, and Mount Baker Station (Link Right Rail Stations). The service will operate within defined regions around each station. The service areas were determined to ensure that each area's unique mobility circumstances were properly considered. Time periods in which the subsidy will be available will be determined on an agency-by-agency basis, determined based on project goals and available budget.

In Los Angeles, TAP is the regional payment system that allows customers to add value to transit, pay for bikeshare, and eventually pay for parking. In the Los Angeles pilot, there will be a "lite-TAP integration," which will allow customers to input their TAP card number when registering for a Via account to receive $2 off each Via ride, although they will not actually be paying with their TAP card. Instead, customers will book and pay for their Via rides through the Via app, which will require them to enter a credit card or pre-paid debit card. Although this pilot will not have full integration with TAP, it will still incentivize customers to use TAP based on the fare policy structure, noting that it is not required. In the PS pilot, there will be full integration with ORCA, the regional payment system in the PS area. Each Via vehicle will be equipped with an ORCA reader, allowing customers to pay for their Via rides with their ORCA cards.

Customers will use the Via app to book rides, and those without ORCA cards will also use it to pay for the service. In both regions, there will be a telephone dispatch service operated by Via that allows customers without a smartphone (or access to the Via app) to register for accounts, book and pay for Via rides. In both regions, the marketing and communications teams will aggressively disseminate information about ways in which to access the Via service for those who do not have access to credit cards or debit cards, such as pre-paid gift cards.

In Los Angeles County, Via will subcontract with a wheelchair accessible vehicle (WAV) provider that will be able to dispatch WAVs per customers' requests if there are not enough WAVs operating on the Via platform. In the PS, Via will provide WAVs as part of the vehicle fleet. Customers will have the option of requesting these services within the Via app or telephone dispatch service.

Key Partners

The Los Angeles County and PS project teams are partnering with Via. LA Metro will serve as the lead in Los Angeles. Supporting operators in Los Angeles include the Los Angeles Department of Transportation (LADOT), Foothill Transit, and Access Services.

The Central Puget Sound Regional Transit Authority (Sound Transit or ST) and the King County Metro and Community Transit (KCM) will serve as the co-leads in the Seattle Metropolitan region.

Project Timeline

The main project milestones are captured in the timeline below. Note that the timeline of the evaluation is provided in a later chapter of this report. The demonstration start and end dates depict the period over which demonstration data collection is expected to take place. This data would be shared with the IE team for evaluation purposes.

1. **February 10th, 2017** – Agreement Execution Date with the USDOT
2. **January 2019** – Field Demonstration Starts (LA)/Begin Data Collection/Before Survey Launch (Before-After Design)
3. **April 2019** – Field Demonstration Starts (PS)
4. **June 2019** – Preliminary and Interim Analysis
5. **November 2019** – After Survey Launch and Conduct Interviews
6. **January 2020** – Field Demonstration Ends/Complete Data Collection
7. **March 2020** – Final Data Analysis/Complete Independent Evaluation
8. **April 2020** – Expert Interview Summary/Complete IE Reporting and Data Submission to the USDOT.

The Los Angeles County and PS team will collect data relevant to this MOD Sandbox demonstration (as outlined in this evaluation plan) between January 2019 to January 2020, and will share the data with the IE team for conducting the evaluation. More details on the data collection planning are provided in Chapters 3 and 4 of this report.

Chapter 2. Evaluation Approach and Process

For each of the 11 MOD Sandbox projects, the IE team developed an evaluation framework in coordination with each project team—the framework is a project-specific logic model that contains the following entries:

1. **MOD Sandbox Project** – Denotes the specific MOD Sandbox project.
2. **Project Goals** – Denotes each of the project goals for the specific MOD Sandbox project. The project goals capture what each MOD Sandbox project is trying to achieve.
3. **Evaluation Hypothesis** – Denotes each of the evaluation hypotheses for the specific MOD Sandbox project. The evaluation hypotheses flow from the project-specific goals.
4. **Performance Metric** – Denotes the performance metrics used to measure impact in line with the evaluation hypotheses for the specific MOD Sandbox project.
5. **Data Types, Elements, and Sources** – Denotes the data types, elements, and the data sources used for the identified performance metrics.
6. **Method of Evaluation** – Denotes the quantitative and qualitative evaluation methods used.

This chapter details the evaluation approach and process, as finalized in the evaluation logic model for the Los Angeles County/PS MOD Sandbox project. This includes listing project goals, evaluation hypotheses, performance metrics, data types, elements and sources, and methods of evaluation.

Project Goals

The project goals denote what Los Angeles County/PS aims to achieve through the MOD Sandbox demonstration. These project goals include the following:

1. Expand mobility in both regions
2. Promote equitable mobility benefits across all populations
3. Expand number of unique users of public transit and increase overall ridership
4. Increase access to transit stations
5. Increase egress from transit stations
6. Preserve or enhance the environment
7. Reduce congestion from personal vehicles
8. Improve mobility for persons with disabilities
9. Comply with ADA equivalent level of service requirements
10. Ensure travelers feel safe on public transit and at public transit facilities

11. Improve cost efficiency of access to, and egress from transit
12. Improve accessibility for all populations
13. Improve level of service per user cost
14. Produce lessons learned through stakeholder interviews
15. Build institutional relationships and systems that can be applied to other transit operators.

The project goals set the foundation for the evaluation hypotheses.

Evaluation Hypotheses

The evaluation hypotheses flow from the project-specific goals and denote what should happen if each project goal is met. They generally apply to the selected transit stops in the specific demonstration areas in both regions. These evaluation hypotheses include the following:

1. Mobility in both the Los Angeles and PS regions will increase as a result of this new service.
2. (a) Users who previously did not have access to TNCs for first-mile/last-mile (FMLM) trips will now have access to Via to complete FMLM trips.

   (b) Integration of Via into the ORCA card will increase its use among: 1) low-income populations, 2) populations without banking/credit-card accounts, 3) minority populations.
3. Number of public transit users in both regions will increase as this new service will create more options for riders, specifically for FMLM.
4. At the selected transit stops, the availability of the new service TO a transit station will increase transit ridership for that system.
5. At the selected transit stops, the availability of the new service FROM a transit station will increase transit ridership for that system.
6. The availability of the new service will decrease fuel consumption and greenhouse gas (GHG) emissions associated with the customers using the service.
7. The availability of the new service will decrease congestion from personal (non-TNC) vehicles.
8. Mobility for persons with disabilities will be improved due to WAVs through the Via platform.
9. FMLM service to passengers with disabilities is equivalent to that provided to passengers without disabilities.
10. Riders will have a safer option to and from the station as a result of Via.
11. Subsidies per rider on Via are lower than the subsidies provided on other FMLM options.
12. The average distance and geographic spread of travel to and from selected stations will be larger than prior to the project.
13. The average minutes per dollar spent to access and egress the station will decline among all users.
14. The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.
15. The project produces a series of lessons learned with respect to institutional relationships and systems that can be applied to other transit operators.

Performance Metrics

The performance metrics are used to measure impact in the specific demonstration areas in line with the evaluation hypotheses for the Los Angeles County/PS IE. These performance metrics include the following[1]:

- Distribution of travel times of all users to and from selected pilot stations
- Distribution of wait times of all users traveling to and from selected pilot stations
- Distribution of travel time reliability (the variance of the travel velocity)
- Number of low-income people who previously did not have access to TNCs as a FMLM option
- Number of low-income people who now use the service
- Number of people without a smartphone (among the pilot participants)
- Number of people without a smartphone who now use the service (among the pilot participants)
- Number of Via trips conducted by underserved populations through the use of ORCA
- Count of unique public transit users
- Count of unlinked trips at selected stations
- Rider survey response to questions probing impact that subsidized Via rides had on their ability to access transit stations
- Rider survey response to questions probing impact that subsidized Via rides had on their ability to egress from transit stations
- CO2 emissions from MOD per person vs CO2 tail pipe emissions from single occupant vehicle (SOV) per person
- Change in fuel consumption and GHGs resulting from shift in behavior as a result of the program per person and in aggregate
- Comparison of total travel distance by vehicle by hour for Via vehicles and for SOV alternative
- Comparison of distributions of WAV trip times (including wait time) of Via service and trip times of the alternative mobility option that the customer would have used
- Comparison of distributions of trip distances for WAV and non-WAV rides
- Comparison of distributions of response times for WAV and non-WAV trips
- Comparison of distributions of travel times for WAV and non-WAV trips
- Comparison of distributions of fares for WAV and non-WAV trips
- Number of WAV trip requests and non-WAV trip requests
- Number of trips provided with WAV and non-WAV trips provided

[1] It is important to note that quality of service and efficiency are affected by vehicle availability, which, in turn, will be a function of the subsidy available in each region, the operating hours, and the size of the service zones.

- Number of criminal incidents (in the pilot areas)
- Rider survey response to questions probing perceived safety between previous option and Via
- Comparison of subsidies paid to Via per ride and subsidies paid per ride for existing agency access modes
- Distribution of travel distances
- Spatial distribution of origins and destinations
- Comparison of travel time (minutes) per cost (dollar) spent getting to and from transit stations with Via and with conventional alternatives (including parking)
- Qualitative documentation from stakeholder interviews

The performance metrics will draw from a set of data sources that are specific to the project. More details about the metrics for each evaluation hypothesis are provided in Chapter 4.

Data Types, Elements, and Sources

The following data types and elements are used for the performance metrics that are defined for the Los Angeles County/PS IE.

Data Types and Elements

1. Survey Data
    - Individual travel patterns
    - The impact that Via had on travel behavior, mobility, and accessibility
    - Transit ridership
    - Mode (including SOV) of accessing and egressing transit stations
    - Mode share
    - Vehicle ownership and distance traveled in personal vehicles
    - Recent trip attributes and alternative modes of travel
    - Methods of payment
    - Perceptions of mobility and accessibility
    - Perception of first-mile and last-mile access/egress, wait times, and travel times
    - Perceived security of transit options
    - Demographics and socioeconomics
    - Disability status
    - Home and work location
2. Ridership and Activity Data
    - Unlinked trips at targeted stations in both regions
    - Via trip data:
        - De-identified Passenger ID
        - Vehicle Make, Model, and Year
        - TAP/ORCA ID (where available)
        - Zone ID

- Request pick-up location – latitude and longitude (rounded to 3 digits after the decimal point)
- Request drop-off location – latitude and longitude (rounded to 3 digits after the decimal point)
- Request pick-up date/time (rounded to the minute)
- Actual pick-up date/time (rounded to the minute)
- Estimated response time communicated to passenger (rounded to the minute)
- Actual amount of wait time to passenger before pick-up
- Actual pick-up data/time (rounded to the minute)
- Actual drop-off date/time (rounded to the minute)
- Origin to destination distance (miles)
- Average travel speed of ride
- Trip cost charged to paying passenger
- Number of guests with requesting passenger (if any)
- WAV ride requested (yes/no)
- WAV ride provided (yes/no)
- Trip outcome (completed, rider cancelled, driver cancelled, no show)
- Trip cancellation or no show date/time (rounded to the minute)
- Trip request never accepted (yes/no)
- Shared ride (yes/no)
- Ride rating awarded by passenger (1-5 stars)
- Method used by passenger to request pick-up
- Payment method (credit card, debit card, promo code, etc.)

3. Payment Data
   - User-cost per trip (original and subsidized)
   - Subsidies provided to Via from LA County and PS project teams
   - ORCA payment data:
     - De-identified user ID
     - De-identified card ID
     - Payment amount by user
     - Payment amount by agency (if applicable)
     - Date/time of payment
     - Public transit agency
     - Bus route (if applicable)
     - Location of payment (e.g., station name, bus stop name, etc.)
     - Origin station or stop (if known)
     - Date/time at origin (if known)
     - Destination station or stop (if known)
     - Date/time at destination (if known)
4. Fuel Usage Data
   - Via vehicle and driving distance data:
     - Vehicle make
     - Vehicle model
     - Vehicle year
     - Date/time of the beginning of the shift
     - Date/time of the end of the shift
     - Non-revenue miles driven while on-shift
     - Revenue miles driven while on-shift
     - PMT: VMT on an hourly basis per vehicle
     - Vehicle miles driven with 1, 2, … , 8 bookings on board during that shift (separate columns for each count)

5. Crime Statistics Data
    - Crime incident numbers and types (including historical)
6. Stakeholder Interview Data

Data Sources

The following data sources are used to collect the above-mentioned data elements.

1. Via
    - Source for ridership and activity data, as well as data on subsidized Via rides, and WAV rides. Via also provides fuel economy data of its fleet.
2. LA Metro (in partnership with LADOT, Foothill Transit, and Access Services)
    - Source for ridership and activity data, as well as data on crime statistics, and subsidy payments to Via.
3. Puget Sound Transit (in partnership with King County Metro and Community Transit)
    - Source for ridership and activity data, as well as data on crime statistics, and subsidy payments to Via.
4. ORCA Payments
    - Source for payment statistics and usage data.

Methods of Evaluation

The quantitative and qualitative evaluation methods used in the Los Angeles County/PS IE include the following:

- Survey analysis
- Time series analysis of ridership data on targeted stations
- Time series analysis of activity data on payment statistics and usage
- Cross-sectional analysis of unlinked trip data, WAV trips and other activity data
- Time series analysis of crime statistics
- Survey and activity analysis
- Activity data analysis before and after program implementation
- Spatial analysis of riders and activity data before and after the program implementation
- Summary of expert interviews.

Further details about the analysis methods by evaluation hypothesis are provided in Chapter 4.

Evaluation Logic Model

Table 1 represents an extract from the final LA/PS evaluation logic model. Building on the project goals, the logic model lists evaluation hypotheses, performance metrics, and data sources for the Los Angeles/PS project.

Table 1. Project Goals, Evaluation Hypotheses, Performance Metrics, and Data Types and Sources for the Los Angeles County/PS Sandbox Project

Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
1. Expand mobility in both regions	1. Mobility in both the LA and PS regions will increase as a result of this new service.	• Distribution of travel times of all users to and from selected pilot stations • Distribution of wait times of all users traveling to and from selected pilot stations • Distribution of travel time reliability (the variance of the travel velocity)	• Survey Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via
2. Promote equitable mobility benefits across all populations	2. (a) Users who previously did not have access to TNCs for FMLM trips now have access to TNCs to complete FMLM trips.	• Number of low-income people who previously did not have access to TNCs as a FMLM option • Number of low-income people who now use the service • Number of people without a smartphone • Number of people without a smartphone who now use the service	• Survey Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro
	2. (b) Integration of Via into the ORCA card will increase its use among: 1) low-income populations, 2) unbanked populations, 3) minority populations.	• Number of trips conducted by underserved populations through the use of ORCA	• Survey Data • Payment Data	• Puget Sound Transit and King County Metro • ORCA Payments

Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
3. Expand number of unique users of public transit and increase overall ridership	3. Number of public transit users in both regions will increase as this new service will create more options for riders, specifically for FMLM.	• Count of unique public transit users	• Survey Data • Ridership and Activity Data • Payment Data •	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via • ORCA Payments
4. Increase access to transit stations	4. At the selected transit stops, the availability of the new service TO a transit station will increase transit ridership for that system.	• Count of unlinked trips at selected stations • Rider survey response to questions probing impact that subsidized rides had on their ability to access transit stations	• Survey Data • Ridership and Activity Data • Payment Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via • ORCA Payments
5. Increase egress from transit stations	5. At the selected transit stops, the availability of the new service FROM a transit station will increase transit ridership for that system.	• Count of unlinked trips at selected stations • Rider survey response to questions probing impact that subsidized rides had on their ability to egress from transit stations	• Survey Data • Ridership and Activity Data • Payment Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via • ORCA Payments
6. Preserve or enhance the environment	6. The availability of the new service will decrease fuel consumption and GHG emissions associated with the customers using the service	• CO2 emissions from MOD per person vs CO2 tail pipe emissions from SOV per person • Change in fuel consumption and GHGs resulting from shift in behavior as a result of the program per person and in aggregate	• Survey Data • Fuel Usage Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via

Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
7. Reduce congestion from personal vehicles	7. The availability of the new service will decrease congestion from personal (non-TNC) vehicles	• Comparison of total travel distance by vehicle by hour for Via vehicles and for SOV alternative	• Survey Data • Ridership and Activity Data • Fuel Usage Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via
8. Improve mobility for persons with disabilities	8. Mobility for persons with disabilities will be improved due to WAVs through the Via platform	• Comparison of distributions of WAV trip times (including wait time) of Via service and trip times of the original mobility option that the customer would have used	• Survey Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via
9. Complies with ADA equivalent level of service requirements	9. FMLM service to passengers with disabilities is equivalent to that provided to passengers without disabilities	• Comparison of distributions of trip distances for WAV and non-WAV rides • Comparison of distributions of response times for WAV and non-WAV trips • Comparison of distributions of travel times for WAV and non-WAV trips • Comparison of distributions of fares for WAV and non-WAV trips • Number of WAV trip requests and non-WAV trip requests • Number of trips provided with WAV and non-WAV trips provided	• Survey Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via

Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
10. Ensure travelers feel safe on public transit and at public transit facilities	10. Riders will have a safer option to and from the station as a result of Via	• Number of criminal incidents (in the pilot areas) • Rider survey response to questions probing perceived safety between previous option and Via	• Survey Data • Crime Statistics Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro
11. Improve cost efficiency of access to, and egress from transit	11. Subsidies per rider on Via are lower than the subsidies provided on other FMLM options	• Comparison of subsidies paid to Via per ride and subsidies paid per ride for existing agency access modes	• Payment Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via
12. Improve accessibility for all populations	12. The average distance and geographic spread of travel to and from selected stations will be larger than prior to the project	• Distribution of travel distances • Spatial distribution of origins and destinations	• Survey Data • Ridership and Activity Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro • Via
13. Improve Level of Service per User Cost	13. The average minutes per dollar spent to access and egress the station will decline among all users	• Comparison of travel time (minutes) per cost (dollar) spent getting to and from transit stations with Via and with conventional alternatives (including parking)	• Ridership and Activity Data	• Via
14. Produce lessons learned through stakeholder interviews	14. The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.	• Qualitative documentation from stakeholder interviews	• Stakeholder Interview Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro

Project Goals	Evaluation Hypothesis	Performance Metric	Data Types	Data Sources
15. Build institutional relationships and systems that can be applied to other transit operators	15. The project produces a series of lessons learned with respect to institutional relationships and systems that can be applied to other transit operators	• Qualitative documentation from stakeholder interviews	• Stakeholder Interview Data	• LA Metro (in partnership with LADOT, Foothill Transit, and Access Services) • Puget Sound Transit and King County Metro

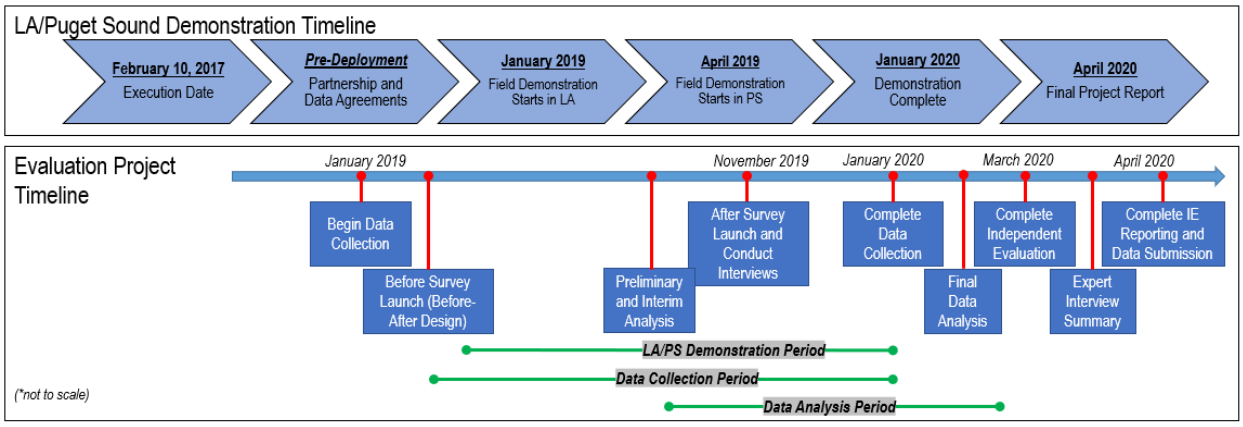
Documentation and Reporting

The IE team will develop an evaluation report for this MOD Sandbox demonstration project. The report will include a summary of major findings of the project in an Executive Summary section, followed by multiple sections providing details of the demonstration, evaluation hypotheses, data collected, analysis performed, findings, and results. The results will be reported through a mix of exhibits including tables, graphs, and charts.

Chapter 3. Evaluation Schedule and Management

Evaluation Schedule

Figure 1 shows the IE schedule from the beginning of quantitative and qualitative data collection that spans throughout the demonstration period and leads to the analysis whose results are included in the site-specific evaluation report. Note that interim data spot checks and sample analyses will be performed during the demonstration period to proactively mitigate data-related risks.



Source: Booz Allen Hamilton, December 2018

Figure 1. MOD Sandbox Evaluation Schedule

The demonstration start- and end-dates depict the period over which demonstration data collection is expected to take place. This data would be shared with the IE team for evaluation purposes. The LA County and PS team will collect data relevant to this MOD Sandbox demonstration (as outlined in this evaluation plan) from January 2019 to January 2020 and will share the data with the IE team for conducting the evaluation.

Roles and Responsibilities

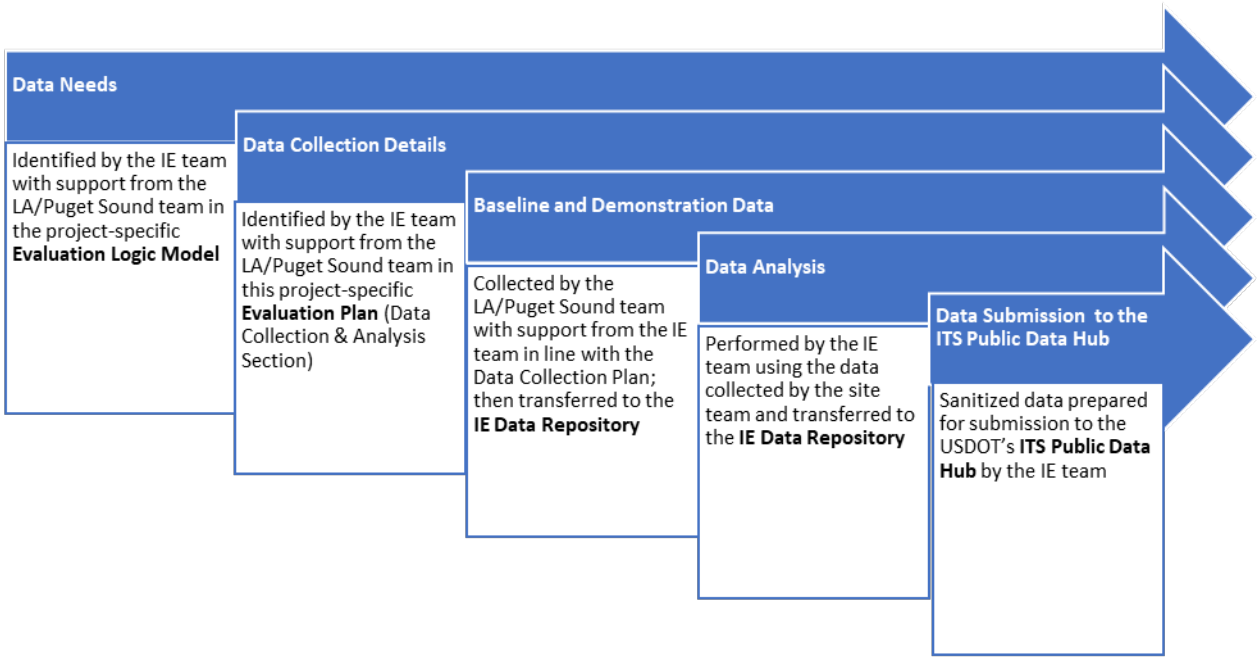
The three main entities involved in the evaluation and their corresponding high-level roles are as follows:

- The **site team** coordinates the collection of the requested evaluation data from the various project partners throughout the demonstration period, and transfers the data to the IE team
- The **IE team** supports the site team in the definition of the requested data elements, and performs the analysis using the data provided by the site team

- The **USDOT team** supervises the work and provides support for topics that encompass more than one site (e.g. coordination with TNCs who are partnering with several Sandbox sites[2]).

Data Transfer and Storage

Various types of qualitative and quantitative data sources are involved in the evaluation, as specified in Chapter 2. Figure 2 shows the overall data collection framework, including the steps and parties involved in data design, collection, transfer, and storage. Please note that Via data shared as part of this project will be subject to a non-disclosure agreement to prevent the disclosure of raw data to non-MOD project entities.



Source: Booz Allen Hamilton, November 2018

Figure 2. Los Angeles County/PS Data Collection Framework

Data Collection Responsibilities

For the various data types required for the evaluation, Table 2 denotes the corresponding data collection responsibilities.

[2]Mainly with respect to data required for assessing the ADA equivalent level of service requirement and for data inclusion in the ITS Public Data Hub

Table 2. Data Types and Data Collection Responsibilities for Los Angeles County/PS Sandbox Evaluation

Data Type	Data Collection Responsibilities
Survey Data	• Survey questions are developed by the IE team in collaboration with the Los Angeles County/PS team and Via. • Surveys are conducted by the IE team via the Qualtrics platform. • Survey links are distributed via email by the LA County and PS teams.
Ridership and Activity Data	• Collected by the LA County and Puget Sound teams (in partnership with LADOT, Foothill Transit, Access Services, King County Metro, and Community Transit) as well as Via and transferred to the IE team.
Payment Data	• Collected by the LA County and Puget Sound teams (in partnership with LADOT, Foothill Transit, Access Services, King County Metro, and Community Transit) and transferred to the IE team.
Fuel Usage Data	• Collected by Via and transferred to the IE team.
Crime Statistics Data	• Collected by the LA County and PS teams and transferred to the IE team.
Stakeholder Interview Data	• Interviewees are identified by the IE team in collaboration with the MOD demonstration team • The IE team is connected to the interviewees by the individual MOD demonstration teams at LA County and PS • The IE team conducts the expert interviews via phone or in person

Risk Management

The IE team will continually monitor risk in an ongoing process throughout the demonstration period and identify the best resources within the team to address each risk. Some of the main risks involved in the evaluation are included below.

Schedule: The IE team will maintain a demonstration tracking schedule to track and contact the demonstration teams for data and documentation. The team will keep an up-to-date integrated schedule that reflects updates from the site teams on a constant basis. Components of the evaluation reports will be created throughout the demonstration period, as the data and documentation for the project becomes available. The site team should inform the IE team of any changes in schedule that could affect the overall evaluation schedule (e.g., delays in the demonstration schedule).

Data quality assurance: The IE team will perform spot checks on the data as it is collected throughout the demonstration period to proactively manage risks related to data quality. This will allow the following:

- Avoiding insufficient data on performance of MOD demonstration to reliably estimate impacts and/or benefits.
- Addressing challenges in empirical data including lack of consistency, biases, and incompleteness.
- Identifying and controlling sources of error.
- Consideration of quality and quantity issues in data collection.
- Ensuring data privacy and proprietary protections in line with human subjects' protections.
- Consideration of confounding factors.

Table 3 includes risk mitigation strategies that will be employed to ensure the availability of the requested Data Types for the evaluation.

Table 3. Data Type and Risk Mitigation Strategies for Los Angeles County/PS Sandbox Evaluation

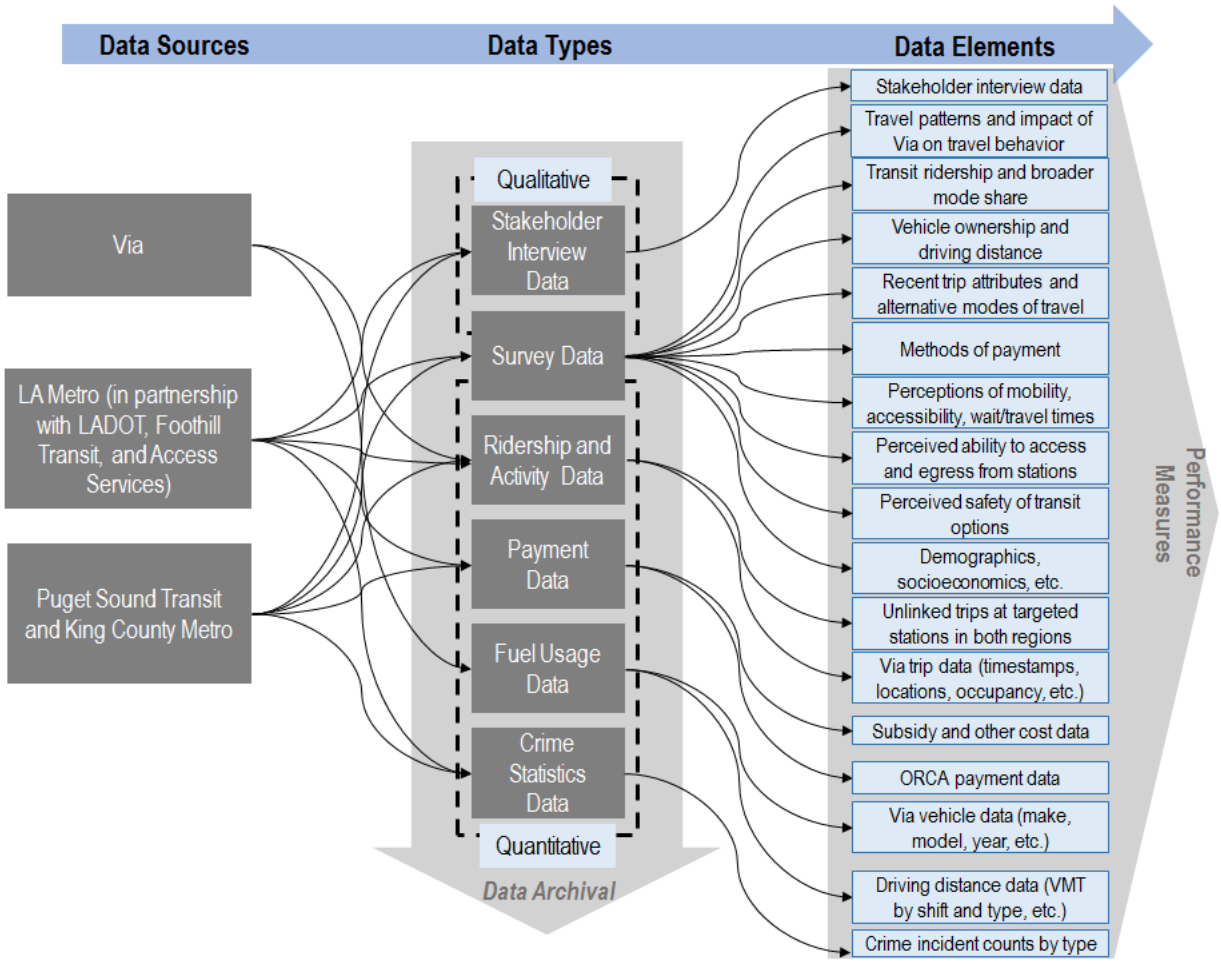
Data Type	Risk	Risk Mitigation Strategies
Survey Data	• Low survey response rate does not lead to statistically significant results	• The LA County and PS teams will work with the IE team and Via to identify and implement strategies that aim to increase the participation in surveys
Ridership and Activity Data	• Inaccessible or insufficient data does not allow for performance metric computation • Data reveals PII and violates the rules regarding sensitive information	• The LA County and PS teams included the data needs/requirements in the agreement with Via • The LA County and PS teams will ensure that the needed data is collected from Via and other project partners and transferred to the IE team • All data shall be de-identified using an ID that does not contain PII or connection to user identity (IE team in collaboration with Via)
Payment Data	• Inaccessible or insufficient data does not allow for performance metric computation • Data reveals PII and violates the rules regarding sensitive information	• The PS team has access to the requested data from ORCA Payments and can provide these to the IE team • All data shall be de-identified using an ID that does not contain PII or connection to user identity (IE team in collaboration with Via)
Fuel Usage Data	• Inaccessible or insufficient data does not allow for performance metric computation	• The LA County and PS teams included the data needs/requirements in the agreement with Via • The LA County and PS teams will ensure that the needed data is collected from Via and transferred to the IE team
Crime Statistics Data	• Inaccessible or insufficient data does not allow for performance metric computation	• The LA County and PS teams will collect historical and current crime statistics and provide them to the IE team.
Stakeholder Interview Data	• Inadequate number of interviews does not lead to a holistic view of pilot outcomes from different perspectives	• The LA County and PS teams will facilitate the connection between the IE team and expert interviewees, and will help in getting their commitment to participate in the interviews

Chapter 4. Data Collection and Analysis Plan

This chapter describes the plan for data collection and analysis for the Los Angeles County and PS MOD Sandbox Project. It summarizes the data that needs to be collected, and how that data should be processed and delivered to the IE team. Where possible, the IE team will help the Sandbox project team with processing the data to get the requested data format to conduct calculations necessary for the evaluation. Any Personally Identifiable Information (PII) will need to be removed, when present in the data.

The data collection and analysis plan follows the logic model presented in Chapter 2. Each data field discussed is associated with a hypothesis and a performance metric. Certain types of data collected will address multiple hypotheses. In cases where the data structure is the same, the plan refers to the data plan for a hypothesis that is already described. Figure 3 provides a mapping of the data sources, types and elements that will be collected in this evaluation.

Most pilot-based data (data provided by project partners) should be provided from the beginning of the pilot. The evaluation team also requests that some data about general Los Angeles County and PS activity, such as ridership, costs etc., be provided back to 2015 if possible. The request for longer time series of activity is motivated by the need to help discern potential background trends that could have been present before the project and then continue through it. Naturally, any data collected as a result of the project itself, can only be produced from the beginning of data collection by systems implemented by the project.



Source: Booz Allen Hamilton, December 2018

Figure 3. Data Sources, Data Types and Data Elements Mapping for this Evaluation

Table 4 summarizes the data types, data elements, collection periods, collection responsibility and mechanisms, and hypothesis alignment for the Los Angeles/PS Sandbox project evaluation. The table is followed by a more detailed data collection and analysis plan for each evaluation hypothesis.

Table 4. Data Type, Data Elements, Period of Collection, Collection Responsibility and Mechanisms, and Hypothesis Alignment for LA/Puget Sound Sandbox Project Evaluation

Data Type	Data Elements	Period of Collection	Collection Responsibility and Mechanisms	Hypothesis Alignment
Survey Data	• Individual travel patterns • The impact that Via had on travel behavior, mobility, and accessibility • Transit ridership • Mode (including SOV) of accessing and egressing transit stations • Mode share • Vehicle ownership and distance traveled in personal vehicles • Recent trip attributes and alternative modes of travel • Methods of payment • Perceptions of mobility and accessibility • Perception of first-mile and last-mile access/egress, wait times, and travel times • Perceived safety of transit options • Demographics and socioeconomics • Disability status • Home and work location	The survey will follow a Before-After design. The Before survey should be distributed near the beginning of the demonstration launch and the After survey should be distributed at least six months after the demonstration launch.	• Survey questions are developed by the IE team in collaboration with the LA/PS team (*draft survey questions provided as an appendix in this document)* • The surveys are conducted by the IE team via the Qualtrics platform • Survey links are distributed to users/participants in the MOD Sandbox project demonstration via email by the LA/PS team	1, 2a, 2b, 3, 4, 5, 6, 7, 8, 9, 10, 12

Data Type	Data Elements	Period of Collection	Collection Responsibility and Mechanisms	Hypothesis Alignment
Ridership and Activity Data	• Unlinked trips at targeted stations from both regions • Via trip data (timestamps, locations, occupancy, etc.)	Data is requested from the year 2015 and through the Sandbox demonstration period, to help identify longer running trends that might be underlying leading up to the project. This will only be available for data that exists prior to project implementation. For data that does not exist prior to project implementation, the IE team naturally requests data from the start to the end of the demonstration period.	• Ridership and Activity Data will be collected by the LA/PS team and Via, and transferred to the IE team via e-mail or OneDrive, on a monthly basis (i.e., once at the end of each month) throughout the demonstration period. • Data from the period prior to the demonstration start should be transferred as soon as it is available, before the demonstration start date. • Alternatively, access to the data could be provided to the IE team by the LA/PS team and Via, if that data is available via an online platform.	1, 3, 4, 5, 6, 7, 8, 9, 11, 12,13
Payment Data	• User-cost per trip (original and subsidized) • Subsidies provided to Via from the LA County and Puget Sound project teams • ORCA payment data	Data is requested from the year 2015 and through the Sandbox demonstration period, to help identify longer running trends that might be underlying leading up to the project. This will only be available for data that exists prior to project implementation. For data that does not exist prior to project implementation, the IE team naturally requests data from the start to the end of the demonstration period.	• Payment Data will be collected by the LA/PS team from ORCA partners, and transferred to the IE team via e-mail or OneDrive, on a monthly basis (i.e. once at the end of each month) throughout the demonstration period.	2b, 3, 4, 5, 11
Fuel Usage Data	• Via vehicle data (make, model, year, etc.) • Driving distance data (VMT by shift and type, etc.)	Data is requested throughout the demonstration period.	• Fuel Usage Data will be collected by Via and provided to the IE team on a monthly basis.	6, 7

Data Type	Data Elements	Period of Collection	Collection Responsibility and Mechanisms	Hypothesis Alignment
Crime Statistics Data	• Crime incident numbers and types (including historical)	Data is requested from the year 2015 and through the Sandbox demonstration period, to help identify longer running trends that might be underlying leading up to the project.	• Crime Statistics Data will be collected by the LA/PS team from their police records and provided to the IE team on a monthly basis. • Historical data will be provided as soon as LA/PS demonstration team gets access to them.	10
Expert Interviews	• Qualitative documentation from stakeholder interviews	Conducted at least six months after the launch of the demonstration.	• Interviewees are identified by the IE team in collaboration with the LA/PS team • The IE team is connected to the interviewees by the LA/PS team • The IE team conducts the expert interviews via phone or in person	14, 15

Logic Model Hypotheses

Hypothesis 1: Mobility in both the LA and PS regions will increase as a result of this new service.

Performance Metric: Distribution of travel times of all users to and from selected pilot stations, Distribution of wait times of all users to and from selected pilot stations, Distribution of travel time reliability (the variance of the travel velocity)

Data Types:

Ridership and Activity Data: Via Trip Data

Via Trip Data consists of data that describes the activity of passengers and vehicles within the system. Via operates with vehicles that circulate and have multiple passengers in the vehicle at the same time. This data describing activity will consist of the following fields that describe trip-by-trip records (one row is a trip):

- De-identified Passenger ID
- Vehicle Make, Model, and Year
- TAP/ORCA ID (where available)
- Zone ID
- Request pick-up location – latitude and longitude (rounded to 3 digits after the decimal point)
- Request drop-off location – latitude and longitude (rounded to 3 digits after the decimal point)
- Request pick-up date/time (rounded to the minute)
- Actual pick-up date/time (rounded to the minute)
- Estimated response time communicated to passenger (rounded to the minute)
- Actual amount of wait time to passenger before pick-up
- Actual pick-up data/time (rounded to the minute)
- Actual drop-off date/time (rounded to the minute)
- Origin to destination distance (miles)
- Average travel speed of ride
- Trip cost charged to paying passenger
- Number of guests with requesting passenger (if any)
- WAV ride requested (yes/no)
- WAV ride provided (yes/no)
- Trip outcome (completed, rider cancelled, driver cancelled, no show)
- Trip cancellation or no show date/time (rounded to the minute)
- Trip request never accepted (yes/no)
- Shared ride (yes/no)
- Ride rating awarded by passenger (1-5 stars)

- Method used by passenger to request pick-up
- Payment method (credit card, debit card, promo code, etc.)

Survey Data

The rider/passenger survey will be used to understand a variety of things as related to their travel and the project. Specifically, the survey will ask questions pertaining to:

- Individual travel patterns
- The impact that Via had on travel behavior, mobility, and accessibility
- Transit ridership
- Mode (including SOV) of accessing and egressing transit stations
- Mode share
- Vehicle ownership and distance traveled in personal vehicles
- Recent trip attributes and alternative modes of travel
- Methods of payment
- Perceptions of mobility and accessibility
- Perception of first-mile and last-mile access/egress, wait times, and travel times
- Perceived safety of transit options
- Demographics and socioeconomics
- Disability status
- Home and work location

We are planning to use a Before-After survey design. The Before survey should be distributed near the beginning of the demonstration launch and the After survey should be distributed at least six months after the demonstration launch. This allows for shorter surveys, since some information is collected in separate surveys, and potentially more robust measures of travel behavior of users at the time they start using the system, and at the end of the evaluation period.

Data Collection Period:

The period of data collection will be from the start to the end of the project evaluation period. Both data sources listed above are derived from project activities and do not exist in the absence of the project. Therefore, the dates stated here are contingent on the timeline of project implementation.

The survey will be implemented online in collaboration with the LA County and Puget Sound project teams, using emails and other contact media to disseminate the survey link. The survey will be implemented according to a schedule determined during discussions between the IE and project teams. The Before survey will be distributed near the beginning of the demonstration launch and the After survey will be distributed at least six months after the project innovations have launched for use by the public.

Analysis Procedure:

The analysis procedure will evaluate whether mobility has increased for each region over the course of the project by analyzing the trend of travel times, wait times, and travel time reliability. These three

metrics will be evaluated both in the survey and in the activity data. Travel time and wait will be measured directly from the activity data. The travel time reliability will be measured by an evaluation of the variance of computed velocity of travel.

The survey will support this analysis with questions that address perceptions of reported travel time, wait time, and travel time reliability. The survey will further contain questions that evaluate respondent perceptions as to whether these metrics have improved as a result of the project innovations. Through discussions with the operator, de-identified linking of responses to activity data may be doable. The survey will also contain questions about travel time, wait time, and travel time reliability before the innovations of the project were available. Origin request and location data, if given in the appropriate precision, can be used to evaluate alternative travel options (such as transit and driving), to evaluate these metrics for alternative modes.

Hypothesis 2a: Users who previously did not have access to TNCs for FMLM trips will now have access to Via to complete FMLM trips.

Performance Metric: Number of low-income people who previously did not have access to TNCs as a FMLM option, Number of low-income people who now use the service, Number of people without a smartphone, Number of people without a smartphone who now use the service

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Data Collection Period:

The data collection period of the survey is as described in Hypothesis 1.

Analysis Procedure:

The analysis of this hypothesis will rely on survey data from riders/passengers. The survey will contain questions about perceptions of mobility and accessibility. Among those, will be questions that ask about the ways in which respondents traveled to and from public transit prior to Via. The responses among those with household incomes less than $50,000 as well as those without a smartphone will be analyzed separately for this hypothesis. Questions will evaluate whether respondents perceive a change in their accessibility to public transit and whether they feel they have more options to access and egress public transit.

Hypothesis 2b: Integration of Via into the ORCA card will increase its use among: 1) low-income populations, 2) unbanked populations without banking/credit-card accounts, 3) minority populations.

Performance Metric: Number of trips conducted by underserved (e.g. low-income populations, unbanked populations without banking/credit-card accounts, and minority populations) through the use of ORCA.

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Payment Data: ORCA Payment Data

ORCA Payment Data describes transaction data from users on the ORCA card. The structure of disaggregated ORCA transaction data is unknown to evaluation team. The structure defined here is given as an ideal structure that can be used to support the evaluation of all hypotheses in this evaluation. The requested structure of ORCA transaction data is as follows:

- De-identified user ID
- De-identified card ID
- Payment amount by user
- Payment amount by agency (if applicable)
- Date and time stamp of payment
- Public transit agency
- Bus route (if applicable)
- Location of payment (e.g., station name, bus stop name, etc.)
- Origin station or stop (if known)
- Date and time at origin (if known)
- Destination station or stop (if known)
- Date and time at destination (if known)

It is recognized that the user ID may not be available in all cases and would likely require registration of the ORCA card by a user. The card ID would serve as an imperfect back-up ID, recognizing that most people likely hold onto a single card for long periods of time. ORCA appears to only require a reader touch upon entry, so it is not clear if destination information is known.

Data Collection Period:

The data collection period of the survey is as described in Hypothesis 1. ORCA data is requested for relevant facilities from 2015 to the end of the evaluation period. The reason for the longer term of request is to permit before and after evaluation of ORCA activity data. That is, trends may exist in ORCA data prior to the project that simply may continue through the project with no deviation. It is possible that data size may be a concern for disaggregated data given the size of the LA Metro/ST system (though only ORCA data for relevant facilities are requested, not the entire system), however, the size is unknown to the evaluation team. Further discussions with the project team can determine whether the size is a prohibitive concern and, if needed, then identify modifications to the historical data that can be made to make the dataset manageable for all project partners.

Analysis Procedure:

The survey will ask questions about ORCA use. Questions will evaluate the number of ORCA transactions that respondents make to access Via, and whether the integration of Via with ORCA played a substantive and causal role in their use of the system and their access to transit. The questions will ask respondents whether they feel the integration of Via with ORCA increased their use of Via as a result. The distribution of responses of those meeting the demographic criteria outlined above will be evaluated separately to ascertain whether Via integration with ORCA increased its use among these populations.

The ORCA payment data will be evaluated to ascertain whether mapping of transactions can be done to areas that are of low-income and whether the number of unique IDs increases within these areas (Census Tracts) during the course of the evaluation. The ORCA data will be used to evaluate whether the increase in transactions from unique user and/or card IDs is associated with Via use. The evaluation team will determine whether ORCA transaction data shows an increase in the number of unique cards being used in low-income Census Tracts served by the project.

Hypothesis 3: Number of public transit users in both regions will increase as this new service will create more options for riders, specifically for FMLM.

Performance Metric: Count of unique public transit users in the pilot areas.

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Unlinked Trips at Targeted Stations in Both Regions

This data consists of ridership data at appropriate transit facilities and bus routes with the transit agencies that could be affected by the project. The scope of the ridership data should cover all facilities that will be influenced by the project. The data would ideally consist of the daily count of users on each facility or route. If count data for facility transfers exist (transfer counts), this would be useful to include in this data. If available for transit stations, the data is requested to distinguish access and egress activity. If daily OD counts are available for activity to and from these stations, this structure would be most preferred, but otherwise raw entrance and exit counts by day by station would be sufficient.

Payment Data: ORCA Payment Data

ORCA payment data is as described in Hypothesis 2b.

Ridership and Activity Data: Via Trip Data

Via trip data is as described in Hypothesis 1.

Data Collection Period:

The data collection period for the survey and Via trip data is as described in Hypothesis 1. The data collection period for the ORCA payment data is as described in Hypothesis 2b. The unlinked trips (ridership) data is requested from 2015 to the end of the evaluation period.

Analysis Procedure:

The analysis will evaluate whether the number of unique users overall has increased for the transit facilities targeted in this evaluation. The ORCA data will be evaluated to ascertain whether there is an increase in the number active cards IDs being used within the targeted areas. The ridership data will be used to evaluate broader trends in ridership in the context of trends in unique active card IDs. The Via travel activity data may be used to support the evaluation of the hypothesis by confirming that trends in ridership and ORCA data are correlated with Via travel activity data.

The survey would also support evaluating this hypothesis. The survey will contain questions about user travel behavior and whether the implementation of this project has affected their transit use. The evaluation will specifically look at metrics like the percentage of users that indicate they increased their use of public transportation due to the improved FMLM access to transit as a result of the project.

Hypothesis 4: At the selected transit stops, the availability of the new service TO a transit station will increase transit ridership for that system

Performance Metric: Count of unlinked trips at selected stations, Rider survey response to questions probing impact that subsidized Via rides had on their ability to access transit stations

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Payment Data: ORCA Payment Data

The structure of the ORCA data is described in Hypothesis 2b.

Ridership and Activity Data: Unlinked Trips at Targeted Stations in Both Regions

This data is as described Hypothesis 3. Of particular interest for Hypothesis 4 is any known transfer activity in this dataset. That is, a person riding a bus to a rail transit station may or may not be seen in the rail ridership data. Known connections from bus to rail would be useful for this evaluation if they are present in the ridership data.

Ridership and Activity Data: Via Trip Data

Via trip data is as described in Hypothesis 1.

Data Collection Period:

The data collection period of the survey and the Via trip data is as described in Hypothesis 1. The data collection period of the ORCA payment data is as described in Hypothesis 2b. The data collection period of the ridership data is as described in Hypothesis 3.

Analysis Procedure:

The survey will contain questions about user travel behavior and whether the implementation of this project has affected their transit use. The survey will ask questions about recent trips made, and whether the cost reductions provided for Via travel impacted or influenced their propensity to use public transit.

The survey will more generally probe whether the availability of Via influenced their use of public transit and whether that influence was due to better access TO public transit.

The payment activity and ridership data from the public transit systems will be used to identify trips that are connections to the targeted transit facilities. Ridership, payment, and Via data will be evaluated to determine whether there is an increase in connections versus a shift from one mode to another. The analysis will evaluate the trends in connections to transit and determine whether they depart from historical trends in a manner that is statistically significant. The data will further evaluate whether Via activity is correlated with any identified trends in connection to public transit facilities.

Hypothesis 5: At the selected transit stops, the availability of the new service FROM a transit station will increase transit ridership for that system.

Performance Metric: Count of unlinked trips at selected stations, Rider survey response to questions probing impact that subsidized Via rides had on their ability to egress from transit stations

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Payment Data: ORCA Payment Data

The structure of the ORCA data is described in Hypothesis 2b.

Ridership and Activity Data: Unlinked Trips at Targeted Stations in Both Regions

This data is as described Hypothesis 3. Of particular interest for Hypothesis 5 is any known transfer activity in this dataset. That is, a person riding a bus to a rail transit station may or may not be seen in the rail ridership data. Known connections from bus to rail would be useful for this evaluation if they are present in the ridership data.

Ridership and Activity Data: Via Trip Data

Via trip data is as described in Hypothesis 1.

Data Collection Period:

The data collection period of the survey and the Via trip data is as described in Hypothesis 1. The data collection period of the ORCA payment data is as described in Hypothesis 2b. The data collection period of the ridership data is as described in Hypothesis 3.

Analysis Procedure:

This analysis will be conducted as described in Hypothesis 4, except that the IE team will instead be focusing on trips FROM transit as opposed to trips TO transit.

Hypothesis 6: The availability of the new service will decrease fuel consumption and GHG emissions associated with the customers using the service.

Performance Metric: CO_2 emissions from MOD per person vs CO_2 tail pipe emissions from SOV per person, Change in fuel consumption and GHGs resulting from shift in behavior as a result of the program per person and in aggregate

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Via Trip Data

This data will be exactly the same as structured for Hypothesis 1.

Fuel Usage Data: Via Vehicle Data and Driving Distance Data

This data consists of fleet data and VMT for Via vehicles aggregated by shift and broken down by different types of driving. The format is:

- Vehicle make
- Vehicle model
- Vehicle year
- Date/time of the beginning of the shift
- Date/time of the end of the shift
- Non-revenue miles driven while on-shift
- Revenue miles driven while on-shift
- PMT:VMT on an hourly basis per vehicle
- Vehicle miles driven with 1, 2, … , 8 bookings on board during that shift (separate columns for each count)

Data Collection Period:

The data collection period of the survey and Via trip data is as described in Hypothesis 1. The fuel usage data will match the data collection period of the Via trip data.

Analysis Procedure:

By matching the Via vehicle data with the driving distance data, researchers can determine the emissions that result from the activity of the Via vehicles. Further, by understanding the origins and destinations of Via passengers, the evaluation team will be able to calculate the CO_2 emissions that would occur if the trip was taken within a conventional SOV vehicle. The survey will further inform whether Via enabled the reduction of SOV travel. That is, the FMLM solution may shift travel from another mode, such as conventional bus, bike, or walking, to Via. Such shifts will exhibit a more limited emissions reduction impact. To supplement this, the evaluation team will additionally consider user survey responses. The survey will contain questions about user travel behavior and whether the implementation of this project

has affected their transit use and reduced their SOV use. The survey will evaluate whether a longer SOV trip is avoided as a result of Via connection to public transit and inform an estimate of emissions impacts that result. The survey data will more broadly inform a sensitivity analysis of SOV trip substitution and the associated emissions that result from the presence of Via.

Hypothesis 7: The availability of the new service will decrease congestion from personal (non-TNC) vehicles

Performance Metric: Comparison of total travel distance by vehicle by hour for Via vehicles and for SOV alternative

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Via Trip Data

This data will be structured as described in Hypothesis 1.

Fuel Usage Data: Driving Distance Data

This data will be structured as described in Hypothesis 6.

Data Collection Period:

The data collection period of the survey and Via trip data is as described in Hypothesis 1. The fuel usage data will match the data collection period of the Via trip data.

Analysis Procedure:

By evaluating the driving distance data, researchers can determine the total travel distance by hour that result from the activity of the Via vehicles. The analysis will further identify all individual trips taken by Via and evaluate them by time of day, determining the distance that would have been traveled had these trips been taken by SOV. Similar to the analysis described in Hypothesis 6, the evaluation will use survey data to evaluate the degree to which these trips substituted for SOV travel versus other modes that would not add to congestion. The evaluation team will attempt to reconstruct the routes that would have been taken by SOV travel for these displaced trips to determine if particular routes were de-congested at particular times.

Hypothesis 8: Mobility for persons with disabilities will improve due to WAVs through the Via platform.

Performance Metric: Comparison of distributions of WAV trip times (including wait time) of Via service and trip times of the alternative mobility option that the customer would have used

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Via Trip Data

This data will be exactly the same as structured for Hypothesis 1.

Data Collection Period:

The data collection period for the survey and Via trip data will be as described in Hypothesis 1.

Analysis Procedure:

The WAV trip times conducted by Via will be calculated using the Via trip data. The evaluation team will average the total trip time over total distance across all WAV rides to get an estimate of WAV speed. The trip times conducted by the alternative mobility option will be calculated using the survey responses. Users with a disability will be asked about their mobility options prior to their use of WAV rides through Via. From this information, the evaluation team can aggregate the distances and times associated with prior transit methods to get an estimate of non-WAV speed.

Hypothesis 9: FMLM service to passengers with disabilities is equivalent to that provided to passengers without disabilities

Performance Metric: Comparison of distributions of trip distances for WAV and non-WAV rides, Comparison of distributions of response times for WAV and non-WAV rides, Comparison of distributions of travel times for WAV and non-WAV rides, Comparison of distributions of fares for WAV and non-WAV rides, Number of WAV trip requests and non-WAV trip requests, Number of trips provided with WAV and non-WAV trips provided

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Via Trip Data

This data will be exactly the same as structured for Hypothesis 1.

Data Collection Period:

The data collection period for the survey and Via trip data will be as described in Hypothesis 1.

Analysis Procedure:

This analysis will evaluate the trips in the Via trip data that are identified to have a WAV passenger and use a WAV vehicle. The response/travel times, distances, and costs of these trips will be directly comparable to the measurements of trips with non-WAV vehicles. The distribution of response/travel times, distances, and costs will be compared against similar distributions of non-WAV trips contained in the same Via trip data. Averages of these attributes will be compared using the t-test to determine the degree to which they are statistically different. The same analysis will be done with similar data reported from the survey to determine if there is agreement in the results.

Hypothesis 10: Riders will have a safer option to and from the station as a result of Via.

Performance Metric: Number of criminal incidents, Rider survey response to questions probing perceived safety between previous option and Via

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Crime Statistics Data

This will include crime statistics specific to areas serviced by the project. The evaluation team will request crime incident data related to reported crimes against passengers to the transit agency during and before the project.

Data Collection Period:

The data collection period of the survey is as described in Hypothesis 1. The data collection period for crime statistics is requested to be from 2015 through the end of the project evaluation period. This longer time frame will permit the evaluation team to inspect trends (upward or downward) that may have existed prior to the project implementation.

Analysis Procedure:

The analysis would use the survey to evaluate whether users' perception of their safety has changed as a result of the project. The survey will contain questions about user travel behavior and whether the implementation of this project has affected their transit use. Questions that assess safety perceptions would be the primary instruments for evaluating whether users of the project innovations see a safety benefit from its operation.

The analysis of crime statistics would evaluate whether there has been an actual change in safety as a result of the project. By comparing crime statistics specific to areas serviced by the project both before and after project implementation, the evaluation team would assess whether crime rates have significantly dropped in areas of service. It is unlikely that the data will provide sufficient evidence to produce any causal link between Via activity and crime against transit passengers. It is possible that crime will shift to other people, where those using project innovations experience a reduction in crime, but the broader system does not. The evaluation of crime statistics will still offer context of actual events to the perceptions reported in the survey and characterize the safety environment during the project.

Hypothesis 11: Subsidies per rider on Via are lower than the subsidies provided on other FMLM options.

Performance Metric: Comparison of subsidies paid to Via per ride and subsidies paid per ride for existing agency access modes

Data Types:

Payment Data: Traditional access and egress mode subsidy data per passenger

This data describes the costs paid by agencies to support traditional access and egress modes. This includes paratransit services, feeder bus services, and other services identified by project partners as serving a comparable role to Via.

Payment Data: Project subsidy data per passenger

This data describes the amount of money spent by the agency to subsidize passenger costs using Via.

Ridership and Activity Data: Unlinked trips at Targeted Stations in Both Regions

This data is as described Hypothesis 3.

Payment Data: Other revenue from traditional modes

This would include any other revenue that might be obtained from the traditional FMLM modes. Such revenue would include advertising on buses, or any other revenue sources that would support the operation of traditional FMLM modes.

Data Collection Period:

The data collection period of the ridership data is as described Hypothesis 3. The historical data on ridership are requested to cover 2015 through the end of the evaluation period. The traditional access and egress mode subsidy data per passenger as well as other revenue from traditional modes is requested to cover the same period. The subsidy data per passenger as related to Via can only extend to the period in which Via is operational from project launch to the end of the evaluation period.

Analysis Procedure:

The analysis will use the data on spending on traditional modes in combination with ridership to evaluate the spending per trip that occurs on traditional modes. This spending will be evaluated over time to ascertain the spending per route, mode, or service. The analysis will account for ridership and the associated revenue that is earned from that ridership. In addition, the analysis will consider any other revenue that is earned from the operation of traditional FMLM modes. These costs and offsetting revenue will be used to compute the subsidy per passenger that is currently paid by the agencies. This will be compared, over time, with the agency spending per passenger that occurs enabling Via travel. The analysis will evaluate whether distinctions in subsidy per passenger calculations can be made for access and egress trips. Absent this distinction, the analysis will otherwise produce general metrics of subsidies per passenger.

Hypothesis 12: The average distance and geographic spread of travel to and from selected stations will be larger than prior to the project.

Performance Metric: Distribution of travel distances, Spatial distribution of origins and destinations

Data Types:

Survey Data

The survey will be implemented as described in Hypothesis 1.

Ridership and Activity Data: Existing Bus Service Ridership and Travel

This data would be pulled from the broader request of daily ridership data defined in Hypothesis 3.

Ridership and Activity Data: Via Trip Data

This data will be exactly the same as structured for Hypothesis 1.

Data Collection Period:

The data collection period of the survey and the Via trip data is as described in Hypothesis 1. The data collection period of the ridership data is as described in Hypothesis 3.

Analysis Procedure:

The objective of this hypothesis is to determine if the availability of improved FMLM options will increase the geographic diversity and spread of locations from which people are accessing or egressing from public transit. Via trip data can reveal the general origins and destinations of people taking the service. Those accessing rail stations can be isolated in the data set. The origins and destinations of these trips can be evaluated for geographic spread over time. The survey can support the analysis by revealing which users increased their use of transit and where those users lived relative to accessible bus lines. The geographic spread of Via trip data may also be comparable to the spread of ridership data, to determine whether Via is enabling connections to rail transit that are not accessible or highly utilized in areas with more limited public transit options. The capacities of addressing this hypothesis will be highly dependent on data quality and resolution.

Hypothesis 13: The average minutes per dollar spent to access and egress the station will decline among all users.

Performance Metric: Comparison of travel time (minutes) per cost (dollar) spent getting to and from transit stations with Via and with conventional alternatives (including parking)

Data Types:

Ridership and Activity Data: Via Trip Data

This data is as specified in Hypothesis 1.

Data Collection Period:

The data collection period is as specified in Hypothesis 1.

Analysis Procedure:

Using the Via trip data, the analysis will take the trip times and cost, and compute a metric of minutes / dollar spent. Using the origins and destinations of the Via trip data, the evaluation team will then determine the method that the traveler would have had to use in order to access the rail station using conventional transit. The expense and time of that alternative trip will be used to calculate the same metric for the conventional transit trip. The average of these metrics across all trips will be computed for the two trips, and the means will be compared using the t-test. The observations are technically paired, so the paired t-test would be most appropriate.

Hypothesis 14: The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.

Performance Metric: Qualitative documentation from stakeholder interviews

Data Types:

Stakeholder Interview Data: Expert interviews, which will include the evaluation of operational components

This data is qualitative in nature. The project team will identify members that can be available to interview with the evaluation team. The project team should specify a minimum of three people with enough knowledge on the project to talk candidly about its successes and challenges. The evaluation team will interview these candidates to understand the lessons learned from project implementation.

Data Collection Period:

The data collection for stakeholder interviews should occur at least six months after the launch of the demonstration, but it may be conducted later, as long as it is within a maximum of two months after the end of the demonstration period.

Analysis Procedure:

An expert interview protocol will be developed. The interviews will be conducted and synthesized from notes and recordings into a summary describing key insights from experts directly involved in the project.

Hypothesis 15: The project produces a series of lessons learned with respect to institutional relationships and systems that can be applied to other transit operators.

Performance Metric: Qualitative documentation from stakeholder interviews

Data Types:

Stakeholder Interview Data: Expert interviews, which will include the evaluation of operational components

These interviews are as described in Hypothesis 14.

Data Collection Period:

The data collection period is as described in Hypothesis 14.

Analysis Procedure:

The analysis of Hypothesis 15 will likely be concurrent with Hypothesis 14, and questions will be incorporated into the same interviews that probe lessons learned with regards to institutional relationships.

Appendix A. Selected Draft Survey Questions

This section presents selected draft survey questions for users/participants in the MOD Sandbox project demonstration. These survey questions are subject to revision, additions, and deletions. These questions provide examples of the types of questions that may be asked, subject matter to be covered, and serve as a starting point for final design. Wording may be adjusted to handle specific nuances or circumstances that are germane to the project. Additional questions may be added. The timing and the structure of the survey implementation may also change content, based on input from project partners. Branching and skip logic will be used, so not everyone will see every question or every option. The questions below follow a Before-After design in which respondents are surveyed twice, once at the beginning and once at least six months after the demonstration launch. It is intended that questions will be supported by activity data provided by operators such as Via. The survey may require modification to present context-specific questions within the LA and Puget Sound environment. Input on the survey question content and design is continuously welcome from all project partners.

DRAFT Before Survey

1. Including yourself, how many people live in your current household?

    - 1
    - 2
    - 3
    - 4
    - 5
    - 6
    - More than 6

>>>>>>>>>>>>>>>>>>>>>>>>**Branch Rule: HOUSEHOLD**>>>>>>>>>>>>>>>>>>**START**

IF (Response > 1) THEN NEXT

>>>

2. How would you describe the other people in your current household? (e.g., if you live with your mother, select "Parent/Guardian(s)"). (Please check all that apply.)

    - Parent/Guardian(s)
    - Relatives (e.g., siblings, etc.)
    - Housemates/Roommates
    - Partner/Significant Other
    - Children (who are under your guardianship)

3. Please select the option that best describes how you and the other people in your household manage finances. This question helps us frame survey questions and responses in the appropriate context.

    - We share some expenses (e.g., rent and utilities), but not income
    - We share expenses (e.g., rent and utilities) and income, and make purchasing decisions together (e.g., the decision to buy a car would be made together)
    - Other, please specify: _______________

>>>>>>>>>>>>>>>**Branch Rule: HOUSEHOLD**>>>>>>>>>>>>>>**END**

4. How many vehicles do **< you / your household > currently** own or lease?

    - 0
    - 1
    - 2
    - 3
    - 4
    - 5 or more

>>>>>>>>>>**Branch Rule: CURRENTLY_OWNS_VEHICLES>>>>>**>>>>**START**

If Response /= 0 THEN NEXT

>>>

5. Please list the year, make, and model of the vehicle(s) that **< you / your household > currently** own or lease as well as your best estimate of the annual miles driven on each (e.g., 2008 Honda Civic 20000).

    Make sure to report all miles driven on the vehicle(s) by anyone in your household. Please list the vehicle you drive most first.

<Show only number of vehicles selected in Q4>

	Year	Make	Model	Approximate Annual Miles Driven
Vehicle 1				
Vehicle 2				
Vehicle 3				
Vehicle 4				
Vehicle 5				

>>>>>>>>>>>>>>>**Branch Rule: CURRENTLY_OWNS_VEHICLES** >>>>>>>>>>>>>>>**END**

6. Which of the following other modes of transportation have you used in **LA/Puget Sound over the past 12 months**?

   Please check all that apply.

   NOTE: This question defines the universe modes that get used by the respondent. From here, the number of modes that they see reduces to only those relevant as questions proceed. ***Also note that the modes will be specific to each region. It is currently formatted to LA, but there will also be modes for Puget Sound. This is true for other questions throughout the document.***

   - o Drive alone
   - o Drive/Ride with family/friend (non-commute)
   - o Carpool (for commuting)
   - o Walk (to a destination)
   - o Personal Bicycle
   - o Bikeshare (e.g., Metro Bikeshare)
   - o Public Bus (e.g., Metro Bus)
   - o Urban Rail (e.g., Metro Rail, Metrolink)
   - o Intercity Rail (e.g., Amtrak)
   - o Intercity Bus (e.g., Greyhound)
   - o Uber/Lyft or other ride-hail service
   - o UberPOOL/Lyft Line or other shared-ride service
   - o Taxi
   - o E-Scooter (e.g., Bird, Lime)
   - o Motorcycle or Scooter (not including E-Scooter)
   - o Vanpool
   - o Employer Shuttle (for commuting)
   - o Carshare (e.g., Zipcar)
   - o Car Rental within LA
   - o Other(s), please specify: _____

7. Please indicate how frequently you **currently** use the following modes.

   <Show only modes selected in Q6>

	Not available to me or not in my area	Never in the last year	Onc e a year	Once every 6 months	Once a month	Twice a month	1 to 3 times per week	4 to 6 times per week	7 to 13 times per week	2 to 4 times per day	More than 4 times per day
<Mode that was selected in Q6>	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
<Mode that was selected in Q6>	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
<…>	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

>>>>>>>>USES PUBLIC TRANSIT>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>START

IF Uses public bus or urban rail THEN NEXT

>>>

Now think about your **most recent trip** when you last used a public bus or urban rail.

8. What type of transit system did use?

   - Public Bus
   - Urban Rail
   - I never use these modes
   - Other, please specify: ________________________

9. What was the **origin** of this trip (before entering the transit system)?

   Please indicate two streets that cross near this location, and the city.

   City: _____
   Street #1: _____
   Street #2: _____

10. What type of place was this?

    - Home
    - Work
    - Work-related meeting
    - School
    - Retail
    - Restaurant/Bar
    - Social/Recreational (not a restaurant/bar)
    - Medical
    - Place of worship
    - Other, please specify: _____

11. At what time did you start this trip (from your origin)?

    <Can be drop down menu>

    - 5:00AM
    - 5:30AM
    - 6:00AM
    - 6:30AM
    - 7:00AM
    - 7:30AM
    - 8:00AM
    - 8:30AM
    - 9:00AM
    - 9:30AM
    - 10:00AM
    - 10:30AM
    - 11:00AM
    - 11:30AM
    - 12:00PM
    - 12:30PM
    - 1:00PM
    - 1:30PM
    - 2:00PM
    - 2:30PM
    - 3:00PM
    - 3:30PM
    - 4:00PM
    - 4:30PM
    - 5:00PM
    - 5:30PM

- 6:00PM
- 6:30PM
- 7:00PM
- 7:30PM
- 8:00PM
- 8:30PM
- 9:00PM
- 9:30PM
- 10:00PM
- 10:30PM
- 11:00PM
- 11:30PM
- 12:00AM
- 12:30AM
- 1:00AM
- 1:30AM
- 2:00AM
- 2:30AM
- 3:00AM
- 3:30AM
- 3:00AM
- 3:30AM
- 4:00AM
- 4:30AM

12. What day was this trip?

    - Monday
    - Tuesday
    - Wednesday
    - Thursday
    - Friday
    - Saturday
    - Sunday

13. What station/stop did you enter the transit system?

    <Dropdown of stations>

14. What mode did you use to get to this station/stop from your origin?

    - <Mode that was selected in Q6>
    - <Mode that was selected in Q6>
    - <…>

15. About how long did it take you to get to this station/stop using this mode? Please include any wait time (if applicable), so that this approximation includes the total time getting from your origin to the station/stop.

    <Can be drop down menu>

    - 30 seconds or less
    - 1 minute
    - 2 minutes
    - 3 minutes
    - 4 minutes
    - 5 minutes
    - 6 minutes
    - 7 minutes
    - 8 minutes
    - 9 minutes
    - 10 minutes
    - 11 minutes
    - 12 minutes
    - 13 minutes
    - 14 minutes
    - 15 minutes
    - 16 minutes
    - 17 minutes
    - 18 minutes
    - 19 minutes
    - 20 minutes
    - 21 minutes
    - 22 minutes
    - 23 minutes
    - 24 minutes
    - 25 minutes
    - 26 minutes
    - 27 minutes
    - 28 minutes
    - 29 minutes
    - 30 minutes
    - More than 30 minutes
    - I don't know

16. What station/stop did you exit the system?

    <Dropdown of stations>

17. What was the **destination** of this trip (after exiting the transit system)?

    Please indicate two streets that cross near this location, and the city.

    City: _____
    Street #1: _____
    Street #2: _____

18. What type of place was this?

    - o Home
    - o Work
    - o Work-related meeting
    - o School
    - o Retail
    - o Restaurant/Bar
    - o Social/Recreational (not a restaurant/bar)
    - o Medical
    - o Place of worship
    - o Other, please specify: _____

19. What mode did you use to get to this destination from the station/stop?

    - o <Mode that was selected in Q6>
    - o <Mode that was selected in Q6>
    - o <…>

20. About how long did it take you to get to your destination using this mode? Please include any wait time (if applicable), so that this approximation includes the total time getting from the station/stop to your destination.

    <Can be drop down menu>

    - o 30 seconds or less
    - o 1 minute
    - o 2 minutes
    - o 3 minutes
    - o 4 minutes
    - o 5 minutes
    - o 6 minutes
    - o 7 minutes
    - o 8 minutes
    - o 9 minutes
    - o 10 minutes
    - o 11 minutes
    - o 12 minutes
    - o 13 minutes
    - o 14 minutes
    - o 15 minutes
    - o 16 minutes
    - o 17 minutes
    - o 18 minutes
    - o 19 minutes
    - o 20 minutes
    - o 21 minutes
    - o 22 minutes
    - o 23 minutes
    - o 24 minutes
    - o 25 minutes

- 26 minutes
- 27 minutes
- 28 minutes
- 29 minutes
- 30 minutes
- More than 30 minutes
- I don't know

21. About how long did the trip take in total? This is the total travel time for the entire trip.

    <Can be drop down menu>

    - Less than 5 minutes
    - 5 minutes
    - 10 minutes
    - 15 minutes
    - 20 minutes
    - 25 minutes
    - 30 minutes
    - 35 minutes
    - 40 minutes
    - 45 minutes
    - 50 minutes
    - 55 minutes
    - 1 hour
    - 1 hour and 5 minutes
    - 1 hour and 10 minutes
    - 1 hour and 15 minutes
    - 1 hour and 20 minutes
    - 1 hour and 25 minutes
    - 1 hour and 30 minutes
    - 1 hour and 35 minutes
    - 1 hour and 40 minutes
    - 1 hour and 45 minutes
    - 1 hour and 50 minutes
    - 1 hour and 55 minutes
    - 2 hours
    - More than 2 hours
    - I don't know

22. Did this trip contain any transfers (e.g., switching trains/buses at some point during the trip)?

    - Yes
    - No

23. What was the purpose of this trip?

    - Get to/from a restaurant/bar
    - Go to/from other social/recreational activities (not a restaurant/bar)
    - Commute to/from work
    - Commute to/from school
    - Go to/from public transit

- Go to/from work-related meetings during the day
- Go to/from grocery shopping
- Go to/from other shopping (non-groceries)
- Run non-shopping errands
- Go to/from healthcare services
- Go to/from the airport
- Go to/from the gym
- Go to/from place of worship
- Move bulky items
- Transport pets
- Other, please specify: _____

>>>>>>>>>>>>>>>**Branch Rule: USES PUBLIC TRANSIT** >>>>>>>>>>>>>>>**END**

24. Overall, how easily are you able to get around? This question refers to your access and use of personal, private, and public transportation services, **not** your physical capabilities.

    Overall, I currently consider myself to be...

    - Very mobile
    - Somewhat mobile
    - Not very mobile
    - Not mobile at all

25. The following questions ask you to rate elements on a scale of 1 to 10, where 10 is Excellent, and 1 is Unacceptable or Very Poor.

    Overall, I currently consider my…

	1 (Unacceptable or Very Poor)	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10 (Excellent)**
Wait times to be… (This question refers to the average time you wait for vehicles to pick you up.)	□	□	□	□	□	□	□	□	□	□
Travel times to be… (This question refers to the average time you spend traveling between locations.)	□	□	□	□	□	□	□	□	□	□
Ability to access desired locations in LA/Puget Sound…	□	□	□	□	□	□	□	□	□	□
Ability to access desired locations in LA/Puget Sound **specifically using public transit**…	□	□	□	□	□	□	□	□	□	□

26. What areas, neighborhoods, or attractions can you **not reach** using public transit that you would like to be able to access?

    Please indicate none, or list up to three.

    - None
    - Area/Neighborhood/Attraction: _____
    - Area/Neighborhood/Attraction: _____
    - Area/Neighborhood/Attraction: _____

27. How would you rate your ability to **get to and from** bus stops and rail stations in LA/Puget Sound (e.g., your access and connectivity)? Please rate each mode and each direction on a scale of 1 to 10, where 10 is Excellent access, and 1 is Very Poor access.

	Get to bus stop	**Get from** bus stop	**Get to** rail station	**Get from** rail station
1 (Very Poor)				
2				
3				
4				
5				
6				
7				
8				
9				
10 (Excellent)				

28. In general, how would you rate your ability to **get to and from** public transit in LA/Puget Sound? Please rate on a scale of 1 to 10, where 10 is Excellent connectivity, and 1 is Very Poor connectivity.

    - 1 (Very Poor)
    - 2
    - 3
    - 4
    - 5
    - 6
    - 7
    - 8
    - 9
    - 10 (Excellent)

29. Select most common mode you use to **get to and from** bus stops and rail stations in LA/Puget Sound. Please choose the most common mode for each direction.

Get to bus stop	**Get from** bus stop	**Get to** rail station	**Get from** rail station
<drop down list of modes selected in Q6>	<drop down list of modes selected in Q6>	<drop down list of modes selected in Q6>	<drop down list of modes selected in Q6>

30. On average, about how long does it take to **get to and from** bus stops and rail stations using the modes identified above?

	I never use this mode	Less than 5 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min	50 min	55 min	60 min	More than 1 hour
Get to bus stop	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Get from bus stop	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Get to rail station	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Get from rail station	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□

31. How safe do you feel when traveling to and from public transit? Please rate on a scale of 1 to 10, where 10 is Very Safe and 1 is Not At All Safe.

    - 1 (Not At All Safe)
    - 2
    - 3
    - 4
    - 5
    - 6
    - 7
    - 8
    - 9
    - 10 (Very Safe)
    - I don't know

32. Do you have a TAP/ORCA card?

- o Yes
- o No

>>>>>>>>USES PAYMENT SYSTEM>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>START

IF Yes THEN NEXT

>>

33. How often do you use your TAP/ORCA card when using transit that accepts it?

- o Every time
- o More than half the time
- o Half the time
- o Less than half the time
- o Rarely
- o Never

>>>>>>>>>>>>>>>**Branch Rule: USES PAYMENT SYSTEM** >>>>>>>>>>>>>>**END**

34. Do you ever use ride-hailing services (e.g., Lyft, Uber) to get to or from public transit?

- o Yes, often
- o Yes, but not too often
- o No, never

>>>>>>>>DOESN'T USE TNCS FOR FMLM>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>START

IF Yes, but not too often or No, never THEN NEXT

>>

35. Why don't you use them **<more often>**? (Please select all that apply.)

- o Too expensive
- o I don't own a smartphone, so I can't access the app
- o Other, please specify: ________________________

>>>>>>>>>>>>>>>**Branch Rule: DOESN'T USE TNCS FOR FMLM** >>>>>>>>>>>>>>**END**

Now, we will ask you questions about your demographic profile.

36. What is your gender?

    - o Male
    - o Female
    - o Other, please specify: _____
    - o Prefer not to answer

37. In what year were you born?

    Drop-down <years>

38. Do you use a wheelchair?

    - o Yes
    - o No

39. Do you have other disabilities that require specialized accommodations for transportation?

    - o Yes
    - o No

40. Do you require transportation vehicles and infrastructure that is ADA compliant (wheelchair or scooter accessible) to get around?

    - o Yes
    - o No

41. What is the highest level of education you have completed?

    - o Less than high school
    - o Currently in high school
    - o High school/GED
    - o Currently in 2-year college
    - o 2-year college degree
    - o Currently in 4-year college
    - o 4-year college degree
    - o Currently in post-graduate program
    - o Post-graduate degree (MA, MS, PhD, MD, JD, etc.)
    - o Other, please specify: _____
    - o Prefer not to answer

42. What is your race or ethnicity? (Please check all that apply.)

- o African American
- o American Indian or Alaskan Native
- o Asian
- o Caucasian/White
- o Hispanic or Latino
- o Middle-Eastern
- o Native Hawaiian or Pacific Islander
- o South Asian (e.g., Indian, Pakistani, etc.)
- o Southeast Asian
- o Other, please specify: ___________________
- o Prefer not to answer

>>>>>>>>>>>>>>>Branch Rule: HOUSEHOLD STRUCTURE>>>>>>>>>>>>>>>START

IF (Person does not live alone)

>>

Please indicate the number of household members (including yourself) that fall into the different age groups listed below.

“0” is selected by default, if no household members fall under that age, just skip it.

	0 people	1 person	2 people	3 people	4 people	5 people	More than 5 people
0 - 5	☒	☐	☐	☐	☐	☐	☐
6 - 15	☒	☐	☐	☐	☐	☐	☐
16 - 18	☒	☐	☐	☐	☐	☐	☐
19 - 65	☒	☐	☐	☐	☐	☐	☐
66 or older	☒	☐	☐	☐	☐	☐	☐

>>>>>>>>>>>>>>>Branch Rule: HOUSEHOLD STRUCTURE >>>>>>>>>>>>>>>END

43. What kind of housing do you currently live in?

    - o Detached single-family home
    - o Attached single-family home
    - o Building with more than 100 units
    - o Building with between 10 and 100 units
    - o Building/house with fewer than 10 units
    - o Mobile home/RV/Trailer
    - o Other, please specify: _____

44. Approximately what was **< your/your household >** gross (pre-tax) income last year?

    - o Less than $10,000
    - o $10,000 to $14,999
    - o $15,000 to $24,999
    - o $25,000 to $34,999
    - o $35,000 to $49,999
    - o $50,000 to $74,999
    - o $75,000 to $99,999
    - o $100,000 to $149,999
    - o $150,000 to $199,999
    - o $200,000 or more
    - o Prefer not to answer

45. Do you have a debit/credit card or bank account?

    - o Yes
    - o No

46. Please indicate two streets that cross near your **home location** as well as the city.

    City: _____

    Street #1: _____

    Street #2: _____

47. Please indicate two streets that cross near your **work location** as well as the city. If you do not travel to a work location, you can skip this question.

    City: _____

    Street #1: _____

    Street #2: _____

[OPTIONAL] This survey asked a lot of questions about your travel behavior and use of public transit in LA/Puget Sound. If you would like, please feel free to elaborate here on how you travel.

Your comments (if you provide any) will only be reviewed confidentially in support of your other responses. You will not be contacted about them. Anything you write may help support the impact analysis, or clarify responses you provided in the survey.

You can tell us about elements we might have missed through the survey questions or that you feel need additional clarification. This is completely optional, you can write as much as you would like or nothing at all.

If you do choose to provide comments, please try to be kind, constructive, and/or helpful; what you write will be read by a real person. In either case, thank you again for taking this survey.

<Comment Box>

Addendum. Documentation of Evaluation Plan Variance Following Demonstration Deployment

The evaluation plans for the MOD Sandbox Demonstration projects were developed in the planning phase of the project, prior to the execution of the demonstration. As part of this process, data structures and data availability were anticipated. As project implementation proceeded, certain elements of the project and data availability changed.

This addendum presents differences between the planned and executed analyses for the independent evaluation of the Los Angeles and Puget Sound First and Last Mile Partnership with Via project. Due to changes resulting from limited survey sample sizes, data availability issues, and other circumstances, some of the hypotheses proposed as part of the original scope of work were modified or their analyses were adjusted to better encompass these changes. In this addendum, changes that were made to each hypothesis (if any) and the key reasons why study methods may have differed from what was planned are discussed. Some hypotheses and their proposed analytical approaches did not change significantly or at all. In these cases, it is noted that there were no differences between the proposed and executed analyses.

Hypothesis 1:	Mobility in both the Los Angeles and PS regions will increase as a result of this new service.

Proposed analysis: The analysis procedure would evaluate whether mobility increased for each region over the course of the project by analyzing the trend of travel times, wait times, and travel time reliability. These three metrics would be evaluated both in the survey and in the activity data. Travel time and wait time would be measured directly from the activity data. The travel time reliability would be measured by an evaluation of the variance of computed velocity of travel.

The survey would support this analysis with questions that address perceptions of reported travel time, wait time, and travel time reliability. The survey would further contain questions that evaluate respondent perceptions as to whether these metrics improved as a result of the project innovations. Through discussions with the operator, de-identified linking of responses to activity data may be doable. The survey would also contain questions about travel time, wait time, and travel time reliability before the innovations of the project were available. Origin request and location data, if given in the appropriate precision, could be used to evaluate alternative travel options (such as transit and driving), to evaluate these metrics for alternative modes.

Executed analysis: The survey questions planned in the evaluation were all asked and analyzed as part of the overall evaluation. The abundance of survey data was sufficient to appropriately address the hypothesis. A number of the originally planned activity data metrics were applied to address other analyses within the report.

Hypothesis 2a:	Users who previously did not have access to TNCs for first-mile/last-mile (FMLM) trips will now have access to TNCs to complete FMLM trips.

Proposed analysis: The analysis of this hypothesis would rely on survey data from riders/passengers. The survey would contain questions about perceptions of mobility and accessibility. Among those, would be questions that asked about the ways in which respondents traveled to and from public transit prior to Via. The responses among those with household incomes less than $50,000 as well as those without a smartphone would be analyzed separately for this hypothesis. Questions would evaluate whether respondents perceived a change in their accessibility to public transit and whether they felt they had more options to access and egress public transit.

Executed analysis: The analysis was generally executed as originally planned. One change was that survey questions asking whether respondents had a smartphone were dropped from the final survey. The main reason for this change was that it was expected that users lacking smartphones would be very rare, particularly given that Via primarily engaged users through a smart phone app. The analysis instead focused on households with annual incomes below $50,000, which was expected to cover any users that did not have smartphone at the time. Questions were analyzed that evaluated changes in perceived access to services, cost savings, changes in travel and wait times, impacts on mode choice, and other related metrics.

Hypothesis 2b:	Integration of Via into the ORCA card will increase its use among: 1) low-income populations, 2) unbanked populations, 3) minority populations.

Proposed analysis: The survey would ask questions about ORCA use. Questions would evaluate the number of ORCA transactions that respondents made to access Via, and whether the integration of Via with ORCA played a substantive and causal role in their use of the system and their access to transit. The questions would ask respondents whether they felt the integration of Via with ORCA increased their use of Via as a result. The distribution of responses of those meeting the demographic criteria outlined above would be evaluated separately to ascertain whether Via integration with ORCA increased its use among these populations.

The ORCA payment data would be evaluated to ascertain whether mapping of transactions could be done to areas that are of low-income and whether the number of unique IDs increases within these areas (Census Tracts) during the course of the evaluation. The ORCA data would be used to evaluate whether the increase in transactions from unique user and/or card IDs is associated with Via use. The evaluation team would determine whether ORCA transaction data showed an increase in the number of unique cards being used in low-income Census Tracts served by the project.

Executed analysis: This analysis mostly followed what was originally planned. The main difference was that provided ORCA data did not have sufficient transaction information in low-income areas. ORCA data and survey data was otherwise used to address the hypothesis.

Hypothesis 3:	Number of public transit users in both regions will increase as this new service will create more options for riders, specifically for FMLM.

Proposed analysis: The analysis would evaluate whether the number of unique users overall increased for the transit facilities targeted in this evaluation. The ORCA data would be evaluated to ascertain whether there was an increase in the number of active cards IDs being used within the targeted areas. The ridership data would be used to evaluate broader trends in ridership in the context of trends in unique active card IDs. The Via travel activity data may have been used to support the evaluation of the hypothesis by confirming that trends in ridership and ORCA data were correlated with Via travel activity data.

The survey would also support evaluating this hypothesis. The survey would contain questions about user travel behavior and whether the implementation of the project affected their transit use. The evaluation would specifically look at metrics like the percentage of users that indicated that they increased their use of public transportation due to the improved FMLM access to transit as a result of the project.

Executed analysis: This analysis mostly followed what was originally planned with respect to the survey analysis. The ORCA data did not have sufficient information on the location of transactions to be applied effectively and the survey data offered sufficient evidence in support of the hypothesis.

Hypothesis 4:	At the selected transit stops, the availability of the new service TO a transit station will increase transit ridership for that system.

Proposed analysis: The survey would contain questions about user travel behavior and whether the implementation of the project affected their transit use. The survey would ask questions about recent trips made, and whether the cost reductions provided for Via travel impacted or influenced their propensity to use public transit. The survey would more generally probe whether the availability of Via influenced their use of public transit and whether that influence was due to better access TO public transit.

The payment activity and ridership data from the public transit systems would be used to identify trips that are connections to the targeted transit facilities. Ridership, payment, and Via data would be evaluated to determine whether there was an increase in connections versus a shift from one mode to another. The analysis would evaluate the trends in connections to transit and determine whether they departed from historical trends in a manner that was statistically significant. The data would further evaluate whether Via activity correlated with any identified trends in connection to public transit facilities.

Executed analysis: The analysis mostly followed what was originally planned with respect to the survey analysis. The ridership data available was not sufficient to determine if there were mode shifts at a large scale. Evidence from the survey was sufficient to address the hypothesis.

Hypothesis 5:	At the selected transit stops, the availability of the new service FROM a transit station will increase transit ridership for that system.

The modifications to the analysis were consistent with the modifications made for Hypothesis 4.

Hypothesis 6:	The availability of the new service will decrease fuel consumption and greenhouse gas (GHG) emissions associated with the customers using the service.

There were no differences between the proposed and executed analyses for Hypothesis 6.

Hypothesis 7:	The availability of the new service will decrease congestion from personal (non-TNC) vehicles.

Proposed analysis: By evaluating the driving distance data, researchers would aim to determine the total travel distance by hour that result from the activity of the Via vehicles. The analysis would further identify all individual trips taken by Via and evaluate them by time of day, determining the distance that would have been traveled had these trips been taken by SOV. Similar to the analysis described in Hypothesis 6, the evaluation would use survey data to evaluate the degree to which these trips substituted for SOV travel versus other modes that would not add to congestion. The evaluation team would attempt to reconstruct the routes that would have been taken by SOV travel for the displaced trips to determine if particular routes were de-congested at particular times.

The analysis would apply a script on Google Maps to determine transit travel times using activity data origins and start times. That is, data from the TNC activity data would be fed to Google Maps to evaluate what the transit travel time would have been with that trip. This would be compared against the time reported through the activity data. These differences in travel times would be tested to determine the degree to which the mean is statistically different from zero. The IE team would further use the survey to evaluate whether respondents felt that they could travel faster to the location.

Executed analysis: As planned, the analysis used survey data to evaluate mode substitution due to the system to determine the degree to which SOV travel was substituted. Also as planned, activity data was evaluated by hour, as was the miles driven by individual vehicles within the system. The reconstruction of routes was not doable with the data available.

Hypothesis 8: Mobility for persons with disabilities will be improved due to WAVs through the Via platform.

Proposed analysis: The WAV trip times conducted by Via would be calculated using the Via trip data. The evaluation team would average the total trip time over total distance across all WAV rides to get an estimate of WAV speed. The trip times conducted by the alternative mobility option would be calculated using the survey responses. Users with a disability would be asked about their mobility options prior to their use of WAV rides through Via. From this information, the evaluation team could aggregate the distances and times associated with prior transit methods to get an estimate of non-WAV speed.

Executed analysis: There was an abundance of survey information that was available to address the hypothesis. The analysis relied on the survey data to draw conclusions. Calculations of WAV activity data was applied to other parts of the evaluation.

Hypothesis 9 (removed): FMLM service to passengers with disabilities is equivalent to that provided to passengers without disabilities.

The hypothesis was removed. Alternatively, an analysis of wait and travel times experienced by those using wheelchair accessible vehicles (WAVs) compared to those traveling in standard vehicles was presented. Also, perceptions of changes in FMLM average wait and travel times were presented for persons with disabilities and persons without disabilities.

Hypothesis 10 (now 9): Riders will have a safer option to and from the station as a result of Via.

There were no differences between the proposed and executed analyses for Hypothesis 10. Crime data was only available for Los Angeles. The analysis in Puget Sound relied exclusively on survey data.

Hypothesis 11 (now 10): Subsidies per rider on Via are lower than the subsidies provided on other FMLM options.

There were no differences between the proposed and executed analyses for Hypothesis 11.

Hypothesis 12 (now 11): The average distance and geographic spread of travel to and from selected stations will be larger than prior to the project.

Proposed analysis: The objective of this hypothesis was to determine if the availability of improved FMLM options would increase the geographic diversity and spread of locations from which people are accessing or egressing from public transit. Via trip data could potentially reveal the general origins and destinations of people taking the service. Those accessing transit stations could be isolated in the data set. The origins and destinations of these trips could be evaluated for geographic spread over time. The

survey could support the analysis by revealing which users increased their use of transit and where those users lived relative to accessible lines/routes. The geographic spread of Via trip data also may have been comparable to the spread of ridership data, to determine whether Via was enabling connections to transit that were not accessible or highly utilized in areas with more limited public transit options. The capacities of addressing this hypothesis would be highly dependent on data quality and resolution.

Executed analysis: The analysis used a mix of survey and activity data. The distribution of trip distances were plotted and analyzed within each pilot region. Survey data evaluated the perceived accessibility of users during early and late stages of the pilot project. Ridership data from prior to the project that would give insights on the distance and geographic spread of travel was not available.

Hypothesis 13 (now 12): The average minutes per dollar spent to access and egress the station will decline among all users.

Proposed analysis: Using the Via trip data, the analysis would take the trip times and cost, and compute a metric of minutes / dollar spent. Using the origins and destinations of the Via trip data, the evaluation team would then determine the method that the traveler would have had to use in order to access the station using conventional transit. The expense and time of that alternative trip would be used to calculate the same metric for the conventional transit trip. The average of these metrics across all trips would be computed for the two trips, and the means would be compared using the t-test. The observations would be paired technically, so the paired t-test would be most appropriate.

Executed analysis: The hypothesis was changed to evaluate the average velocity per dollar as opposed to the average minutes per dollar as this was considered to be a better metric to measure the cost effectiveness of mobility. The analysis was otherwise executed generally as planned with the revised metric. Assumptions were applied to the alternative bus trip considering average speeds and standard fares for fixed route bus travel. The observations were not paired and applications of the paired t-test were not applied. The comparisons generated by the revised metrics of each mode were applied to generate conclusions about the hypothesis.

Hypothesis 14 (now 13): The project produces a series of lessons learned that will be documented through expert interviews with project stakeholders.

There were no differences between the proposed and executed analyses for Hypothesis 14. However, it was combined with Hypothesis 15 below, where lessons learned on all issues were covered under a single hypothesis.

Hypothesis 15 (removed): The project produces a series of lessons learned with respect to institutional relationships and systems that can be applied to other transit operators.

See above.

U.S. Department of Transportation
ITS Joint Program Office – HOIT
1200 New Jersey Avenue, SE
Washington, DC 20590

Toll-Free “Help Line” 866-367-7487

www.its.dot.gov

Federal Transit Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

www.transit.dot.gov

FHWA-JPO-18-698

U.S. Department of Transportation