

March 2023

City of Pittsburgh Smart Loading Zones Case Study

2023 Report



Automotus



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Overview

The Problem

Curbside deliveries have increased dramatically in Pittsburgh, like many other cities across the U.S. This is especially true for same-day and instant deliveries. Conventional curb users, including passenger vehicles, buses, taxis and bikes, are now competing with ride-hailing services, food delivery vehicles, and delivery trucks and vans. This competition and jockeying at the curb exacerbates safety concerns and increases pollution and congestion. Before the pandemic, the World Economic Forum projected an estimated 36% increase in commercial vehicles on city streets by 2030. This is expected to lead to a 32% increase in emissions, 21% increase in congestion, and an additional 11 minutes of commute time per passenger per day. Since that prediction was made, commercial vehicle use has surged, with e-commerce growing 44% in 2020 alone.

The Solution

- Use comprehensive curb activity data to inform smarter policies and regulations
- Increase compliance with curb policies through fully automated payment and enforcement
- Use graduated rates to incentivize turnover and create easy access to curb space for drivers

Minutes	Rate per minute	Total maximum cost
0-5	\$0.067	\$0.33
5-15	\$0.134	\$1.67
15-30	\$0.20	\$4.67
30-60	\$0.267	\$12.67

Pittsburgh rate structure for Smart Loading Zones adopted in December 2021



Overview

Anticipated Outcomes

- Align parking and loading policies with real-time data
- Decrease emissions from unnecessary idling & circling
- Reduce parking-caused traffic by 20% and double-parking by 60%
- Generate additional revenue from parking and loading
- Increase parking turnover for restaurants and small businesses
- Improve safety for pedestrians, cyclists, and other curb users
- Increase delivery efficiency and reduce dwell time



How do Smart Loading Zones Work?

Smart Loading Zones rely on innovative digital camera technology to collect data that stakeholders can then use to create a more efficient loading zone experience, increase revenues, and improve safety for the diverse range of curb space users. The technology facilitates several important opportunities to achieve these objectives including data collection and analysis, automated payments and billing, and automated enforcement.

Cities and parking authorities can access all of the loading zone data needed to evaluate patterns and develop and implement policies to increase turnover, reduce carbon emissions, and improve safety for everyone using the streets and sidewalk spaces. A comprehensive dashboard allows the city to customize the data obtained to fit their specific needs. In addition, Automotus will work with the parking authority to automatically invoice loading zone patrons for the exact amount of time they use the space, making it easier for commercial fleets and businesses to pay for their driver parking while eliminating the need for parking meters and apps.

From an enforcement standpoint, the solution automatically captures all loading zone utilization in real-time, letting the parking authority know when a violation occurs and sending a notification to enforcement staff. The parking authority can also monitor all violations at any time, helping them understand any unusual or inefficient patterns, and implement policies to help users better understand the loading zone requirements and improve compliance rates.

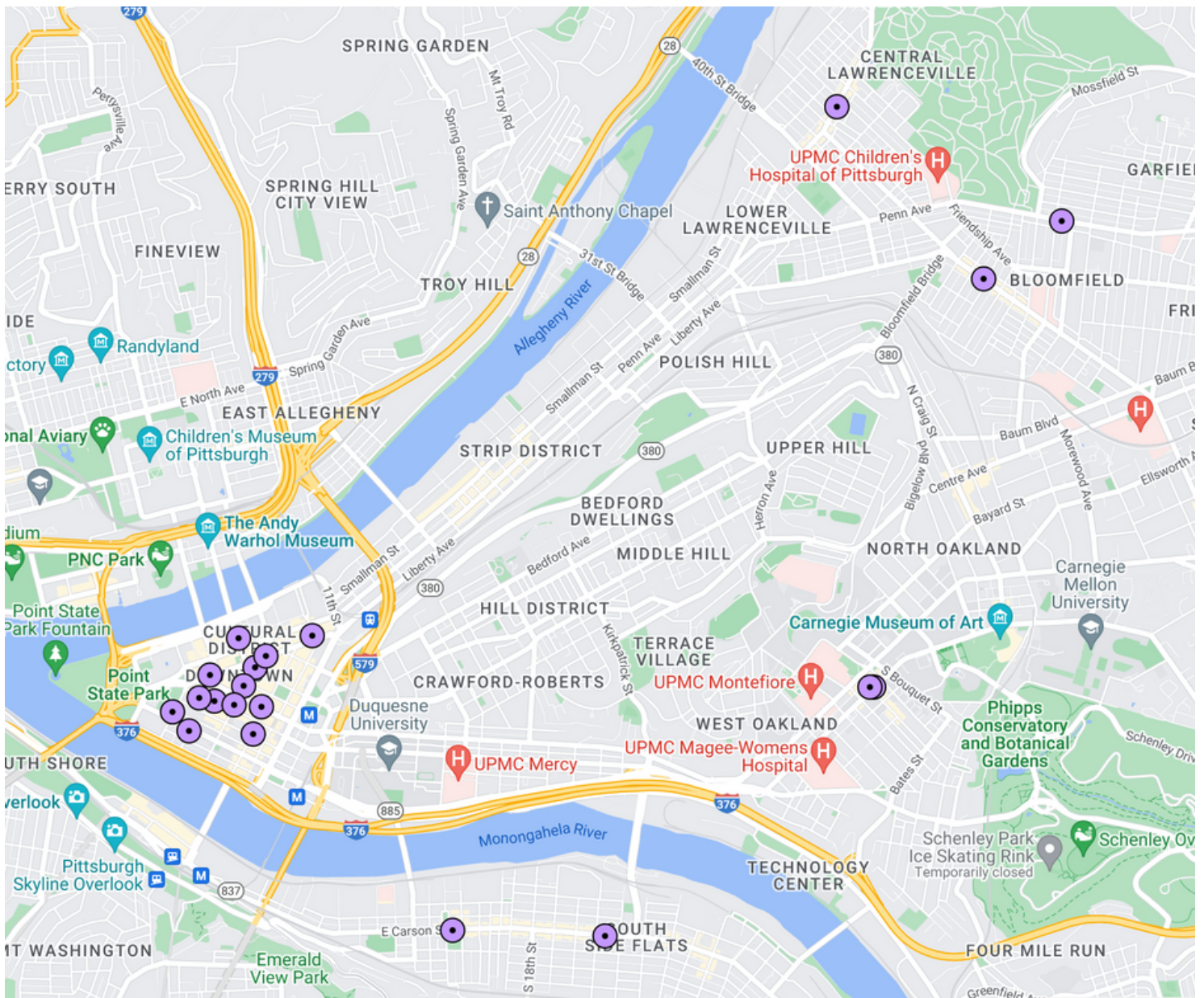


Overview

Stage 1 Locations

Most of the Smart Loading Zones are located in the Downtown neighborhood. There are two each in South Side Flats, Bloomfield, and Oakland. There is one zone in Lawrenceville.

Almost all Smart Loading Zones were previously unpaid loading zones and one in Oakland was a newly made loading zone.



The Process



Cross-departmental coordination

Pittsburgh Parking Authority (PPA) is responsible for parking enforcement, including parking payments, throughout the City, while Pittsburgh's Department of Mobility and Infrastructure (DOMI) is responsible for designating curb use and setting meter rates not already set forth in municipal code. Successful curb management requires the coordination and cooperation of all three of these departments and agencies. Weekly meetings with Automotus, DOMI, and PPA were held at the start of this project to ensure alignment across contracts, legislation to enable the initial pilot project, questions of legal authority, integration into the existing parking meter payment system, accounting, and more. The commitment of DOMI and PPA and their willingness to collaborate is crucial to the success of this program.



Stakeholder Engagement

Collaboration and engagement with stakeholders is a critical initial step toward implementing effective curb management solutions. In Pittsburgh, the Automotus team worked with DOMI to reach out to council members, business improvement districts, community organizations, and local businesses to discuss the curb conflicts they were experiencing and to explore potential locations for Smart Loading Zones. This early collaboration validated the City's observed problems at the curb and ensured effective solutions were being implemented through the pilot.

Additionally, during and following the launch of the Smart Loading Zones, Automotus provided on-the-ground support at high-trafficked zones to educate and increase registration and compliance. The City reported that Automotus's commitment to stakeholder engagement and on-the-ground support increased their trust and confidence in Automotus.



Process



Identifying zones

Many, if not most, cities do not have reliable data regarding double parking, idling time, or time spent searching for loading zone space. However, most cities do have anecdotal evidence that these safety conflicts and increased tail-pipe emissions are occurring due in part to poor curb management. In Pittsburgh, DOMI's Curb Management and New Mobility Analyst created a list of about 40 of those areas with frequent loading conflicts that could benefit from Smart Loading Zones. From there, DOMI took those locations to business improvement districts (BIDs) and registered community organizations (RCOs) to review and validate the proposed Smart Loading Zones.

Without reliable data, validating proposed locations with stakeholders was essential to ensure that effective solutions were being implemented in the right locations.

Available and suitable infrastructure for the Automotus cameras was also a necessary consideration when identifying zones. This review process included understanding ownership of the infrastructure (city owned or utility owned), power available to the locations (24 hour power or periodic) and viewing locations of streetlights and traffic lights that enable optimal viewing of the proposed Smart Loading Zone locations.

In Pittsburgh, owners of street poles vary between the City and the electric company, with a majority of the downtown core being owned by the City and street lights outside of the downtown core, such as Lawrenceville being owned by Duquesne Light Company (DLC).

For the first phase of the project, the team opted to move forward primarily with the City-owned streetlights due to the ease of implementation. One location in Lawrenceville owned by DLC was implemented in the first stage as a test case to understand the approval process with DLC in order to prepare to use more DLC street poles in the future.

Timeline

Q2-Q4 2022

- Deployed computer vision to support 20 SLZs in Pittsburgh's most congested areas
- Collect comprehensive curb activity data and fully automate payment w/ graduated rates

Q1-Q3 2023

- Deploy additional tech to support 180 smart loading zones
- Integrate fully automated enforcement by automatically capturing and mailing citations
- Integrate zero emission pricing incentives to explore paths to accelerate zero emission vehicle adoption

Process



Funding

Many cities, like Pittsburgh, have limited funds to deploy new technologies or pilot projects. In this case, the Smart Loading Zone pilot was made possible through in-kind contributions from Automotus through the Commercial Curb Challenge, as well as a revenue-share agreement. This allowed for the implementation of the Smart Loading Zone pilot without any out-of-pocket expenses for the City or PPA. Automotus provides a variety of pricing and revenue-share options for cities of all resource capacities and all variations of curb management (e.g., automated enforcement, directed enforcement, data collection).



The Results (so far)

Summary of Results

Implementation of Smart Loading Zones in Pittsburgh has resulted in several benefits for the City, loading zone users, and the public. The project has increased Smart Loading Zone turnover by 40%, while reducing the average stay by 23%. It has also significantly increased delivery efficiency for small businesses and delivery drivers. These improvements have also reduced vehicle idling, thereby lowering greenhouse gas emissions and the devastating impacts to the environment, estimated at 12MT/year/zone.

From a safety perspective, the Smart Loading Zones have helped to decrease double-parking by 40%. This not only allows traffic to continue to flow unobstructed past the loading zones, but also creates fewer obstacles for curb users such as cyclists and pedestrians to navigate safely.

In addition, this project includes potential for future revenue generation for the city. As the public and loading zone users continue to be educated on the smart loading zone opportunities, adoption rates will continue to increase. Drivers will be able to register their vehicles in the system, without the need to download a mobile app. Therefore, drivers are able to come and go from loading zones at their convenience and pay for time spent at the curb through their established accounts. Not only will this substantially improve compliance and loading efficiency, but it will also improve turnover times as drivers no longer have to spend time downloading an app or paying through an app or a parking meter, and are incentivized by graduated pricing to make their stop at the curb quick and efficient.

Key Dates

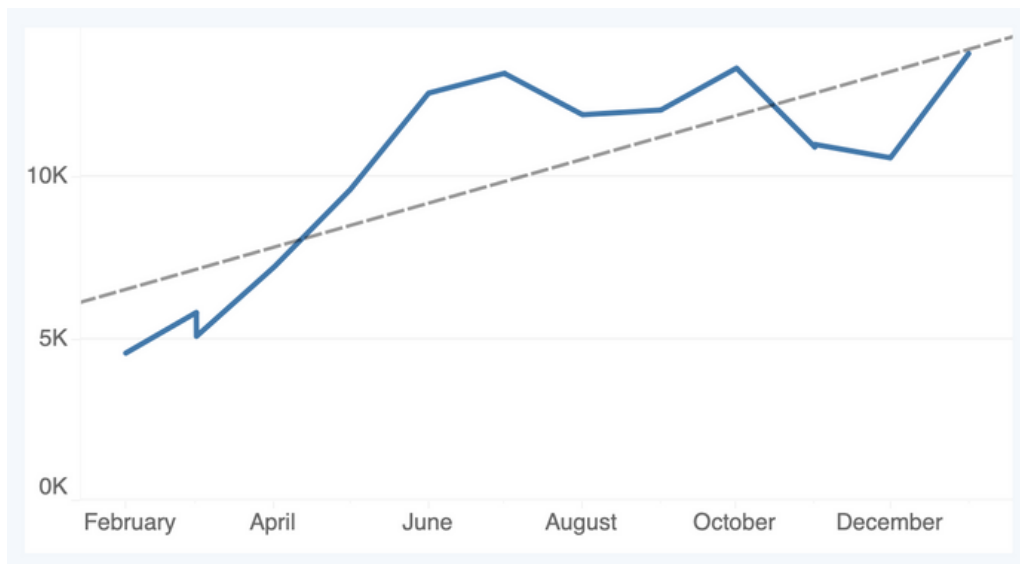
Week of April 11, 2022 - payments launched in a few select zones

Week of April 18, 2022 - payments launched across all installed zones

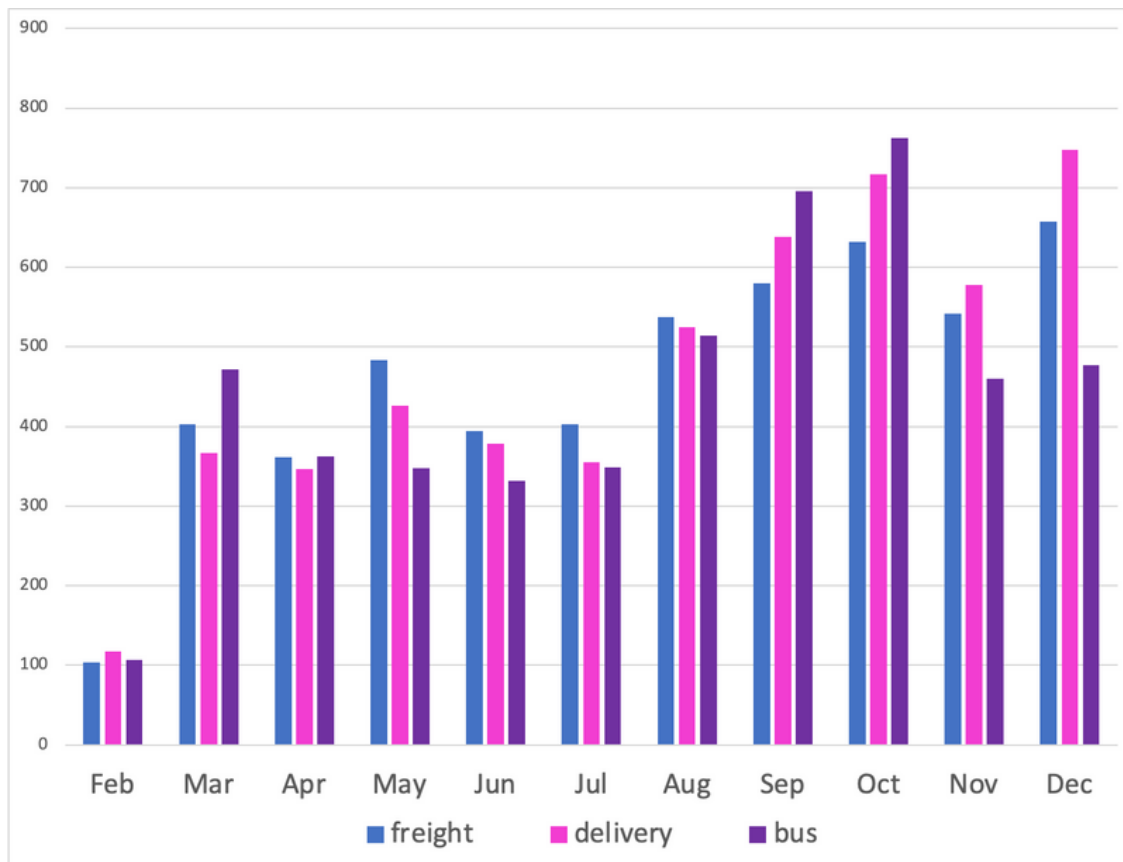


The Results

Total park events per month

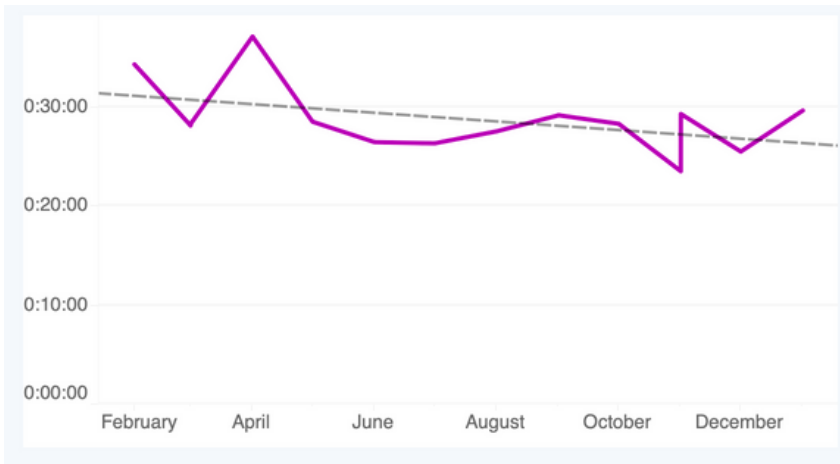


Total park events per by modality without passenger cars

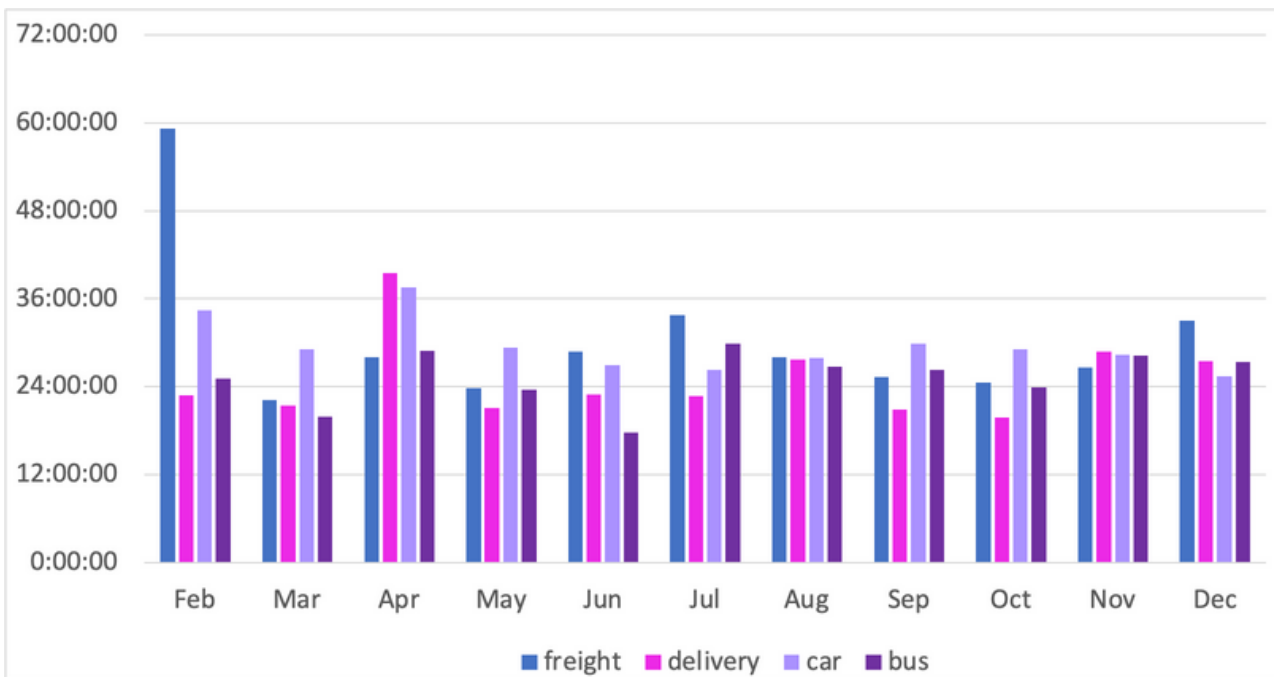


The Results

Average dwell times



Average dwell times by modality

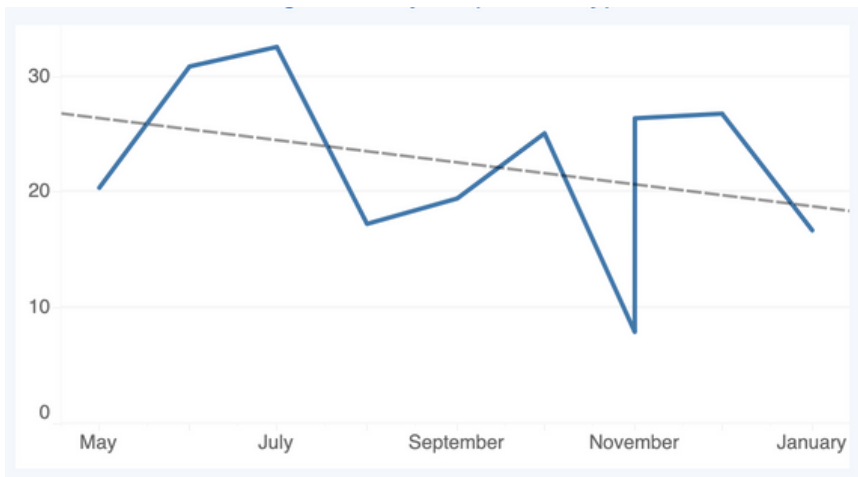


DATA INSIGHTS

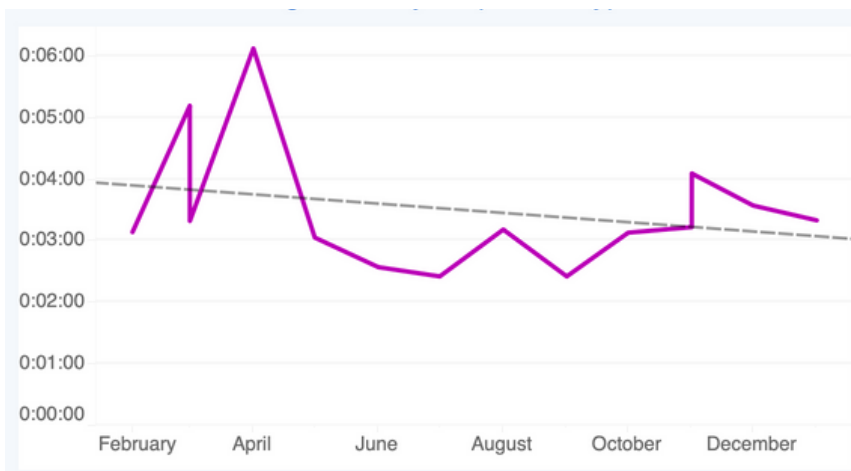
- ✓ Parking events increased regularly since the kick off. Dwell times have dropped during the program, reflecting an expected increase in turnover and optimization of loading zones.
- ✓ The zones are overwhelmingly used by passenger vehicles, but over time other modalities have increased used of the zones. Dwell time is consistent across modes.

The Results

Double Parks: average amount per location



Double Parks: dwell time average

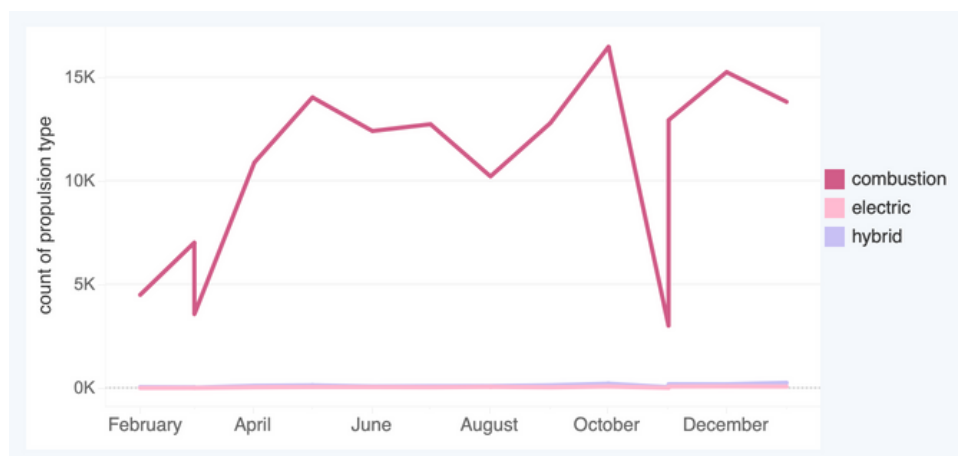


DATA INSIGHTS

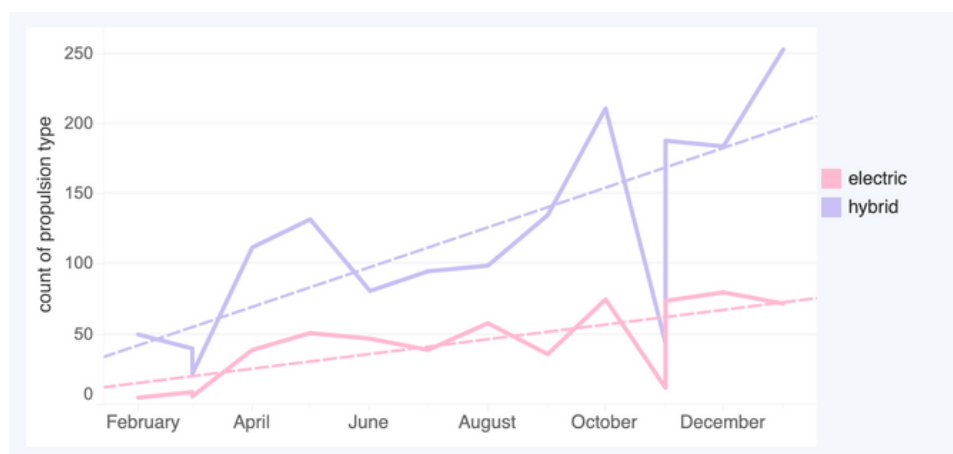
- ✓ Double parking events and double park dwell times are down for the period of the project.
- ✓ Power outages in November represents the dip shown on some graphs.

The Results

Propulsion type: all



Propulsion type: hybrid and electric only



DATA INSIGHTS

- ✓ Combustion engines dominate the total number of vehicles using loading zones. However, an increase in electric and hybrid type vehicles shows both the increase in vehicles using the spaces and improved accuracy of the system over time.

The Results

Aim	Progress through Dec 2022
Align policies with real-time data	2022 results informing change in Smart Loading Zones hours/days of operation to encourage demand to move off-peak
Decrease emissions from unnecessary idling & circling	Emissions calculations in 2023
Reduce parking-caused traffic by 20%	Traffic reductions to be assessed in 2023
Reduce double-parking by 60%	25% double park dwell time reduction
Generate additional revenue from parking and loading	Revenue generation picking up as program is being more widely adopted
Increase parking turnover for local businesses	+50% increase in parks, utilizations to be calculated in 2023
Improve safety for pedestrians, cyclists, and other curb users	Safety metrics to be assessed in 2023
Increase delivery efficiency and reduce dwell time	Anecdotal feedback from large fleet supports adding loading zones due to operational improvements

Next Steps

Compliance

To encourage further adoption and compliance for the Smart Loading Zones, the Pittsburgh Parking Authority will launch a program to issue automatic tickets for out-of-compliance and unregistered vehicles. This policy shift is expected in Q2 of 2023.

Scale and Zero Emissions Incentives

The City of Pittsburgh, Pittsburgh Parking Authority, and Automotus are subrecipients on a United States Department of Energy (DOE) Vehicle Technologies Office (VTO) grant that is led by the Los Angeles Cleantech Incubator (LACI). Additional partners include, Nation Renewable Energy Lab (NREL), Pacific Northwest National Lab (PNNL), Carnegie Mellon University (CMU), University of Southern California (USC), Southern California Association of Governments (SCAG), City of Santa Monica, City of Los Angeles. The project's \$3.8M in funding, of which at least \$1M will go to Pittsburgh Smart Loading Zones research and scaling in Pittsburgh. The grant will also support the evaluation of curb management policy and technology implementation outcomes on key metrics, including incentivizing the transition of commercial delivery companies and drivers to zero emission vehicles or smaller delivery form factors.

The project, which spans over three years, will scale the present work in Pittsburgh in policy and implementation. In year two of the DOE project (2023), Automotus will scale to 200 Smart Loading Zones throughout the city and will also incorporate incentivized pricing for zero emission vehicles. Policies to support zero emissions pricing and the scale of locations are expected in Q2 and Q3 of 2023.



Definition of terms



Park Types

Full: Parking fully alongside a curb or spot

Double: Parking parallel to a car already parked at the curb

Lazy: Crooked, or partially out of a curb or spot

Vehicle Types

Car

1. Limousine - Large luxurious often chauffeur- driven vehicle
2. SUV - Taller and boxier than sedans, offer an elevated seating position, and have more ground clearance than a car
3. Sedan - Four doors and a traditional trunk
4. Pick-up - has a passenger cab and an open cargo bed in the rear

Bus

1. Large - Passenger carrying vehicle over 35 feet long
2. Mini - Passenger carrying vehicle with larger passenger capacity than a minivan or sedan, but less than a large bus (20-25 feet in length)

Cyclist

1. Pedal-based Mountain bicycle, road bicycle, or similar
2. E-Cargo

Delivery Vans

1. Heavy Van (USPS) and (UPS)
2. Light Van (Amazon Prime)

Pedestrians

1. Adults
2. Toddlers

Freight/ Freight Trucks

1. Light - Larger than a van, but smaller than a large freight
2. Heavy - Tractor trailer, semi-truck, Lorry, 3 axle or more

TNC - transportation network companies

1. Lyft
2. Uber

Acknowledgments

Automotus would like to thank the many partners who have supported the Smart Loading Zones project thus far. Innovation and charting new territory does not come easily and would not be possible without the collaboration, advocacy, and feedback from many partners including the teams from:

- City of Pittsburgh's Department of Mobility and Infrastructure
- Pittsburgh Parking Authority
- CityFi
- Pittsburgh Downtown Partnership
- Lawrenceville Corporation
- Oakland Business Improvement District
- Carnegie Mellon University

