# Philadelphia Digital Right-of-Way and Mobility Improvement Project

Strengthening Mobility and Revolutionizing Transportation (SMART) Grant Program
Funding Opportunity: DOT-SMART-FY22-01
Funding Opportunity Title: Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program

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**SMART Grant Application**
Location: Philadelphia, Pennsylvania
Area Type: Urban
Amount Requested: $2,000,000

City of Philadelphia
Municipal Services Building
1401 John F. Kennedy Boulevard
Philadelphia, PA 19102

November 18, 2022

# Narrative

City of Philadelphia
Philadelphia Digital ROW & Mobility Improvement Project
2022 SMART Grant Program
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City of Philadelphia

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**Appendices**

# SECTION 1. OVERVIEW & PROJECT DESCRIPTION

## 1.1 INTRODUCTION

The City of Philadelphia (City) requests $2 million in USDOT SMART grant funding for the **Philadelphia Digital Right-of-Way and Mobility (ROW) Improvement Project**. The proposed project seeks to address two major City challenges: 1) scarcity in ROW space; and 2) scarcity of information about ROW users. USDOT SMART grant funding will support digitizing street, sidewalk, and curbside space (referred to as "right-of-way" or "ROW" space) within the project area and developing an online application to communicate ROW information to ROW users.


The City of Philadelphia will provide match funding to deploy advanced traffic sensors, smart traffic cameras, and upgraded signal technology that will collect anonymous data on travel times, travel patterns, and routing, as well as deploying innovative transit signal priority communication technology, which is required infrastructure for data collection, and is a necessary pre-requisite for digitization. Together, the proposed activities will allow the City to better understand how ROW is currently being utilized and will enable the City to digitally manage the public ROW using a real-time, reservation-based system. Optimizing ROW use in this way will provide safety, reliability, economic, and environmental benefits by reducing congestion, decreasing unnecessary idling, and improving traffic flow.

The proposed demonstration will be conducted within Philadelphia's historic 340-year-old Center City. Founded in 1682, Center City remains rooted in William Penn's urban street grid system, which was planned well over 200 years before automobiles became commonplace. Most arterial streets are 25' wide – just enough room for two travel lanes and a narrow parking lane. Local streets are usually less than 12' wide, and some are less than 8' across.

Given the ebbs and flows of modern pedestrian and vehicular traffic, the City requires innovative technology to optimize ROW usage and meet the demands of twenty-first century life. Continually rising population has placed substantial strain on Philadelphia's dense and spatially constrained transportation network. Additionally, the City anticipates increased strain on already limited space as Centers for Disease Control and Prevention (CDC) relaxes Covid-19 restrictions, and Philadelphians return to places of work, education, and tourism.

Center City's northeast and southeast quadrants are home to Census tracts identified by USDOT as Historically Disadvantaged Communities (HDCs), Areas of Persistent Poverty (APP), and Environmental Justice (EJ) Communities City residents and visitors in the project area compete for scarce curb space. Improving curb space management, and providing Philadelphians with accurate ROW information, is an urgent, critical need for the City.

This project builds upon ongoing City efforts, including SmartCityPHL's "Smart Zones" Pilot project launched in Fall 2022, which focuses on safe and efficient curb space solutions for delivery drivers. Furthermore, lessons from the proposed demonstration are expected to promote a greater understanding of how data can be operationally institutionalized and used to improve curb usage on a national scale. The City of Philadelphia has joined Boston, Los Angeles, Miami-Dade, Minneapolis, Portland, San Francisco, San José, and Seattle in submitting collaborative applications towards this effort.

## SECTION 2. LOCATION

The Project is located within the City of Philadelphia, PA, Urbanized Area (UZA) in Congressional District PA-03 (see Figure 2.1.) and is situated around the eastern portion of Center City. The full project area is bounded by Spring Garden Street to the north, South Street to the South, Broad Street to the west, and 6th Street to the east. The project area boundary is primarily guided by three factors: equity, economic conditions, and travel patterns.

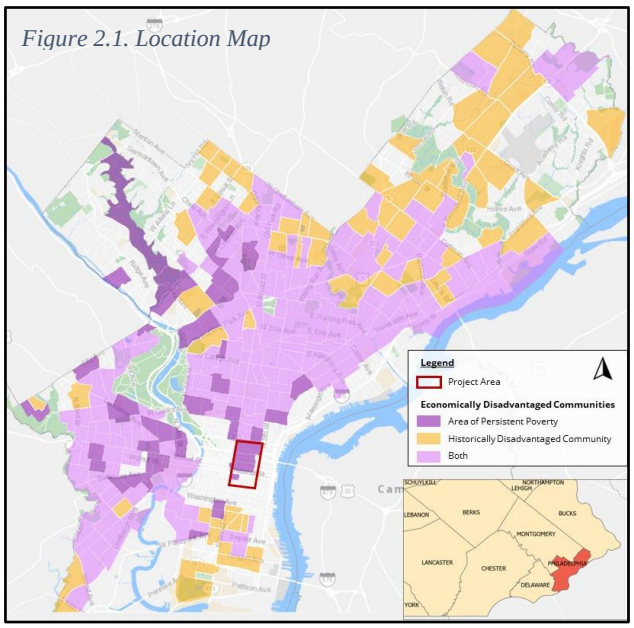

*Figure 2.1. Location Map*

- **Equity**: The project area consists of Census tracts that are either identified by USDOT as Historically Disadvantaged or Areas of Persistent Poverty as well as areas identified by the Climate and Economic Justice Screening tool as disadvantaged.
- **Job and Population Growth**: The project area has the highest concentration of jobs in the region and is the most accessible by all modes – walking, driving, biking, and transit. Growth of the region's economy over the last 10 years has been particularly pronounced in this part of the greater Philadelphia region. Between 2010 and 2014, the project area experienced an 11% increase in population. For context, total population fell by 6% between 1980 and 1990 and dropped by 1% between 1990 and 2000.
- **Travel Patterns**: The travel patterns in this part of the City are distinct. According to the Philadelphia Planning Commission District Plan, 35% of residents in the area commute to work by automobile compared to 60% in the rest of the City, while 30% commute by walking and 6% by biking compared to 8% and 2% respectively for the City as a whole. Based on DVRPC cordon counts, when excluding through-trips on I-95, 48% of passenger trips entering and exit the core Center City area (from river-to-river and from Vine Street to Pine Street) by private vehicle whereas 52% do so by transit, biking, or walking.

# SECTION 3. COMMUNITY IMPACT

The City of Philadelphia's commitment to promoting equity and fostering diversity is central to the City's mission, as stated in *Connect Philadelphia's Strategic Transportation Plan (2018).* The City's transportation strategy prioritizes projects benefitting all Philadelphians, regardless of race, income, or ability.

The proposed project will direct City resources towards HDCs, which historically have received less infrastructure investment. Only a quarter of the City's 3,000+ signals are integrated with the City and State's traffic operations center. Roughly 51% of City signals rely on antiquated electromechanical controllers, and other technologies from the 1950s. Lack of infrastructure investment prevents the City from deploying modern tools to collect continuous data on ROW users and guide decision making.

The proposed work will optimize ROW usage, benefiting HDCs by increasing access to economic, educational, and cultural opportunities in Center City. A Philadelphia Community Needs Assessment (2020) identified transportation as the largest obstacle to employment for low-income residents. For the one out of every four Philadelphians living in poverty, an effective, safe, and dependable public transportation system can represent the difference whether they can reliably get to an interview, job, or class. Digitizing City's ROW management will significantly improve the City's ability to deliver a transportation system that is more reliable and equitable.

# SECTION 4. TECHNICAL MERIT OVERVIEW

## 4.1 PROBLEM DESCRIPTION

The proliferation of businesses and rapid delivery business models (e.g. food delivery services, digital ride-hailing services, etc.) heightens competition for right-of-way (ROW) access throughout Philadelphia. As online purchasing and expectations for rapid delivery increases, efficient use and timely access to right-of-way (ROW) space is essential for local businesses, restaurants, stores, and manufacturers. That same ROW space is also in demand for long-established transportation related functions like transit, walking, biking, and driving.

Spatially constrained City streets serve a highly dense mixed-use urban fabric. Most of the City's arterial streets are 25' wide, which is just enough room for two travel lanes and a narrow parking lane. Local streets are usually less than 12' wide, and some are less than 8' across. Philadelphia is Pennsylvania's largest city, the second-largest city on the east coast of the United States, and the sixth-largest city in the United States. Prior to the COVID-19 Pandemic, Center City served a daytime population of over 400,000 people. To support current and future user demand, the City requires innovative technology to optimize ROW usage.

At the center of this issue lies the City's inability to capture data at a level of "spatial granularity" appropriate for ROW management. The City's ROW operations depend on mapping streets using centerlines. Each centerline is an abstraction of the entire ROW for an entire block length (see 4.1.a). This is a challenge because City operations (including street closure permits, bus stops, etc.) occur at a unit closer to per foot per lane. To streamline ROW operations, the City must develop a new base map capturing granular details. Without a granular base map of the City's ROW, the City has been unable to accurately and efficiently capture information about ROW usage. This has prevented establishing broader planning and operational processes to best leverage City's most valuable property asset.

*Figure 4.1*

*Fig. 4.1.a: Without data-driven planning, the City cannot effectively address ROW conflicts.*

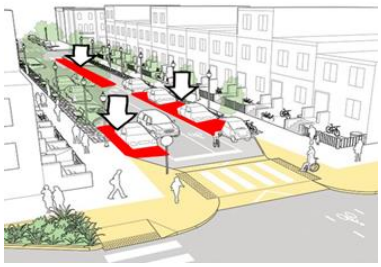

*Fig. 4.1.b: A granular base-map informed by accurate, real-time data allows optimal ROW use.*

Inefficient ROW management is detrimental to user experience; today's ROW users often rely on familiar tools (e.g. Google Maps) to plan and navigate trips, yet these apps do not account for limitations presented by the City's curb space usage. This gap in information encourages unsafe behaviors such as double parking, parking within crosswalks, idling, or circling multiple blocks in search for a parking space.

Modernizing traffic monitoring and operating technologies are top City priorities; however, reliance on legacy technology poses constraints. Only a quarter of the City's 3,000+ signals are integrated with the City and State's traffic operations center. Roughly 51%of City signals rely on antiquated electromechanical controllers and other technologies from the 1950s. Without these investments, the City is prevented from deploying modern tools to collect continuous data on ROW users, and to communicate ROW information to ROW users.

## 4.2 PROPOSED SOLUTIONS AND BENEFITS

To address constrained mapping abilities, lack of processes, poor user experience, and outdated infrastructure, the **Philadelphia Digital ROW & Mobility Improvement Project** proposes a two-phase approach to establish standards for mapping and communication and deploy hardware to enable digital management of ROW.

First, the City will implement a three-component **Planning Phase** addressing multiple dimensions of ROW management. The first component will establish the topology of a new base map to precisely capture events along each sidewalk, parking, travel, or bike lane. The second component will assess existing processes that interact with the ROW-based information, providing a deeper understanding of how the technologies in the Pilot Phase must publish information to avoid heavily disrupting legacy systems and processes. The third component will develop network capabilities to connect traffic signals, sensor gateways, and bus routes within the project, supporting real-time communication, and facilitating Transit Signal Priority (TSP) deployment. Details about location and type of communication will be established through this step. All **Planning Phase** components will be implemented concurrently to ensure project completion within the required timeframe.

In the second project phase, or **Pilot Phase**, the City will use Planning Phase findings to deploy and evaluate technologies for efficient digital ROW management. The deployed hardware technologies in the **Pilot Phase** will include digital signage, parking sensors, networked communication devices, and signal technology upgrades. The City will test innovative software technologies such as augmented-reality based inventory of assets and regulations, and multiple web-applications designed to improve user experience for users to "reserve" curb spaces and improve operations for Streets Department ROW managers.

The **Pilot Phase** will leverage the City's SmartCitiesPHL Pitch and Pilot program to ensure timely completion of all procurements and deployments. New procurement strategies recently established by the SmartCitiesPHL project team will allow seamless expansion of successful technologies tested in the **Pilot Phase**. The upgrades will be supported by revenue generating opportunities from the pilot. Lessons from the City's on-going Smart Loading Zone pilot show that delivery companies value the ability to reliably use and reserve space. A curb space reservation system will allow the delivery companies to turn high monthly fines for illegal traffic behaviors (e.g. double parking) into fees. Monthly fines for some delivery service companies have exceeded six figures, showing a willingness to pay fees for the sake of predictable deliveries. The proposed reservation-based system would create tax deductible solutions at a lower cost to businesses.

The City also intends to deploy innovative transit signal priority (TSP) communication technology in collaboration with SEPTA to enhance transit operations in conjunction with digital ROW management improvements. While TSP has been tested in the past, breakthroughs in technology such as large scale data processing, GPS tracking, and interconnected signal platforms will allow the City and SEPTA to develop new, innovative strategies for implementing TSP in a manner that ensures faster and more reliable service. Bus riders represent over half of SEPTA's total ridership, and the majority of SEPTA operations are within Philadelphia. With this logic, TSP improvements have the potential to affect 100+ million bus trips per year when deployed at scale.

# SECTION 5. PROJECT READINESS

## 5.1 WORKPLAN

The City is prepared to execute a grant agreement with USDOT within one year of award announcements. As stewards of a federal grant, the City will ensure funds are expended responsibly and in a timely manner. The City is also committed to completing the project within the required 18-month period of performance. As described in Section 5.3, the City has considerable experience successfully delivering complex, federal funded infrastructure projects. The City's track record is supported by its team of subject matter experts identified in Section 5.3. The team is led by Michael Carroll who currently serves on the Board of Directors for OMF. Furthermore, the ongoing "Smart Loading Zone" pilot, managed by the City's SmartCityPHL team, has set a strong foundation for the **Digital Right-of-Way and Mobility (ROW) Improvement Project** and provides a roadmap for the City to deliver meaningful results. A timeline of the project is provided in Table 5.1.

*Table 5.1. Project Schedule*

| Major Activities | Start | End | Duration |
|---|---|---|---|
| Grant Award Announcement | March 2023 | | |
| Grant obligation (signed grant agreement) | March 2024 (or earlier) | | |
| Planning Phase Activities | March 2024 | Aug 2024 | 6 Months |
| Pilot Phase Activities | Sept 2024 | Aug 2025 | 12 months |
| Project Completion | Aug 2025 | | |

**Planning Activities**: Planning Phase activities will focus on establishing standards for mapping and communication. The Smart Loading Zone pilot project has helped the City develop a strong understanding of the technical landscape available in the market today that support ROW inventory. Hence, the City is well positioned to procure the right technologies and complete a successful inventory in a relatively quick timeframe.

**Pilot Phase Activities**: Pilot Phase activities will focus on deploying hardware to enable digital management of ROW events. The Pilot Phase will focus on developing web-applications designed to improve user experience for ROW users. The City will upgrade existing traffic signal technology at approximately 40 intersections. As mentioned previously, the City will cover the costs associated with traffic signal upgrades. The City and project partners will demonstrate and test a prototype digital ROW management platform. The Smart Cities PHL team has established a Pitch n Pilot process that has successfully delivered technology project procurement and deployment in less than 10 months. The City and project partners will also demonstrate and test advanced TSP communication technologies to improve transit reliability. TSP efforts are grounded in a long-standing working relationship with SEPTA. City and SEPTA staff meet regularly to address problems related to bus service reliability. This relationship and commitment to transit prioritization are formally documented in a joint memorandum of understanding.

The City is committed to offering workforce opportunities for historically underrepresented groups throughout the project's life. Each year, the City aims to reach 35 percent participation from minority, women, and disabled-owned enterprises on its contracts. The City achieves this by maintaining a registry and database for certified disadvantaged businesses and communicating upcoming contract opportunities to that network. The City's Director of Federal Infrastructure will oversee contracting to ensure workforce development, inclusion, and diversity goals are sufficiently met for this project.

## 5.2 COMMUNITY ENGAGEMENT AND PARTNERSHIPS

The **Philadelphia Digital ROW & Mobility Improvement** project exemplifies a coordinated effort by the City, partners, and stakeholders involved in project implementation. This project is the first step towards a large, multi-phase effort by the City and its partners to collect data, analyze information and stakeholder experiences, and develop an implementation and funding strategy to efficiently manage ROW space in Philadelphia. This project will construct a strong foundation needed for both agency coordination and key stakeholder engagement. It is also rooted in a collaborative effort. Led by OMF, the City of Philadelphia has joined Boston, Los Angeles, Miami-Dade, Minneapolis, Portland, San Francisco, San José, and Seattle in an agreement to submit Collaborative Applications addressing similar problems with similar technologies. Specifically, cities will digitally gather and analyze curb information to reduce congestion, enhance livability, provide the tools to address equity, and improve safety on city streets. Participants will share common resources including technical assistance and network facilitation.

Additionally, citywide outreach is critical to this work. The City and its partners seek to enrich the public dialogue around ROW space management. As part of this effort, the City will host a facilitated public conversation demonstrating the ways in which outdated infrastructure can hinder ROW management. The City will host a public open house highlighting key insights found via data collection and showcasing the smart technology and tools available.

*Table 5.1 Project Partners*

| PROJECT PARTNERS |
|---|
| **Grant Applicants** |
| **City of Philadelphia (lead applicant)** – The City will serve as the lead recipient. In this role, the City will lead administration of the grant project. The City will be responsible for contracting services and equipment involving federal funds. The City will cover budget shortfalls and cost increases. |
| **Key Partners** |
| **Open Mobility Foundation (OMF)** – OMF is a committed partner in the City's SMART grant application and will support the implementation and development of the Curb Data Specifications (CDS). OMF will also provide technical assistance, peer learning, and capacity building. |
| **The Bloomberg Center for Cites at Harvard's Kennedy School (HKS)** – HKS commits to directly supporting Philadelphia and will convene a peer learning network of cities, facilitate best practices, support cities in the use of mapping and visualizations, and disseminate insights to wide policy audiences. |
| **INRIX** – INRIX is committed to providing the City with our industry leading products that support the outcomes of this project. These products and services include an existing dataset of right of way geometries, rules, rates, and availability analytics as well as other supportive administrative tools for growing the footprint of the current dataset. |
| **SEPTA** – SEPTA and the City will collaborate to demonstrate advanced Transit Signal Prioritization (TSP) technologies. SEPTA is committed to partnering with the City to ensure buses have TSP equipment that is compatible with the City's signal technology for use in conjunction with traffic signal coordination for bus service. This project supports ongoing efforts to optimize bus operations and service for transit riders which is documented in the City and SEPTA's joint memorandum of understanding (MOU). |

## 5.3 LEADERSHIP AND QUALIFICATIONS

The City has an excellent history of risk management, decades of experience managing and successfully delivering complex federally-funded capital projects (including USDOT TIGER, BUILD, and RAISE projects). To date, the City has successfully completed or is in the process of completing 6 grant awards totaling over $82 million. As proven, reliable stewards of federal grants, the City is well-versed in reporting requirements associated with such grants.

The project will be led by an experienced and highly capable team committed to project implementation. The digital ROW efforts will be led by the City's Smart City team; installing advanced traffic monitoring and operations technology will be led by the Department of Streets. This work will directly tie into the City's Traffic Operations Center (TOC) which has been working to streamline operations since 2016 through active traffic management. The TOC centralizes traffic control and intelligent transportation systems throughout the City. After smart camera technology deployment, the TOC will use collected data to better manage congestion. The transit priority communication technology will be led by the Philadelphia Office of Transportation, Infrastructure, and Sustainability (OTIS).

Letters of commitment signed by the Deputy Managing Director of OTIS demonstrate the City's functional capacity to carry out the project and to maintain and operate the project after completion.