parkdc

# PENN QUARTER/ CHINATOWN PARKING PRICING PILOT

Final Report | January 2019

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# parkDC: Penn Quarter/ Chinatown Parking Pricing Pilot

January 2019


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*This research was performed by the District Department of Transportation (DDOT) in cooperation with the Federal Highway Administration (FHWA). The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA. This report does not constitute a standard, specification, or regulation.*

**Data Sources**

*Full data sources for the content of this document may be found within the parkDC: Penn Quarter/Chinatown Parking Pricing Pilot Final Report.*


The parkDC: Penn Quarter/Chinatown Parking Pricing Pilot (parkDC pilot) sought to use technology, pricing, and information to make parking easier and reduce congestion in part of downtown Washington, DC.

The parkDC pilot met the customer- and agency-related goals identified by DDOT at the pilot's outset. Due to the success of the parkDC pilot, DDOT is working to expand demand-based parking pricing to other District neighborhoods.


# EXECUTIVE SUMMARY

# The District's residents, commuters, and visitors all share one need: access to public curbside spaces.

## The number and variety of customers sharing the District's curbside parking spaces is growing.

The District of Columbia is located at the center of one of the largest metropolitan areas in the United States. The resident population of over 700,000 people nearly doubles daily with an influx of over half a million commuters and over 125,000 visitors. These residents, commuters, visitors, and commercial vehicles all need access to public space, namely roads, sidewalks, and the curbside.

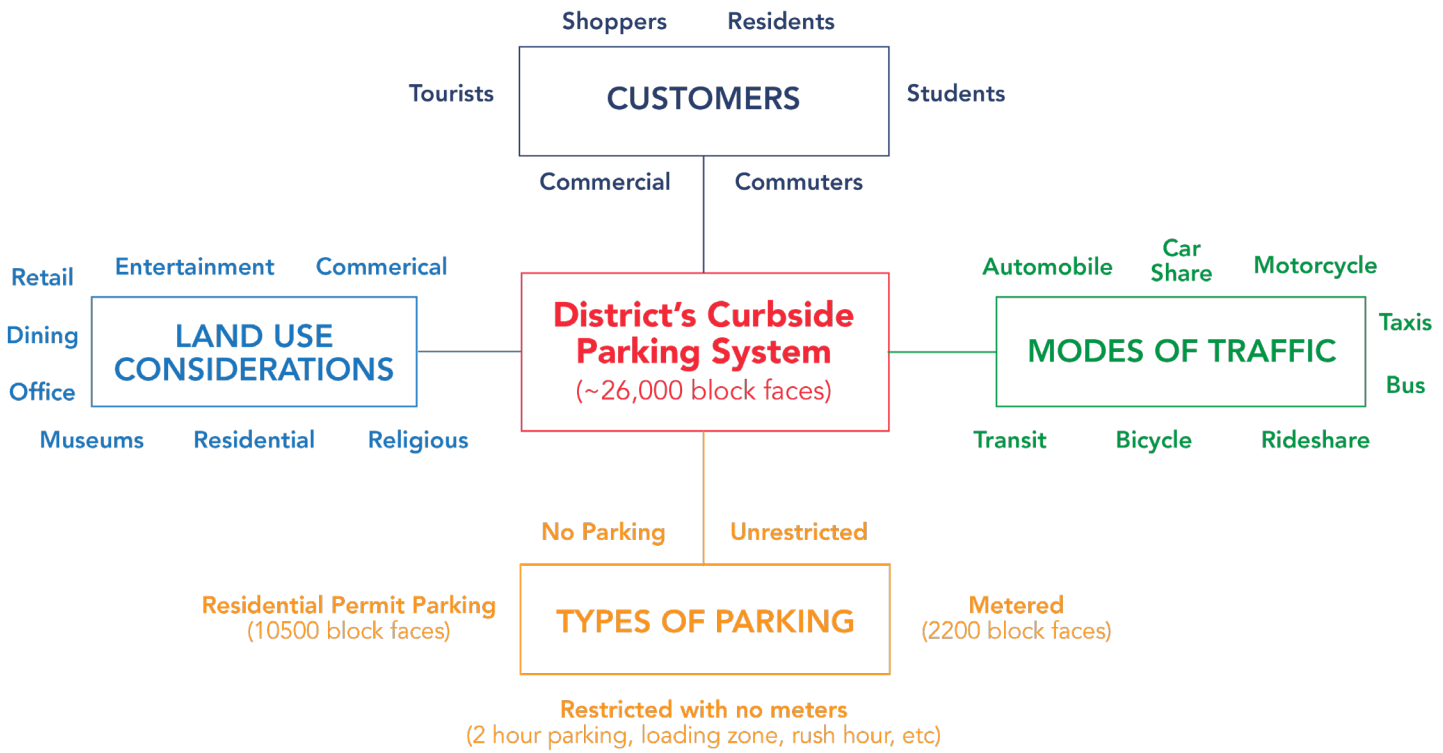
As a result, the District's on-street parking and curbside space is utilized by a diverse range of customers, ranging from personal cars to transit buses to commercial vehicles to taxis. The growth of new transportation options such as transportation network companies (mobile app-based ride hailing companies) are simultaneously expanding access to District neighborhoods and increasing demand for already limited curbside space. As the District's economy and population continue to grow, how the curbside is managed will help to shape how people and goods move.

## Customer challenges related to finding parking add to downtown congestion.

When demand outweighs supply for on-street parking, drivers are more likely to circle for parking or resort to parking illegally. The practice of circling for parking and parking illegally have both been identified as major contributors to congestion in the District. Illegally parked vehicles can block travel lanes, bicycle lanes, pedestrian crosswalks, and bus stops, leading to unsafe interactions between motorists, bicyclists, pedestrians, and transit users.

## Limited information on parking availability contributes to frustration.

Customers often prefer on-street parking spaces for shorter durations since they are priced significantly lower than off-street garages. However, lack of visible information about the location of open spaces contributes to frustration.



Shoppers
Residents
Tourists
CUSTOMERS
Students
Commercial
Commuters
Retail
Entertainment
Commerical
Dining
Office
LAND USE CONSIDERATIONS
Museums
Residential
Religious
District's Curbside Parking System
(~26,000 block faces)
Automobile
Car Share
Motorcycle
MODES OF TRAFFIC
Taxis
Bus
Transit
Bicycle
Rideshare
No Parking
Unrestricted
Residential Permit Parking
(10500 block faces)
TYPES OF PARKING
Metered
(2200 block faces)
Restricted with no meters
(2 hour parking, loading zone, rush hour, etc)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MORE
The MORE Everything Plan
PLANS STARTING AS LOW AS
$45
MONTHLY ACCESS
capital bikeshare

# Better information and demand-based pricing can help reduce the "agony" of parking downtown.

## Across the transportation field, public agencies are increasingly turning to demand-based pricing to help manage access to scarce resources.

In the Washington, DC region, time of day pricing is used on the Metrorail system to help spread out peak demand. High-occupancy toll (HOT) lanes in Virginia use pricing to provide less congested travel to carpools, buses, and for a price, solo drivers.

## Major urban areas have made the connection between roadway congestion and curbside management.

Simply adjusting time limits and pricing through spot applications on an as-needed basis does little to mitigate the practice of circling for parking and parking illegally, both of which contribute to roadway congestion. A more active, data-driven approach to curbside management with regularly updated parking pricing and policies helps to mitigate circling and illegal parking, and supports larger agency goals such as increasing network mobility and reducing system congestion.

## Cities and towns are increasingly recognizing that parking pricing has an important role in addressing parking demand.

Pilots and programs in San Francisco, Los Angeles, Seattle, and Indianapolis, among others, have demonstrated that demand-based parking pricing is an important tool for parking management and has a positive impact on urban congestion.

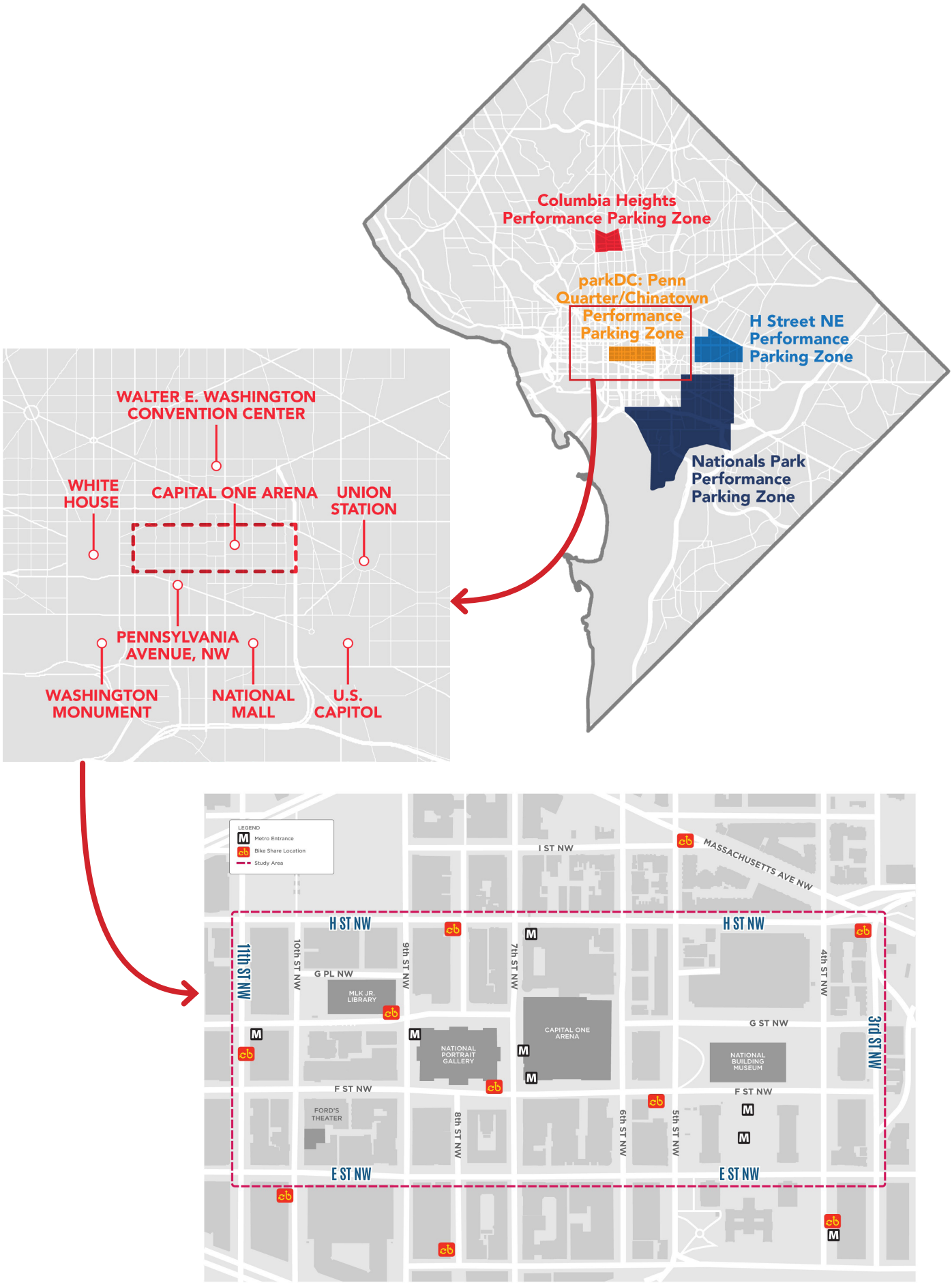
## Gathering parking demand data has been expensive.

However, continued technological innovations and advances in big data analytics provide an opportunity to reshape the way agencies manage valuable curbside spaces at a fraction of the cost. These technologies also provide opportunities to look at other curbside space users, such as commercial vehicles and motorcoaches, and explore how pricing affects their activities.

# DDOT's parkDC: Penn Quarter/Chinatown Parking Pricing Pilot set out to improve curbside access from all user perspectives.

Building on the experiences of other agencies and with the support of a grant from the Federal Highway Administration's (FHWA) Value Pricing Pilot Program, DDOT set out to leverage technology and data to test demand-based parking pricing in the District's downtown. The parkDC pilot also sought to advance the state of the practice by applying a multimodal and asset-lite approach to the program. DDOT executed the pilot in the Penn Quarter and Chinatown neighborhoods from September 2014 to November 2017.

| ADVANCING THE STATE OF THE PRACTICE | |
|---|---|
|  Multimodal | Apply pricing principles to other modes (i.e., commercial loading zones) |
|  Asset-Lite | Develop demand-based pricing and real-time parking availability information at a significantly lower price point by deploying fewer assets |


Columbia Heights
Performance Parking Zone
parkDC: Penn
Quarter/Chinatown
Performance
Parking Zone
H Street NE
Performance
Parking Zone
Nationals Park
Performance
Parking Zone
WALTER E. WASHINGTON
CONVENTION CENTER
WHITE
HOUSE
CAPITAL ONE ARENA
UNION
STATION
PENNSYLVANIA
AVENUE, NW
WASHINGTON
MONUMENT
NATIONAL
MALL
U.S.
CAPITOL
LEGEND
Metro Entrance
Bike Share Location
Study Area
I ST NW
MASSACHUSETTS AVE NW
H ST NW
H ST NW
11th ST NW
10th ST NW
9th ST NW
7th ST NW
4th ST NW
3rd ST NW
G PL NW
MLK JR.
LIBRARY
G ST NW
NATIONAL
PORTRAIT
GALLERY
CAPITAL ONE
ARENA
NATIONAL
BUILDING
MUSEUM
F ST NW
F ST NW
FORD'S
THEATER
8th ST NW
6th ST NW
5th ST NW
E ST NW
E ST NW

# DDOT's demand-based pricing pilot wanted to accomplish three goals:

## Reduce time to find an available parking space

- Increase parking availability
- Provide parking availability information to customers in real time
- Improve parking regulatory signage

## Reduce congestion and pollution, improve safety, and encourage use of other modes

- Reduce double parking
- Reduce circling for parking
- Encourage travel by other modes
- Improve operations of commercial loading zones

## Develop parking management solutions through a cost-effective asset-lite approach

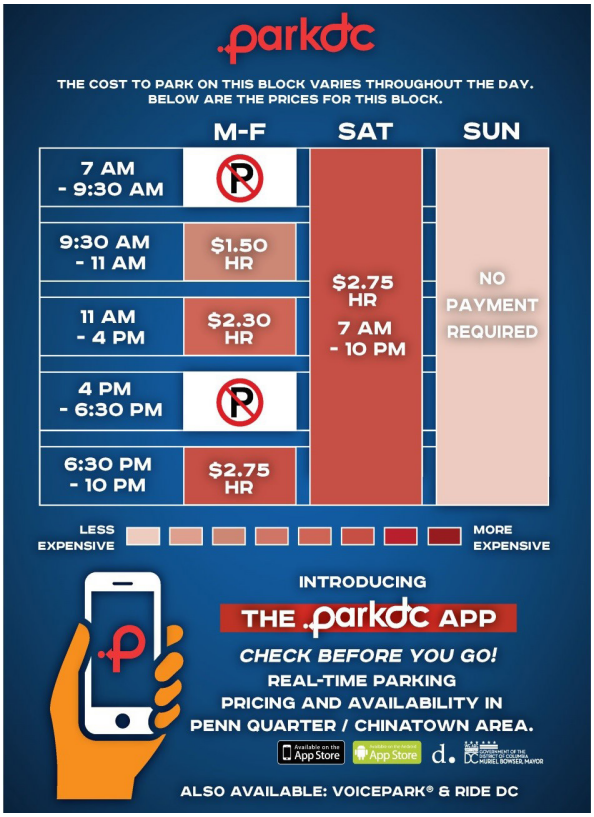
- Test different parking occupancy detection solutions
- Explore effectiveness of fusing data from various sources to provide real-time availability information and inform pricing algorithms with fewer deployed assets

# This is how DDOT made it work.

## Pricing.

DDOT applied demand-based parking pricing to on-street spaces in the pilot area. High-demand blocks have higher hourly prices to improve turnover, and low-demand blocks have lower hourly prices to incentivize greater use. In the parkDC pilot area, prices vary by block, side of the street (block face), day of the week (weekday vs. Saturday), and time of day (morning, midday, or evening). DDOT extended the concept of demand-based pricing to commercial loading zones.

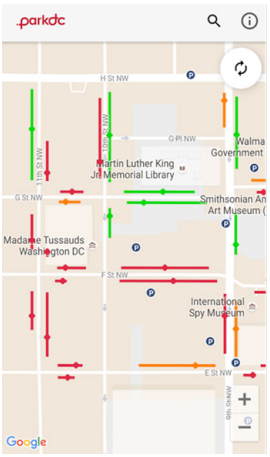
DDOT changed prices in the pilot area five times between October 2016 and November 2017 based on ongoing monitoring of parking demand. DDOT developed price changes based on the prevailing District-wide base price for on-street parking ($2.30/hr.), and gradually increased the total number of price options over the five price changes. Prices increased on block faces where demand exceeded supply, decreased on block faces where supply exceeded demand, and remained constant on block faces where demand matched supply. Those blocks where demand matched supply would generally have one open parking space at any given time for drivers seeking to park in the area. Commercial loading zone pricing was based on the highest prevailing hourly rate on the zone's block.




| PRICE CHANGE | RATE STRUCTURE (HOURLY RATES) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Baseline | | | | $2.30 | | | | | |
| Round 1 *October 2016* | | | $2.00 | $2.30 | $2.75 | | | | |
| Round 2 *February 2017* | | $1.50 | $2.00 | $2.30 | $2.75 | $3.25 | | | |
| Round 3 *May 2017* | $1.00 | $1.50 | $2.00 | $2.30 | $2.75 | $3.25 | $4.00 | | |
| Round 4 *August 2017* | $1.00 | $1.50 | $2.00 | $2.30 | $2.75 | $3.25 | $4.00 | $4.75 | |
| Round 5 *November 2017* | $1.00 | $1.50 | $2.00 | $2.30 | $2.75 | $3.25 | $4.00 | $4.75 | $5.50 |

## Time Limits.

Like parking pricing, adjusting the amount of time a customer is permitted to park in a curbside space can influence customer behavior and balance demand for curbside space. DDOT increased time limits in the evenings and on weekends in portions of the pilot area where demand was especially low to make those areas more attractive to parking customers.




## Communication.

Information about parking availability can help customers to find an open parking space and enhance customer experience associated with finding a space. Two mobile apps, parkDC and VoicePark, developed as part of this pilot, provide customers with real-time information about parking availability and pricing. DDOT also tested new signage to reduce clutter and more clearly communicate on-street parking regulations. Calendar-style posters on every parking meter let customers know how much it costs to park based on the time of day and day of the week.

## Outreach.

DDOT kept the public, policymakers, and other stakeholders informed about the progress of the pilot. Press releases, public presentations, DDOT's project website, social media channels, and other outreach tools helped DDOT raise awareness and collect feedback from residents, commuters, community leaders, and business representatives.

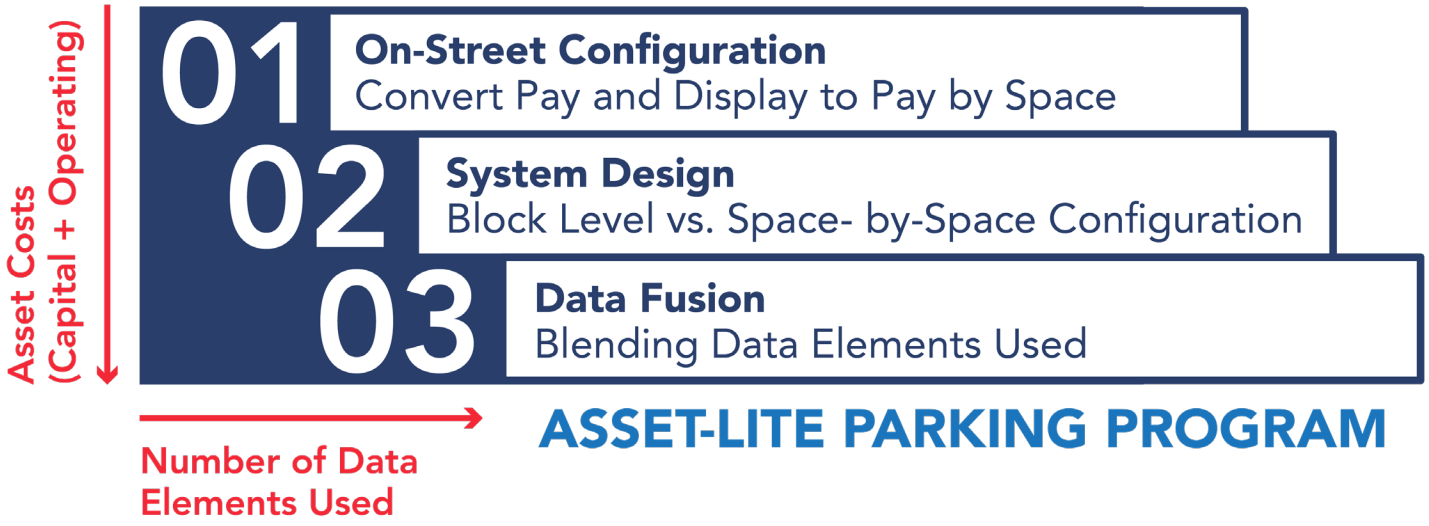
## Technology.

DDOT's pilot program is designed to work and it is designed to last. Understanding real-time parking availability typically requires expensive data-collection technology. DDOT set out to design an "asset-lite" approach that would be sustainable from a cost and operations perspective. DDOT took a methodical approach to identify the right mix of data-collection technologies to support DDOT's demand-based pricing program with the fewest assets in the field.

# The three steps of the asset-lite approach were:

1. **On-Street Configuration.** DDOT migrated to demarcated parking in the pilot area. Instead of being able to park anywhere between the signs on a block, this approach defined the spaces. By doing so, DDOT knew the total parking supply and how best to place and calibrate parking occupancy detection devices for maximum accuracy.
2. **System Design.** DDOT designed its demand-based pricing system to focus on the block face, not the individual space. Instead of collecting data in every single parking space, DDOT could strategically collect data in fewer locations and still predict on-street parking availability. Providing data at the block face level is good enough for a driver searching for an available space and for developing pricing strategies.
3. **Data Fusion.** DDOT reduced the number of devices that must be used to measure parking availability by combining data from multiple sources. Inputs ranged from in-ground parking sensors to parking payment data; different sources were tested to identify the right mix of data. By blending complementary data sources, DDOT was able to accurately measure parking availability while keeping the number of devices and costs down.

The data-driven, asset-lite approach allows DDOT to understand parking availability, develop price change recommendations, and communicate real-time traveler information to customers with half the assets typically deployed in the field.

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# Pilot Successes

After four years and five price changes, DDOT evaluated how well the parkDC pilot met the original goals. The next three sections provide the outcomes for each of the three goals:

1. Reduce time to find an available parking space
2. Reduce congestion and pollution, improve safety, and encourage use of other modes
3. Develop parking management solutions through a cost-effective asset-lite approach


# DDOT directly influenced customers' ability to find and pay for parking

## Parking availability increased on high-demand blocks, and underutilized spaces found more takers.

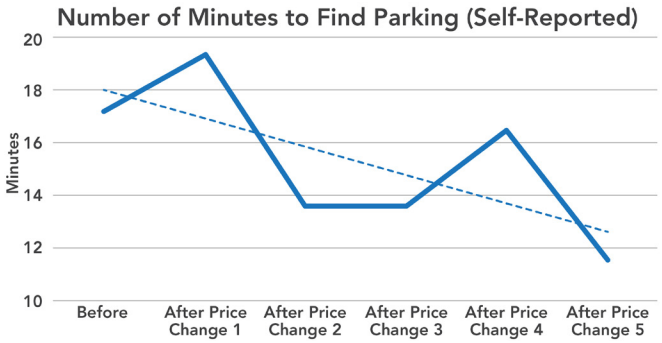
At the start of the pilot, 62% of block faces had the desired level of usage (demand matched supply). This number increased to 72% at the end of the pilot. On high-demand blocks, occupancy stabilized as the price to park went up. When DDOT increased time limits in addition to lowering prices on low-demand blocks in the eastern portion of the pilot area, the blocks experienced a 12% increase in occupancy and a 14-minute increase in length of stay during weekday evenings.

**Goal: Reduce time to find an available parking space**

- Increase parking availability
- Provide parking availability information to customers in real time
- Improve parking regulatory signage

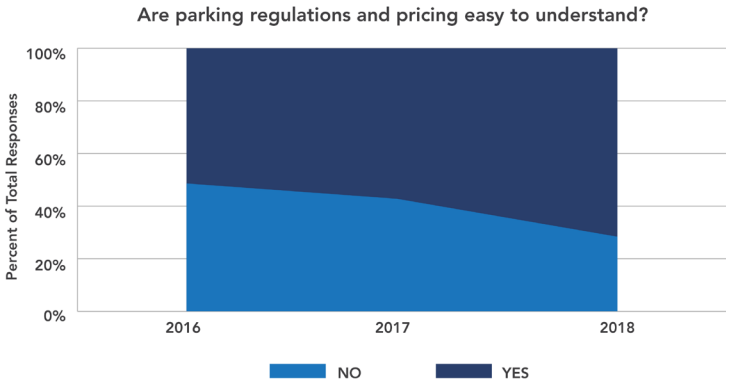
## The pilot made parking easier to find.

The demarcated, pay-by-space environment guides customers to park more efficiently while pricing encourages turnover on high demand blocks. Customers parking in the pilot area self-reported a 7-minute decline in the time to find parking.




## DDOT's communication strategy increased customer understanding.

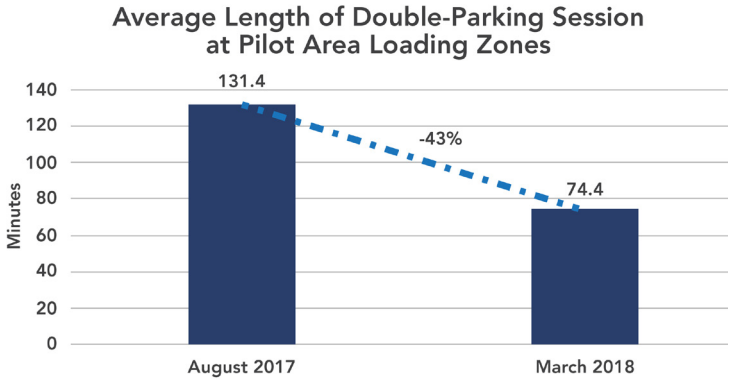
DDOT improved how parking regulations and prices are communicated. Real-time traveler information apps and new parking signage improved the overall customer experience, with 15% more customers surveyed reporting that parking regulations and pricing are clear and easy to understand.




# DDOT's pilot had positive secondary impacts on the broader transportation and land use network

## As supply opened up, illegal parking decreased.

Double parking is a telltale symptom of high parking demand and low parking supply. Decreases in both citations issued for double parking and in the amount of time vehicles were observed double parking in loading zones point to the positive impacts of the pilot program on parking supply and demand.




**Goal: Reduce congestion and pollution, improve safety, and encourage use of other modes**

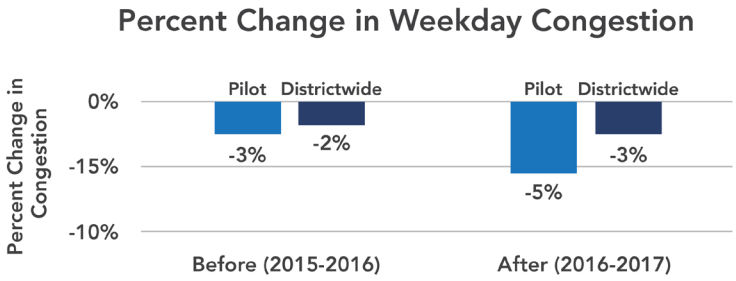
- Reduce double parking
- Reduce circling for parking
- Encourage travel by other modes
- Improve operations of commercial loading zones

## Circling for parking decreased.

After DDOT implemented demand-based pricing, the amount of time vehicles spent cruising for a spot decreased by as much as 15% during all time periods on weekdays and weekends.

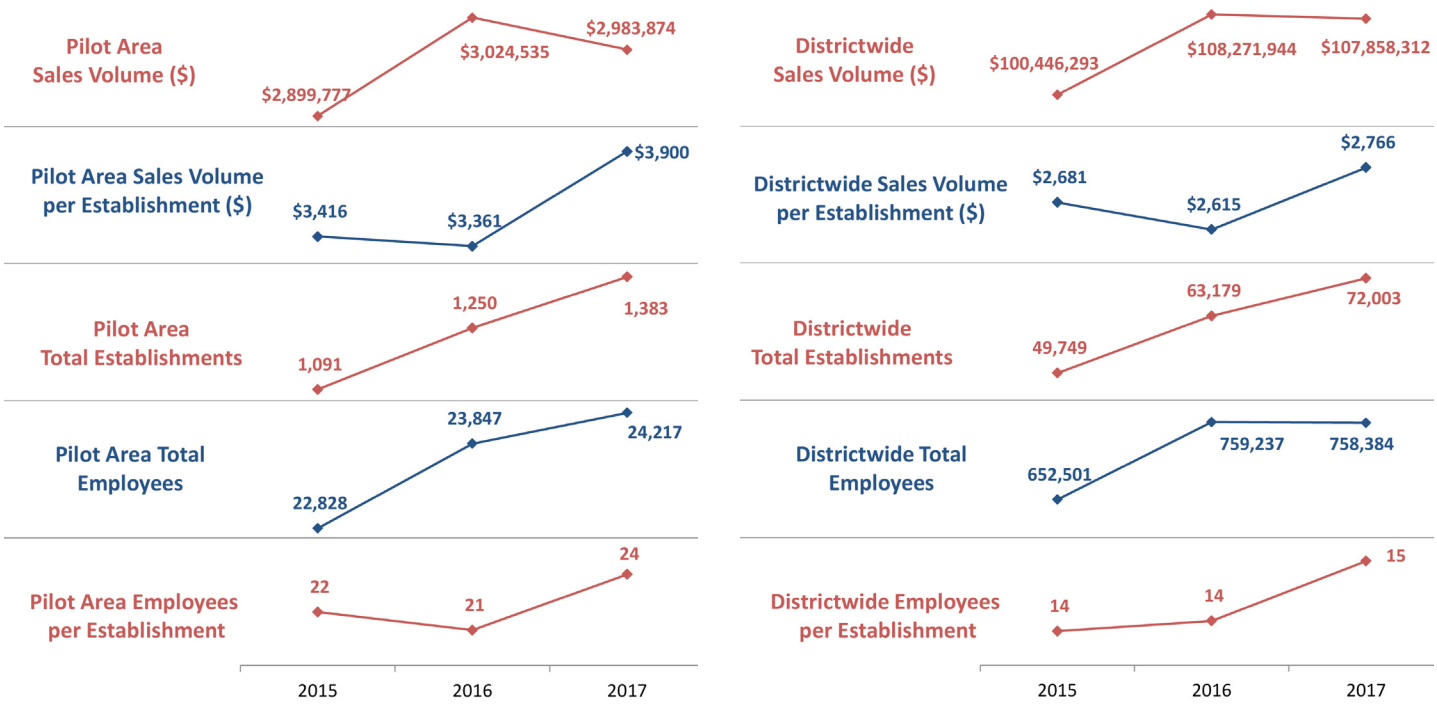
## Congestion decreased and travel time reliability increased.

Weekday automobile congestion decreased by 5% and travel time reliability improved by 5% in the pilot area. Congestion trends in the parkDC area align with congestion trends Districtwide.




## Economic access and vitality aligned with Districtwide trends.

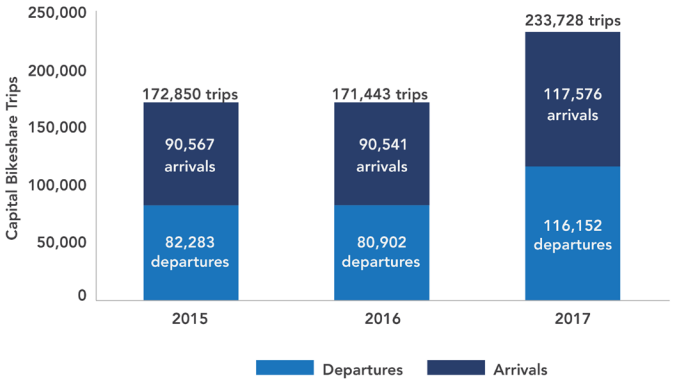
Economic data from within the pilot area and Districtwide showed generally positive trends after the study. Positive trends in sales volume, employment, and the number of establishments in the parkDC pilot area aligned with trends Districtwide. These trends suggest that the pilot did not adversely affect economic vitality.



## The pilot area continues to support many modes.

Multimodal data from the parkDC area showed largely positive trends after DDOT implemented the pilot. Capital Bikeshare ridership increased, bus speeds remained relatively stable, and bus ridership declined slightly, consistent with Districtwide trends. These trends indicate that DDOT's pilot did not hinder these modes and in some cases may have supported them. Despite ongoing interruptions related to system repair efforts, Metrorail ridership in the pilot area stabilized after DDOT implemented the parkDC pilot. This stable trend contrasts with systemwide activity, which continued a downward trend, and indicates that customers may have turned to transit based on better information about parking pricing and availability in the pilot area.

**Change over time in Capital Bikeshare ridership in the pilot area**




## Safety impacts unknown but likely positive.

Although detailed safety data were not available for analysis during the pilot implementation period, the pilot's role in making it easier to find and pay for parking likely resulted in more predictable motorist behavior and fewer erratic movements.

# DDOT developed a pilot program that meets agency needs

## DDOT managed assets more effectively.

The pilot demonstrated that with pricing and time limit adjustments parking can be used as a demand management strategy for the District's metered on-street curbside spaces.

**Goal: Develop parking management solutions through a cost-effective asset-lite approach**

- Test different parking occupancy detection solutions
- Explore effectiveness of fusing data from various sources to provide real-time availability information and inform pricing algorithms with fewer deployed assets

DDOT successfully implemented a cost-effective, data-driven approach to managing on-street parking in two of the District's busiest downtown neighborhoods. DDOT took a "sandbox" approach to test a range of technologies and find the best fit from a technical and operational perspective. A partial deployment of sensors was successfully combined with a range of data sources, including transactions, historical occupancy data, and citations, to produce real-time availability information and inform pricing algorithms. The result was a technically viable, cost-effective occupancy detection and parking pricing program.


TOW AWAY
NO STANDING OR PARKING
7AM-9:30AM
4PM-6:30PM
MONDAY-FRIDAY
IF TOWED 202-727-5000
2 HOURS
Pay by Phone Parking
YOUR PARKING ZONE#:
21986
Register online or via mobile app:
www.parkmobile.com
To pay for parking:
Use our Mobile App
or Call 1-877-727-5758
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# The success of DDOT's pilot creates an opportunity to do more. Delivering the following steps in the next five years will help transform its parking management program.

## Employ an incremental but intentional expansion plan:

- Expand demand-based pricing to other on-street spaces across the District, neighborhood by neighborhood, starting with areas most impacted by congestion
- Select neighborhoods for expansion based on data and analysis, including multimodal mobility data from DDOT's District Mobility project
- Identify a point-of-departure for on-street parking prices based on paid use, block by block
- Establish consistent time limit and pricing time periods Districtwide (exceptions should be established using data and analysis)
- Develop business rules related to pricing changes based on data and customer feedback to accurately reflect the expansion plan

## Expand demarcated parking:

- Use demarcated parking at all metered on-street parking spaces across the District

## Continue testing alternative technologies:

- Test emerging and alternative technologies such as automatic license plate readers (ALPR) and closed circuit television (CCTV) cameras
- Assess multiple vendors for the same technology to ensure that the District is served by the best in the business
- Establish a programmatic mechanism for piloting new technologies and testing new vendors, similar to the "sandbox" approach applied during the parkDC pilot
- Expand DDOT's proprietary system used to blend different occupancy data sources to incorporate new occupancy detection technologies
- Track evolving business models to ensure that DDOT's demand-based pricing program remains relevant
- Preserve flexible contracting and implementation to keep up with the ever-changing nature of the technology landscape

## Move beyond on-street parking:

- Research and test strategies for managing parking in non-metered parking spaces
    - Consider strategies such as digital electronic permitting and the use of pay by cell zones for parking payments in residential neighborhoods
- Grow the parkDC pilot model to help locate disabled parking meters (Red Top meters), loading zones, and other unique uses for curbside space
    - Consider data-driven strategies for enforcing and understanding disabled parking and loading zone activity


parkdc