

Evaluation Plan
for
The City of Philadelphia Digital Right-of-Way (ROW) and Mobility Improvement Project

Title: Philadelphia Digital ROW and Mobility Improvement SMART Grant Project

Recipient Name: City of Philadelphia

Fiscal year of award: 2023

Period of Performance: September 15, 2023 – March 15, 2023

Organizations preparing Plan: City of Philadelphia Office of Innovation and Technology

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Part 1: Introduction and Project Overview

The City of Philadelphia's Digital Right-of-Way (ROW) and Mobility Improvement Project ("the Project") seeks to address two major challenges: scarcity in ROW space; and scarcity of information about the ROW and its users. Recently increasing proliferation of businesses and rapid delivery business models such as food delivery services and digital ridesharing services heighten competition for ROW access in Philadelphia's spatially-constrained streets. Accurate, granular, integrated, and up-to-date information about the ROW must be made available and maintained digitally to ensure maximum safety, reliability, equitability, and sustainability of ROW use.

With the SMART Grant funding from USDOT, the City will digitize street, sidewalk, and curbside space within a 112-block project area in Center City and develop online applications for ROW management and to communicate ROW information to ROW users. The City will also deploy updated Transit Signal Priority (TSP) technology, as well as use matching funds to deploy upgraded signal controller technology to lay the groundwork for integrated traffic data collection and controls, and digital signages to convey augmented information about the ROW to ROW users. Through these technologies, the City aims to optimize ROW use in a manner that increases safety and reliability and provides economic and environmental benefits through reduced congestion, decreased idling, and improved traffic flow.

Technology to be deployed:

- Smart Right-of-Way Management Software (systems integration)
- E-Ink or similar Digital Signages (approx. 30, systems integration)
- Traffic Signal Controller Upgrades (approx. 40, smart technology traffic signals)
- Transit Signal Priority Upgrades (smart technology traffic signals)

Proof of Concept

The project is divided into two main phases: planning; and prototyping. In the planning phase, the City will work with a professional services vendor to establish the topology of a new basemap to precisely capture events along the ROW. The City and the professional services vendor will also assess existing processes that interact with ROW-based information, thereby providing a deeper understanding of how technologies in the prototyping phase must publish information in a manner that avoids heavily disrupting legacy systems and processes. All of the above will be done with an eye towards enabling an eventual digital ROW inventory that meets the Open Mobility Foundation's (OMF) Curb Data Specification (CDS). This exercise will be conducted for the project area only, though scaling of the lessons learned and deliverables of this phase should be largely owned by the City directly and therefore not cost-prohibitive in Stage 2.

In the prototyping phase, the City will deploy a "Smart Right of Way" Software-as-a-Service solution building off of the topology and process map from the planning phase to allow web-based applications to improve ROW management and ROW user experience. In this phase the City will also deploy: digital signages to communicate up-to-date and concise information about the ROW to ROW users; upgraded TSP technology to increase public transit (bus) reliability and throughput; and upgraded traffic controllers and signals at approximately 40 intersections to integrate with the City's and State's traffic operations centers and to replace outdated electromechanical controllers. These technologies will be

deployed throughout the 112-block area in Center City bounded by Spring Garden Street, South Street, Broad Street, and 6th Street.

The Stage 2 scale-up is anticipated to consist of digitization and integration into the Smart Right of Way SaaS of all relevant assets and ROW data at a citywide level. Deployment of all other technologies contemplated under Stage 1 and mentioned above at a citywide level would likely be cost-prohibitive based on the maximum amount of awards contemplated by USDOT for Stage 2. Prioritization of siting of Stage 2 deployments of the same or similar technologies will be performed subject to the results of the Stage 1 evaluation, lessons learned from other cities in the cohort as applicable, and the practical needs of City agencies and departments at the time of application to Stage 2.

Evaluation Process Summary

Evaluation will be conducted collaboratively between staff from the Office of Innovation and Technology (OIT), Streets Department, and vendors, with possible additional consultation and collaboration from or with the Open Mobility Foundation, other cities in the cohort, and local academic partners. Vendors will be asked to provide discrete reports at regular intervals during the performance period, and final reports within the last month of the grant performance period related to the technology (and/or services) that each is providing. OIT and Streets staff will internally track performance metrics (described in detail in Part 3, below) for each of the deployed technologies. Data captured through legacy systems as well as the newly-deployed technologies in Stage 1 may be retrospectively added to the evaluation schema upon discovery of its relevance by other cities in the cohort or any other source. Finally, Office of Innovation and Technology staff will also conduct community engagement activities in the project area and provide mechanisms to collect community feedback and input to ensure that any Stage 2 implementation is informed by community involvement.

Part 2: Project Goals and Objectives for At-Scale Implementation

Project Goals

The City's Stage 2 project is anticipated to focus on scaling-up the digital (software) aspects of the Stage 1 prototype at or near a citywide level. In Stage 2, additional information about the ROW that currently exists in disparate or entirely non-digitized systems will be ingested into and integrated with the data topology and process map(s) derived from the planning phase of Stage 1. Stage 2 will also entail integration of further to-be-determined legacy systems into the Smart Right of Way software and vice-versa. Finally, Stage 2 anticipates further deployment of upgraded traffic signal controllers, TSP software and hardware, and digital signages in accordance with lessons learned about these systems' integration with Smart Right of Way software and other legacy City systems in Stage 1. The deployment of other as-yet-unidentified "smart" ROW technologies in Stage 2 is not out of the question.

GOAL AREAS	QUALITATIVE (or Quantitative if available) DESCRIPTION DIRECTION OF CHANGE OR LEVEL AND IMPACT TARGET
Safety and reliability: <i>Improve the safety of systems for pedestrians, bicyclists, and the broader traveling public. Improve emergency response.</i>	<ul style="list-style-type: none"> • Reduce conflicts between transit vehicles, private vehicles of all types, cyclists, and pedestrians in all areas of the ROW • Reduce conflicts amongst and between transit and non-transit ROW uses e.g. permitted road closures, special events, curbside dining
Resiliency: <i>Increase the reliability and resiliency of the transportation system, including cybersecurity and resiliency to climate change effects.</i>	<ul style="list-style-type: none"> • Improve the effectiveness of curb management policy and space allocation to better inform and serve ROW users • Increased transparency and awareness about the status of the ROW by ROW managers and e.g. first responders
Equity and access: <i>Connect or expand access for underserved or disadvantaged populations. Improve access to jobs, education, and essential services.</i>	<ul style="list-style-type: none"> • Improve transit outcomes and options for those who cannot afford to own a private vehicle
Climate: <i>Reduce congestion and/or air pollution, including greenhouse gases. Improve energy efficiency.</i>	<ul style="list-style-type: none"> • Reduce transportation-created pollutants by reducing idling and circling time due to clearer curb policies and signages and the proliferation of APIs based on e.g. CDS to enhance drivers' ability to locate available parking
Partnerships: <i>Contribute to economic competitiveness and incentivize private sector investments or partnerships, including technical and financial commitments on the proposed solution. Demonstrate committed leadership and capacity from the applicant, partners, and community.</i>	<ul style="list-style-type: none"> • Increase the level of coordination between City agencies and departments and close City partners such as PPA and SEPTA due to standardized digitized curb data and integrated systems • Provide city-wide curb regulation data in CDS and other formats to support the proliferation of APIs based on e.g. CDS
Integration: <i>Improve integration of systems and promote connectivity of infrastructure, connected vehicles, pedestrians, bicyclists, and the broader traveling public.</i>	<ul style="list-style-type: none"> • Improve the systems and processes to manage the ROW and to ingest and publish data about the ROW • Increase interoperability amongst and between new and legacy systems and datasets via the Smart Right of Way software • Reduce duplication of effort or inconsistencies in ROW use or management due to integration of systems

Anticipated Costs of At-Scale Implementation

The project area for Stage 1 represents only 1/141 of the City's area. Though a very crude means for estimation, one could anticipate that a citywide scale up of the deployed *physical* technologies may cost up to one-and-a-half hundred times the amount contemplated for those items in Stage 1, or approximately \$210 million. As mentioned above, the City would have to prioritize sections for a Stage 2 scale-up as this amount far exceeds the contemplated maximum awards for Stage 2.

Part 3: Performance Measures for the Proof-of-Concept or Prototype

Table of Evaluation Questions and Performance Measures

Goals	Evaluation Question	Performance Measure	Performance Measure Target (Stage 1)
Overall Project Goal	Can a ROW basemap with granularity beyond the centerline level (e.g. lanes, sections) be established and integrated with new and legacy systems to more effectively manage and inform users about the ROW?	ROW managers' ability to add, alter, or query information about the ROW at a granular level	ROW managers report better user experience with ROW management systems and outcomes Enhanced data about ROW able to be queried through APIs for new or extant web apps
Safety and Reliability:	Does availability of better data about the ROW lead to fewer conflicts, incidents, injuries, and/or deaths?	# of conflicts, incidents, injuries, deaths in ROW in project area	Statistically significant reduction in conflicts, incidents, injuries, deaths in ROW in project area
Resiliency	Does availability of better data about the ROW lead to better responses to disasters/emergencies?	Amount of congestion caused by sudden changes in ROW Ability of first responders to route around or to sudden changes in ROW	Reduced congestion resulting from sudden changes in ROW Faster emergency vehicle response times from departure to destination
Equity and access	Does availability of better data about the ROW lead to better transit and transportation outcomes for	Community feedback	Members of Justice40-identified communities report improved transit and transportation outcomes

	Justice40-identified communities?		
Climate	Does availability of better data about the ROW lead to lower levels of transit-related emissions?	Instance of circling, idling	Statistically significant reduction in instances of circling, idling
Partnerships	Does availability of better data about the ROW lead to increased coordination between City agencies and departments?	Feedback from variety of City agencies and departments and City-adjacent authorities e.g. PPA and SEPTA	Stakeholders report greater interagency or interdepartmental coordination around ROW management
Integration	Can new and legacy ROW management systems integrate with a more granular ROW basemap?	Interoperability of legacy systems and the Smart Right of Way software	Legacy systems, APIs, and the digital signages, TSP, and traffic signal upgrades deployed here communicate effectively with Smart Right of Way software

Part 4: Evaluation Methodology for the Proof-of-Concept Prototype

Evaluation of the interoperability and usability of the central Smart Right of Way software system will rely on the process map established in the planning phase of Stage 1. With the help of a professional services vendor, the City will inventory processes and workflows that interact with or rely upon information about the ROW. Deployment of the Smart Right of Way software system will seek wherever possible to digitize, integrate, and otherwise streamline those processes. The evaluation of the efficacy of the Smart Right of Way software and integration will necessarily be tied back to how many ROW processes were able to be digitized and integrated, to what extent, and with what benefits. This evaluation will be conducted in coordination between the Office of Innovation and Technology, the Streets Department, both professional services and software vendors, and possibly a local academic institution.

For evaluation along the Safety and Reliability, Resiliency, and Climate goals above, the City will use baseline data from its recent Smart Loading Zone pilot (two studies of multiple zones within the project area including baseline levels of events such as vehicular conflict with bicycles or pedestrians, impediments to traffic flow due to double parking, and non-compliance with parking regulations). Comparative studies using the same or very similar methodology should be deployed at the same locations after all project technologies have been successfully deployed. These statistics can be augmented with further data around these goals, such as crash statistics from e.g. the Delaware Valley Regional Planning Commission, both pre- and post-project technology deployment.

Evaluation will be conducted collaboratively between staff from the Office of Innovation and Technology (OIT), Streets Department, and vendors. It is anticipated that the City will work with the OMF, as the project coordination entity for the cohort of cities including Philadelphia in addition to Los Angeles, Miami, Minneapolis, Portland, San Francisco, San Jose, and Seattle, throughout the project to establish evaluation best practices and share mid-project learnings throughout the cohort. As the sole steward of the CDS, OMF is in the best position to assist the City with the evaluation of its primary and overarching goal of establishing a more granular ROW basemap that can be published in an open data format and made readily available to app developers and, ultimately, ROW managers and users.