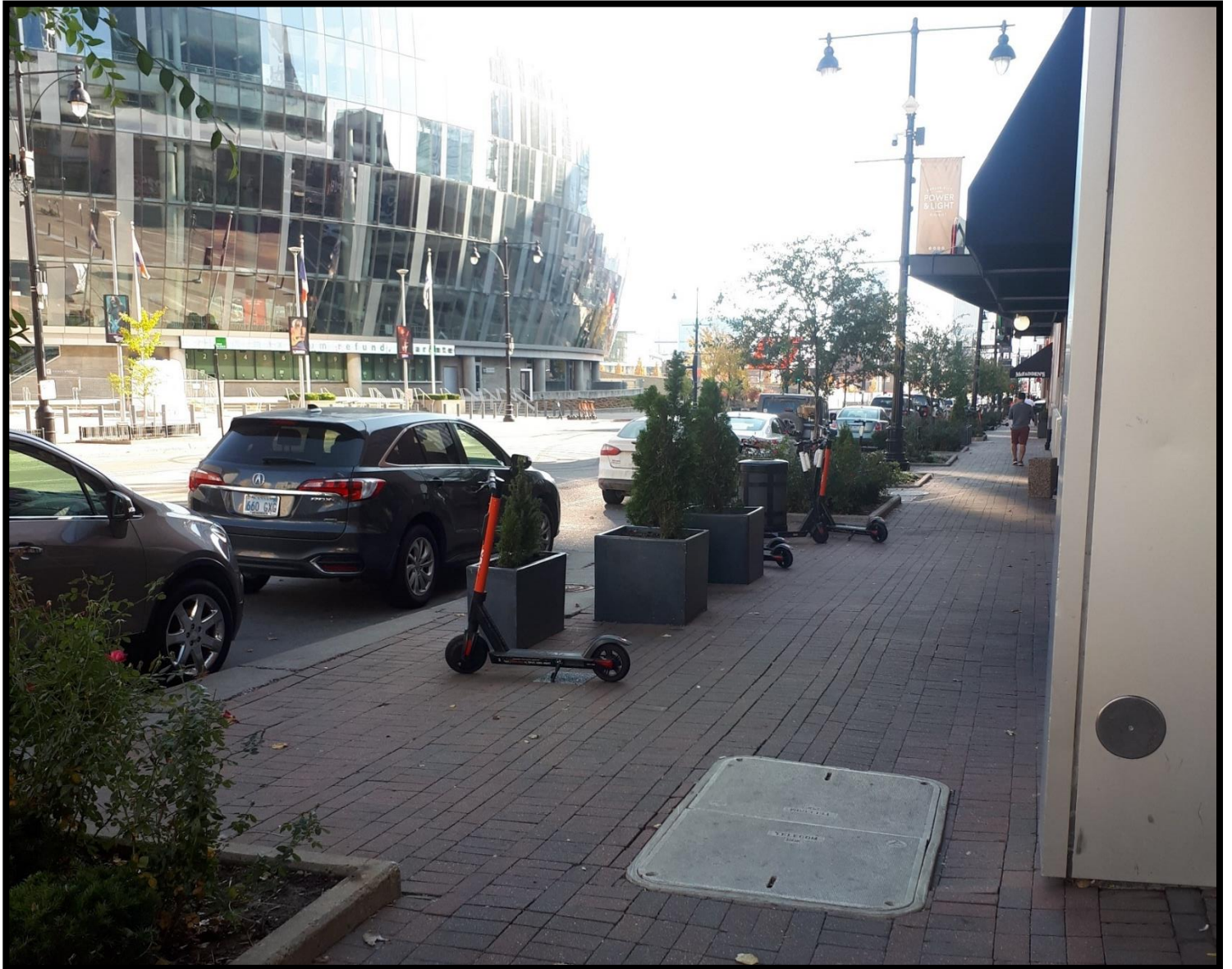


# Kansas City Area Curbside Management Resource and Guide



November 2020

## Contents

Executive summary .....	3
Introduction .....	3
What is curbside management and why is it important? .....	3
How to think about the curb .....	4
What are curbside management challenges in the Kansas City area? .....	4
Measuring the Need .....	5
Basic curbside management planning and techniques .....	5
Planning steps .....	5
Techniques .....	7
Performance measurement .....	8
Curbside management as a supplement to previous planning work .....	8
Westport – multimodal planning .....	9
Downtown Overland Park – optimizing off-street parking .....	10
The Crossroads – optimizing off-street parking .....	10
Curbside management and special events .....	11
Other considerations for the present and the future .....	11
Autonomous vehicle management .....	11
Sidewalk delivery bots .....	12
Metered on-street parking .....	12
Public or private data .....	12
Digital curb inventories .....	12
Vendors .....	13
Supporting Services – OurStreets .....	14
Curbside management case studies .....	14
Local case studies .....	14
National case studies .....	16
Library of resources .....	18
Appendix: Curb Productivity Index .....	20

## Executive summary

**Purpose:** To provide actionable information on curbside management, which is the practice of analyzing and adjusting the uses and regulations of space around the structure of the curb so that it can more efficiently and safely serve different kinds of users.

**Need:** Increased use of the curbside space due to densifying activity centers, innovative mobility services and increasing parcel delivery demand.

**Benefits:** Practicing curbside management will result in:

- Efficient use of the curb as an access point between streets and destinations.
- Less congestion and safer use of travelways due to less dangerous maneuvering.
- A comprehensive view of infrastructure assets and regulations within the curb space.
- Preparation for challenges to curbside use that are either unexpected or anticipated but not yet present.

## Introduction

### What is curbside management and why is it important?

A thriving city street involves many people engaged in many activities, using many modes. Cars drive up and park so that passengers can patronize their favorite businesses. Delivery trucks make stops so that businesses have enough stock. Buses and ride hailing services stop for a moment, dropping people off and picking up others. Cyclists and scooters roll down streets where the cars are slower and lock their small vehicles to racks or in special painted parking zones.

When people using all different modes often need to transition from the street to the sidewalk to reach their destinations, particularly in dense commercial areas, they often use the curb. If space around the curb is managed well then, more transportation choices are viable and street life is vibrant. If it is not managed well, then not enough people can access a limited resource, and unsafe situations and delays develop from blocking of the right-of-way. The potential of inefficiency and unnecessary safety risk are reasons why it is important to manage the curb.

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*Curb space is where movement meets access<sup>1</sup>*

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Curbside management is the practice of analyzing and adjusting the uses and regulations of space around the structure of the curb so that it can more efficiently and safely serve different kinds of users. It is also a way of responding to rapid change. In the past decade in Kansas City, the public transportation system has added new and enhanced services and the bikeshare service is transitioning away from docking hubs to a dock-less system. Nobody predicted the arrival of scooters on city sidewalks, nor the way in which physical distancing measures taken in response to the COVID-19 pandemic would impel the appropriation of more curbside space for non-automobile use. Other challenges, such as autonomous vehicles and sidewalk delivery bots, are anticipated, but subject to speculation about how they may affect city life. More mundane activities such as construction could also drive a need for public agencies to be flexible with the curbside. Preparation to enact nimble solutions would be wise considering the possibility of varied future challenges.

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<sup>1</sup> “Curbside Management Practitioners Guide,” Institute of Transportation Engineers <<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>>, p. 4.

## [How to think about the curb](#)

To get a more complete picture of the activity at the curb, the city of Seattle constructed a useful table showing the functions of the curb<sup>2</sup> (Table 1). While many of these functions might be obvious, this organizational framework may be helpful when decision makers are deliberating on the best use of public right-of-way.

Table 1. Seattle's functions of the curb

Function	Definition	Examples of Uses
<b>Mobility</b>	Moves people and goods	<ul style="list-style-type: none"><li>• Sidewalks</li><li>• Bus or streetcar lanes</li><li>• Bike lanes</li><li>• General purpose travel lanes (includes freight)</li><li>• Right- or left-turn only lanes</li></ul>
<b>Access for people</b>	People arrive at their destination, or transfer between different ways of getting around	<ul style="list-style-type: none"><li>• Bus or rail stops</li><li>• Bike parking</li><li>• Curb bulbs</li><li>• Passenger load zones</li><li>• Short-term parking</li><li>• Taxi zones</li></ul>
<b>Access for commerce</b>	Goods and services reach their customers and markets	<ul style="list-style-type: none"><li>• Commercial vehicle load zone</li><li>• Truck load zone</li></ul>
<b>Activation</b>	Offers vibrant social spaces	<ul style="list-style-type: none"><li>• Food trucks</li><li>• Parklets (right-of-way used for public space) and streateries (combination of parklet and sidewalk café)</li><li>• Public art</li><li>• Street festivals</li></ul>
<b>Greening</b>	Enhances aesthetics and environment health	<ul style="list-style-type: none"><li>• Plantings</li><li>• Rain gardens and bioswales</li></ul>
<b>Storage</b>	Provides storage for vehicles or equipment	<ul style="list-style-type: none"><li>• Bus layover</li><li>• Long-term parking</li><li>• Reserved spaces</li><li>• Construction</li></ul>

## [What are curbside management challenges in the Kansas City area?](#)

Curbside management is often discussed in the context of largest, densest cities in the country. San Francisco, Seattle, New York and Washington, D.C. are all areas where curbside management takes on a vital importance. However, within the eight-county Kansas City region<sup>3</sup> there appear to be a few different kinds of areas or situations that could benefit from curbside management:

- **High-intensity, historical urban areas in the center of the metro area**, such as downtown Kansas City, Missouri, the Crossroads, the Country Club Plaza, Westport, downtown Kansas City, Kansas, and the 39<sup>th</sup> Street West/University of Kansas Medical Center district.

<sup>2</sup> City of Seattle <<https://www.seattle.gov/transportation/projects-and-programs/programs/parking-program/parking-regulations/flex-zone/curb-use-priorities-in-seattle>>

<sup>3</sup> The 8-county Kansas City region (also referred to as the metro area) includes Johnson, Leavenworth, Miami and Wyandotte Counties in Kansas and Cass, Clay, Jackson and Platte Counties in Missouri.

- **Rapidly densifying suburban centers**, often suburban downtowns, such as Lenexa City Center and downtown Overland Park. Centers in Kansas City, Missouri, that were mentioned above, such as downtown and the Crossroads, are also increasing in density.
- **Areas of the metro that have experienced chronic parking shortages**, such as the Crossroads, the Brookside shopping district and downtown Overland Park. Such areas may have received attention in the form of parking studies in recent years but could also benefit from additional curbside management planning.
- **Yearly special events that take place across the region**, such as Weston’s Apple Fest and Irish Fest, Independence’s SantaCaliGon, and Lee’s Summit’s Downtown Days and Oktoberfest, during which attendees may attempt to park on-street in surrounding residential areas.

This resource can be used as the starting point for conversations about the need for curbside management in diverse urban settings and situations across the Kansas City metro area.

### Measuring the Need

How do we know we need to manage the curbside? The first indication may be anecdotal evidence of travelers and delivery businesses experiencing difficulties accessing the curbside for their purposes. Cities can also attempt to measure the degree of need with data. Housing permit or construction data, or population estimates can be a helpful indicator if the data is reliable and spatially matched to the area of interest. (For example, housing permits in a county

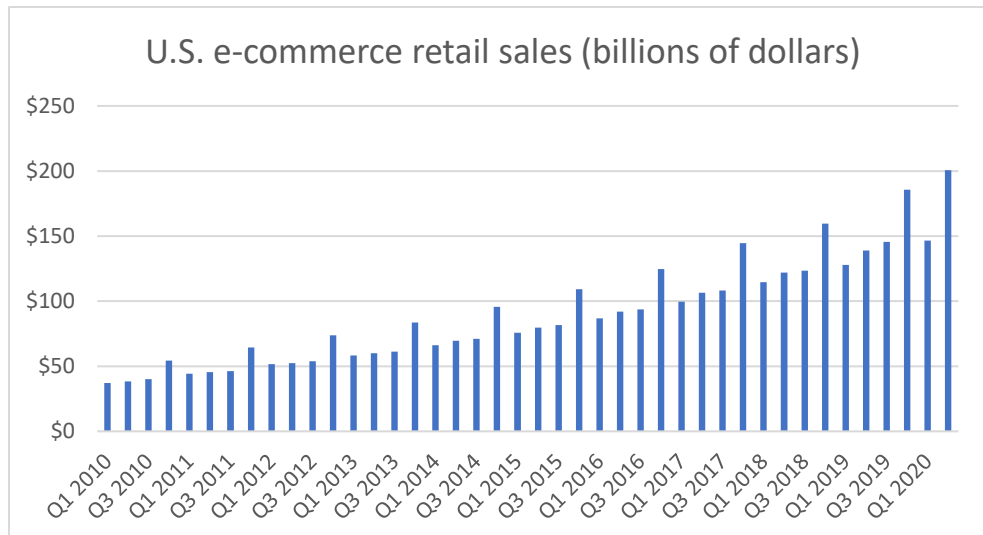


Figure 1. Historical national e-commerce sales, not adjusted. Source: U.S. Census Bureau. Q2 2020 data is preliminary.

will not give you an understanding of the need for curbside management in a downtown district.)

National trends are also worth looking into if cities believe they are applicable. Data on parcel delivery and e-commerce may be one example. When the national data for e-commerce sales is charted, it shows a steady and steep upward trend. More parcel deliveries will mean an increased need for access to the curbside — a challenge in dense, walkable areas.

## Basic curbside management planning and techniques

### Planning steps

How does one begin to manage the curbside? The most basic steps to curbside management, outlined by the Institute for Transportation Engineers (ITE)<sup>4</sup>, look similar to those in an urban planning process for any other situation:

- Inventory existing conditions.
- Identify land use and activity considerations to develop modal prioritization.
- Identify appropriate treatment alternatives.
- Assess and present alternatives for public feedback.

<sup>4</sup> “Curbside Management Practitioners Guide,” Institute of Transportation Engineers <<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>>, p. 31.



- Refine and implement treatments.

MARC staff's reflections on these steps are below, combined with advice from ITE's resource.

#### Inventory existing conditions

One advantage of adopting curbside management as a planning paradigm is that the work can be comprehensive. ITE recommends that an inventory of existing conditions include a review of existing policies, pricing, bylaws and codes that impact the use of the curbside, as well as field observations and the identification of any obvious needs or opportunities. Existing planning work, particularly concerning parking in dense areas, should be reviewed to stay consistent with the community's goals. A digital curb inventory allows curbside uses and regulations to be viewed at a glance. An inventory will also create a resource that can be easily updated later for future condition reviews.

#### Identify land use and activity considerations to develop modal prioritization

Cities often have well-established plans that identify their most important transit and bicycle routes. They also have a good understanding of which streets are most frequented by pedestrians, where transportation network company (TNC) drivers pull up, and when and where delivery drivers unload cargo. Using this information, cities should identify which modes are a priority to serve on each corridor, block or time of day. More than one mode can be identified as a priority. The results of this identification can prioritize private vehicles, but care should be taken to ensure other modes are not obstructed.

#### Identify appropriate treatment alternatives

Once the modal priorities are established, planners and other stakeholders can propose a reallocation of curbside space according to need. Some corridors may be straightforward in their needs, and alternatives will be easy to develop. Others may serve multiple modes, or different modes at different times of day, and planners will need to be careful and creative in devising alternatives. ITE notes that some treatments are small-scale while others are more appropriately corridor-scale, and that short- and long-term strategies should be considered.

#### Assess and present alternatives for public feedback

ITE rightly notes that "given public sensitivity to roadway and parking changes in many cities, the presence of a high-functioning, collaborative public-private stakeholder advisory body can be crucial to allow an open and productive dialogue." One engaging way to do this besides a public meeting would be to set up a temporary pop-up street treatment, using inexpensive materials. Better Block KC has set up such street treatments in the recent past.

#### Refine and implement treatments

Using insights gained from public and stakeholder feedback, planners can improve their concepts and advance them to implementation. Pop-up street treatments are useful here too, as they can show real world use of the new space allocations and physical structures. Post-implementation, planners can track performance measures to see if the street treatments are in need of further refining.

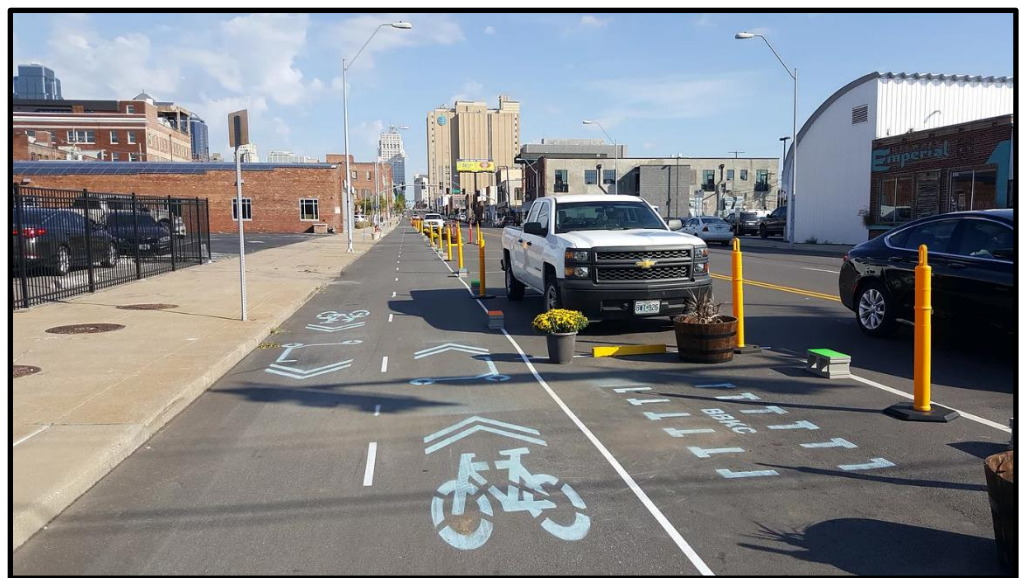


Figure 2. Better Block KC street treatment at 18th and Oak, Kansas City, MO

## Techniques

### The three basics

There are three basic techniques of managing the curbside. Other techniques can be built off of these. In a study prepared for Uber, the consulting group Fehr and Peers devised three basic strategies for improving the productivity of the curbside: relocation, conversion, and flexibility.<sup>5</sup> **Relocation** means changing the locations of curbside uses while keeping the amount of space dedicated to each use the same. **Conversion** involves changing space along the curbside so there is a different amount of space for each use compared to what there was before. **Flexibility** changes the curbside use to make it accessible to different users at different times of day, when each use is in greatest demand.

### Proximate location

Looking at an area comprehensively is important because some curb users, such as freight and package deliverers, must rely on accessible space near their destinations. ITE proposes the concept of “moving loading and access around the corner,” explaining:

*Rather than attempting to serve all curbside uses directly in front of each adjacent land use, cities can identify a reasonable proximity for loading and unloading access to each individual destination.<sup>6</sup>*

### Off-peak hour arrangements

Flexible-use space at the curbside can help remove freight and deliveries from travel lanes, making the street safer and more efficient. However, when the problem of commercial loading and unloading crowding the curbside reaches a large enough scale, other approaches may be needed. Arranging for commercial deliveries to be conducted in off-peak hours requires cooperation from suppliers and (more importantly) receivers of the goods. In locations where the problem is acute, creating partnerships is worthwhile.

### Leveraging existing off-street parking

Relieving pressure at the curbside may be at least partly a matter of increasing the use of underutilized off-street parking lots. This could require a combination of wayfinding, educational, and technological solutions, as well as negotiations for shared parking with the owners of private lots.

### Urban consolidation centers

ITE describes urban consolidation centers as hubs that combine packages from different carriers into one location.<sup>7</sup> These packages are then delivered using smaller vehicles. Urban consolidation centers are public-private partnerships, and they work best when there are high numbers of low-volume deliveries made to the same locations by different delivery services.



Figure 3. Example of greening at the curb in Kansas City, Missouri

<sup>5</sup> “San Francisco Curb Study,” Fehr and Peers <<https://www.fehrandpeers.com/curbs-of-the-future/>>, p. 20.

<sup>6</sup> “Curbside Management Practitioners Guide,” Institute of Transportation Engineers <<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>>, p. 17.

<sup>7</sup> Ibid., p. 16

## Activation and greening

Seattle's framework reminds us that "activation" (social spaces for people) and "greening" (providing natural amenities) are important functions of the curbside. Greening in the form of street trees, bioswales and rain gardens is important to consider in curbside management because they enhance the pedestrian landscape, yet occupy a significant amount of curb space. Activation uses, such as food trucks, parklets, and street cafés, may be viable in highly walkable centers where curb access is not stressed by various kinds of modal traffic. Alternatively, increased activation uses may work well in places where pedestrian traffic is such a large stressor for the curbside that it pushes other modes out. This can be seen during special events, or when city mandates require people keep an increased distance from each other due to pandemic concerns, leading people to wait on the sidewalk and street in order to patronize businesses.

## Performance measurement

The final steps of the planning process involve measuring the changes made to the urban environment to see if the investment had the desired effect. Curbside management is a relatively new practice with no set standards. ITE has proposed a list of measures that can be adopted individually to fit a city's goals for a particular street, such as "target zone utilization and turnover levels achieved," and "reduced cruising behavior."<sup>8</sup>

For planners seeking to optimize access to the curbside using all modes of travel, the Curb Productivity Index from Fehr and Peers's San Francisco study may be especially worth consideration. This index calculates how many passengers are served per hour per foot of curb using a given mode. This normalizes the different modes for the level of passenger delivery based on curbside space utilized.<sup>9</sup>

Using this index, the Fehr and Peers study makes it clear that, in the San Francisco context, public transit and passenger loading through various vehicles (TNCs, private vehicles, and shuttles) are the most effective ways for a high number of people to access the curb from the street. On-street private vehicle parking does not help a high number of people access the curb, so continuing to allocate space to that mode may not serve the city's interests. When measured, the context of Kansas City's high-intensity urban centers may prove quite different. However, as population in these high-intensity centers increases, cities can use this index to assess the changes they make to the right of way. See the Appendix for a detailed explanation.

The Fehr and Peers study tracks a few other measures to help provide context to the Curb Productivity Index. These include average dwell times, the amount of curb length allocated to different uses, and comparisons of vehicles and passengers by mode. Two more notable measures concern the passenger loading events that happen in the travel lane (versus the loading events that happen at the curb) and loading events that impacted travel flow. These are risky situations that a curbside management approach seeks to avoid.

Data for the above measures from the Fehr and Peers study was collected based on observational data — photo and video documentation. Although such data will be illuminating, cities will have to prudently discern when resources should be deployed to collect the data.

## Curbside management as a supplement to previous planning work

The goals of curbside management include less congestion, less risky maneuvering and more efficient access to the curb for people and goods. As cities consider a curbside management approach for dense, high-traffic areas, they will want to account for previous planning work that has been done for those areas. This prior work most likely included public engagement and is often approved by governing bodies. Recommendations in these plans can coincide with curbside

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<sup>8</sup> Ibid., p. 42

<sup>9</sup> "San Francisco Curb Study," Fehr and Peers <<https://www.fehrandpeers.com/curbs-of-the-future/>>, p. 16.



management goals, and curbside management techniques may be able to supplement these plans in achieving their aims. Examples are below.

### [Westport – multimodal planning](#)

The Westport district is north of the Country Club Plaza and just west of Main Street in Kansas City, Missouri. This historic area is so heavily trafficked by pedestrians on Friday and Saturday nights that sections of it are closed to vehicular traffic. The area has also suffered significant violence, leading the area's Community Improvement District to implement security screening during those high-traffic times. This area has been subject to more than one planning study.

#### [Westport District Master Plan – pedestrian modal priority](#)

[This plan](#), focused squarely on the Westport district, is often concerned with maintaining the district's pedestrian-friendly character. For important streets in Westport such as Westport Road, Pennsylvania Avenue, and Mill Street, the plan repeatedly recommends pedestrian activation uses, such as patios, street cafés, and expanded sidewalks (or maintenance of existing wide sidewalks).

Notably, the same places in the plan that call for pedestrian amenities also call for preservation or addition of on-street parking. A curbside manager will want to inventory of existing curbside space to find out how much space is taken up by each use, and how productive the curb is for those uses. Accomplishing those initial tasks will help in determining whether both activation and parking uses can be maintained or even expanded.

#### [Midtown Complete Streets Plan – multimodal considerations surrounding Westport](#)

[This plan](#), published in 2018 through MARC's Planning Sustainable Places (PSP) program, examines several corridors around the Midtown area of Kansas City, Missouri. One of these corridors is Broadway Boulevard, at the eastern edge of the Westport district, and another is Southwest Trafficway, at the western edge. While the Westport District Master Plan has recommendations for Broadway Boulevard, it also refers the reader to the Midtown Complete Streets Plan.

The Midtown plan's vision for Broadway is ambitious, requiring a great deal of engineering and construction work to meet the modal priorities of pedestrian crossings and separated bicycle facilities (the plan notes a relatively high number of bike crashes at Broadway and Westport Road). Until funding is dedicated for these physical improvements, a curbside manager tasked with allocating the existing area would have to be creative, not only inventorying the area to find the current curb space configuration and the curb's productivity, but perhaps using pop-up techniques with paint and roadway control devices, as Better Block KC did in this area several years ago.

The plan's recommendations for Southwest Trafficway involve leaving it as a vehicle-focused roadway, though enhancing it so that it does not present a barrier to active transportation modes. This is an excellent example of the recommendations of the ITE resource for major thoroughfares in a planning document.

The Midtown plan also addresses freight deliveries succinctly. It envisions delivery trucks parking in new center left turn lanes proposed by the plan, but concedes that off-peak deliveries and short-term loading zones could be provided. A curbside manager should consult freight stakeholders about these methods.

One more notable aspect of both plans is that they mention a future bikeway running through Pennsylvania Avenue, but do not explore it in detail. The Bike KC Master Plan confirms this. A curbside manager will want to understand this thoroughly. The Westport District Master Plan's desire for expanded sidewalks, additional activation uses and maintained on-street parking, as well as Westport's weekend security measures, could commandeer the curb to such an extent that a bikeway is precluded, particularly if it features lanes that require curbside space.

### [Downtown Overland Park – optimizing off-street parking](#)

Overland Park is one of the largest cities on the Kansas side of the region. Its urban fabric is largely auto-oriented, yet it does have a dense, popular, and walkable downtown. The farmers market is an important attraction to the area, and the downtown district itself is growing its residential capacity with new apartment construction. Given all this, curbside management will become increasingly important. A primary strategy to relieve pressure on the curbside is better management and use of off-street parking. Overland Park has already done planning work to address this problem.

[The Overland Park, Kansas, Parking Plan](#), completed in 2014 through MARC’s PSP program, looked at strategies to increase the utilization of parking downtown. The plan has five “Big Ideas,” several of which accomplish curbside management goals directly or indirectly:

- **Make parking easier to find and use** – wayfinding methods, including signage on the curbside, could help greatly in finding off-street parking, relieving parking pressure at the curbside.
- **Use parking more efficiently by sharing** – the unavailability of private lots for public parking during off-peak hours may be putting more pressure on the curbside. The plan outlines necessary traits of deals the city of Overland Park can offer to owners of private lots.
- **Increase supply** – the plan includes sketches of restriped on-street parking that increases the total supply of parking at the curb. A curbside manager might notice that the places where this parking is proposed are away from the most active streets in downtown Overland Park. This could create opportunities to dedicate some space to other uses along the active streets, such as pick-up/drop-off zones that would keep taxis and TNC vehicles safely out of the travel way.
- **Capture the true value of parking** – if a city employs methods to price or regulate parking, it should be with an eye towards increasing productivity (i.e., turnover) of the most valuable spaces in the district. Pick-up/drop-off zones (perhaps nested within flex zones) could also accomplish the goal of maximizing the value of parking space.
- **Improve the pedestrian experience** – curbs are where mobility meets access. Sometimes the “access” side also involves mobility – as people transition from one mode (car) to another (walking) and then travel some distance to reach their destinations using the latter mode – particularly if the city is trying to encourage shoppers to park once and walk to multiple destinations. The plan makes it clear that infrastructure on both sides of the curb should be well-maintained for access to be successfully facilitated.

### [The Crossroads – optimizing off-street parking](#)

The Crossroads District, like Westport, is one of the oldest parts of Kansas City, Missouri. It is part of greater downtown Kansas City, and is known as a hub for the arts. More residential construction has taken place in recent years, raising the district’s activity intensity. The district experiences similar parking problems to downtown Overland Park, and a consultant was contracted by the city of Kansas City, Missouri, to conduct a parking study.

[The Crossroads District Parking Study](#), completed by Walker Parking Consultants in 2017, found that the Crossroads District had an imbalance in demand between on-street spaces and off-street spaces: on-street spaces were full during peak times while off-street spaces were available.

Some of the recommended remedies mirror those of downtown Overland Park. Wayfinding methods were a remedy raised in public feedback, as well as loading zones. Uniquely, the plan documents a suggestion for loading zones partly in the context of artists dropping off heavy items. This reflects the district’s unique needs and is a factor a curbside manager should inquire about and consider. The plan also proposes a shared parking district as a strategy to consolidate numerous private lots into one larger pool, while relieving private owners of legal liability.

The Crossroads District Parking Study also makes proposals to simplify the regulations of the on-street parking. It recommends “one policy per block face to avoid confusing drivers” and even “one policy along a single street.”

Notably, the study recommends establishing loading zones for non-commercial use only, as the consultants believe that commercial deliveries should only occur on off-peak hours. While off-peak delivery is a fine strategy for mitigating conflicts with freight deliveries, it may also require a high level of stakeholder coordination and agreement. A curbside manager should be prepared to allocate curb space differently if stakeholders cannot realize off-peak delivery.

In certain ways, a curbside manager's job in this District may begin where this plan ends. If the need for on-street parking is not felt so acutely thanks to better utilization of off-street parking, perhaps that will create physical and political room for different modes and uses. With more residents coming to the Crossroads, perhaps even greening and activation uses can be implemented more widely.

## Curbside management and special events

Some cities around the Kansas City metro area host events on a yearly basis that draw large numbers of people. Many of these people arrive in cars, and although event organizers often make arrangements for parking and shuttles that will relieve the pressure around the venue areas, festival goers may still park in nearby residential areas for certain events, such as Apple Fest in Weston, Missouri, SantiCaliGon in Independence, Missouri, and Lee's Summit Days in Lee's Summit, Missouri. A planner or other curbside manager can adapt and apply the five planning steps. An example might look as follows:

1. **Inventory existing conditions** – In this step, staff would measure the amount of curbside space in the neighborhoods within walking distance of the event, and perhaps how much space is typically consumed by residents' parked vehicles. This step might also involve public engagement. Do residents see the sudden, temporary influx of people as a frustration? Or do they accept it easily due to the event's limited time span?
2. **Identification of need** – This step will most likely identify vehicle storage as the modal priority, but perhaps the analysis will identify other kinds of modes to be served to encourage less space-intensive automobile use.
3. **Identify alternatives** – In the event that residents accept visitors but don't want on-street parking to get out of control, could visitor passes be issued or allowances made for area residents to rent out their driveways?
4. **Public engagement** – Conduct an initial round of engagement to understand the problem and then engage the public again with any proposed solutions.
5. **Implement treatments** – Enact the solutions with the next event and survey the public for the results.

## Other considerations for the present and the future

Curbside management is appealing because a comprehensive understanding of an area's curbs can prepare a city for unanticipated challenges. It can also help cities prepare for some known challenges that are present or on the horizon, but have not yet materialized across the country. This section discusses some of those challenges.

### Autonomous vehicle management

Autonomous vehicle (AV) technology is being developed and piloted, and public sector staff have long recognized a need to plan for the arrival of autonomous vehicles. Curbside management prepares for AVs in a couple of ways:

- Passenger loading zones along the curb will be the kinds of spaces an AV will use to pick up and drop off passengers. "Smart" loading zones for freight, which would involve paid reservations through online applications, may prepare for a situation where AVs are charged for the use of space at the curbside.
- Digital curb inventories are digital tools that document curbside assets and regulations. They may function as an additional level of ground-truth to supplement an AV's sensors and its other navigational data.

MARC's white paper [\*Driving Change: A Policy and Planning Framework for Autonomous and Connected Vehicles in Greater Kansas City\*](#) mentions curb sharing as a strategy to address certain policy focus areas.<sup>10</sup> The Infrastructure, Planning and Investment chapter mentions the need to convert parking spaces to pick-up/drop off areas. The Equitable Access and Mobility Services chapter follows up by recommending curb sharing policies that allow better access, touching on the urban curb's role as the transition point between the journey and the destination.

### [Sidewalk delivery bots](#)

Although not as high-profile as passenger-carrying AVs, autonomous sidewalk delivery robots are in development and being tested on the sidewalks of some American cities and college campuses. Much like e-scooters before them, sidewalk delivery bots are privately owned and operated and will occupy and/or travel along public right-of-way in an unfamiliar manner. Larger cities such as Kansas City, Missouri, have experience in making agreements with e-scooter companies, which may be useful in managing sidewalk delivery bots. A curbside manager will have to watch as ideas and best practices emerge, or pioneer new ones. Do these bots move similarly to pedestrians? Or will they need special parking spaces at the curbside as with e-scooters?

### [Metered on-street parking](#)

Free parking is predominant in the eight-county Kansas City metro area, not just in surface lots or garages, but at the curbside. With few exceptions (such as Greater downtown Kansas City, Missouri, and downtown Kansas City, Kansas), suburban downtowns and other dense, walkable centers in the metro are characterized by on-street parking that is free of charge to use. Metered on-street parking has two functions: to generate revenue for the managing agency and to encourage turnover so that businesses can serve more customers with fewer convenient parking spaces. Higher turnover supports the curbside management goal of increased curbside productivity, so metered on-street parking is certainly appropriate to discuss in the context of curbside management.

### [Public or private data](#)

Currently, much of the knowledge about what is happening at the curbside in a given area is the result of planning studies, which are completed once and are typically not updated regularly. Continuous data about the curbside has come from ride-hailing companies, bike share, and e-scooters. Data available to public entities varies. The city of Kansas City, Missouri, for example, has not been able to obtain ride-hailing company data, but does have anonymized e-scooter data. Based on interviews, a digital curb inventory firm may not own the collected data, but they may sell access to proprietary software platforms that collect and/or display the data in a convenient and useful manner.

This issue is relevant to cities because data informs decisions for the built environment. Competing budgetary needs limit cities' ability to purchase data and analysis tools. Addressing this issue as the data grows will be important.

## [Digital curb inventories](#)

A digital curb inventory is a spatially organized database of assets (physical structures) and regulations that are present at the sidewalk or street space immediately adjacent to the physical curb structure (the curbside). Such an inventory is a helpful tool when it comes to curbside management planning efforts. An inventory can display surrounding curbside uses and put a proposed change to curbside use in context. If a city wants to practice curbside management in an area in a comprehensive way, a digital curb inventory can function as a centerpiece of its curbside management strategy.

MARC staff reviewed and interviewed vendors of digital curb inventories; the information is gathered below. This information will benefit MARC member cities who may wish to start a digital curb inventory and want a summary of different vendors' capabilities before contacting them.

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<sup>10</sup> "Driving Change: A Policy and Planning Framework for Autonomous and Connected Vehicles in Greater Kansas City", Mid-America Regional Council, <<https://www.marc.org/Transportation/Plans-Studies/pdfs/Driving-Change-AV-White-Paper.aspx>>, p. 4-5.



## Vendors

### Coord

[Coord](#) is a for-profit, software-as-a-service firm that is notable for its augmented reality data collection iPhone application, advertised as more accurate at providing locations of curbside assets than GPS-based methods. Its system interprets signage to generate regulations data and provides analytics on that data. If speed of data collection is a priority, then Coord may be competitive.

### SharedStreets

[SharedStreets](#) is a project of the Open Transport Partnership, a nonprofit organization. For curbside management purposes, it promotes two digital systems: the SharedStreets Referencing System, which uniformly links data to streets, and CurbLR, a data standard that documents curbside assets and regulations. CurbLR is linked to the SharedStreets Referencing System. CurbLR is intended to be universal, although the data standard for curbs has not yet been settled. Data using the SharedStreets/CurbLR system can be collected in a variety of ways, with varying collection times. Use and support of the SharedStreets and CurbLR tools is free.

### INRIX Road Rules

[INRIX's Road Rules](#) platform is similar to a curb inventory tool, but its differences should be noted. Road Rules is a platform meant to document all rules of a streetscape, including rules of the roadway (speed limits, access restrictions, etc.), rules of the curbside (parking, loading zones, etc.), and rules of the sidewalk. It documents some curbside assets, such as bicycle parking and fire hydrants, but not others, such as parking regulation signs. It does not use photo documentation for verification, as other vendors do. Data collection is done using Google Maps, which is integrated into the Road Rules interface.

Table 2. Digital curb inventory vendors

	Coord	SharedStreets (CurbLR)	INRIX Road Rules
<b>GIS-compatible</b>	Yes	Yes, with data conversion	Yes; can import from GIS, and can export as a shapefile or GeoJSON
<b>Data standard</b>	Proprietary	SharedStreets/CurbLR	SharedStreets; CurbLR compatible
<b>Disconnected locations in one database</b>	Yes	Yes	Yes
<b>Can capture bicycle infrastructure</b>	Yes	Potentially, with customization	Bicycle parking, bike lanes
<b>Data ownership</b>	Coord retains rights to use data; collected data is the client's	Client; open source standard	Client-owned
<b>Cost/Pricing structure</b>	Approx. \$25k annually; Coord may attempt to price below bidding range	n/a	Free, though future additions may be monetized
<b>Data collection time estimate</b>	20 curb miles took 4.5 total person-days to cover each curb twice; 15.25 minutes for one NYC block	100-200 manhours to survey one blockface using a measuring wheel; variable depending on data collection method	12-16 hours to enter all rules (sidewalk, curb, street) for one mile

INRIX staff are forthright about the intent of this platform: it is intended more as a database of rules that can be shared between mobility companies and the public than as a planning or asset management tool, although modules for those

purposes may be developed in the future. INRIX is also explicit about Road Rules's intent and potential to support AV preparedness by functioning as an additional layer of ground truth for AV navigation.

### Supporting Services – OurStreets

BikeWalkKC has begun using the [OurStreets application](#), which tracks sidewalk and traffic violations through reports made by users, who are members of the public. If use of this application continues and is expanded (for instance, by the City of Kansas City, Missouri), it could complement a curb inventory by hot-spotting curbside-related problems. If curbside problems are spotted in locations where the curbside is already inventoried, appropriate changes to the curb space could be identified more quickly and easily.

## Curbside management case studies

There are several notable examples of curbside management on the national stage. However, since they often occur in areas much denser than most places in the Kansas City metro area, local examples of curbside management are also worth noting. Not all of the case studies are successful, but they may provide lessons that cities can learn from when managing their own curbsides.

### Local case studies

#### Lawrence, Kansas – downtown street dining

The city of Lawrence, Kansas, is just outside MARC's eight-county planning area in Douglas County, Kansas. It is home to the University of Kansas and Haskell Indian Nations University, but it also has a renowned downtown district. This district was the subject of a street dining experiment intended to remedy the lack of adequate prescribed space for businesses during the COVID-19 pandemic.

The city began discussing the idea with the nonprofit organization Downtown Lawrence, Inc. (DLI) in mid-May 2020. DLI had been working with the architecture firm Gould Evans, who did pro bono



*Figure 4. Curbside dining area in Lawrence, KS*

planning work around street dining for the downtown district. The city passed a resolution for the district on June 16, 2020. This allowed businesses who held sidewalk dining permits to expand their dining areas into the street by-right. Those who did not already hold a sidewalk dining permit needed to apply for a Temporary Right of Way Use License, with a waived fee. Several street dining structures were built. The City sought clarification with the Kansas Alcoholic Beverage Control (ABC) department so that the structures would comply with the ABC's regulations. The structures were required to have a three-dimensional barrier within the areas where alcohol was served. This program was set to expire at the end of October 2020, but has been renewed through the end of 2021.

Interviews with staff at the City indicated that the City learned about the different perspectives on parking between retail merchants and restaurants. The retail merchants, in turn, made comments about understanding the importance of the success of restaurants to their own businesses. Staff reported 16 street dining permits as of mid-to-late August, 2020.

## Shawnee, Kansas – downtown parklets

*Note: the structures discussed in this case study are referred to as “parklets” in instances that include staff reports. However, since they are tied to food and drink establishments as extensions of premises, they may be more accurately referred to as “street cafés”.*

In June 2020, the Shawnee Mission Post reported that the city of Shawnee was considering the allowance of temporary parklets in its downtown, for the purpose of providing more space for drinking and dining during the COVID-19 pandemic.<sup>11</sup> These structures would be along the public right of way, specifically within on-street parking. The city would require an application but waive the application fee and provide some financial assistance for the construction of the parklet. Although the ordinance allowing the parklets passed the City Council, an interview with staff at the city of Shawnee in August of 2020 revealed that no applications for parklets had been received to that point. Staff explained that the city and business owners faced restrictions from the Kansas ABC department, since the parklets were intended to be spaces where food and drink could be consumed. The ABC required that the parklets be temporary, and the application sent to the city would also have to be approved by the ABC. The bars and restaurants that would have been eligible for these structures desired a more permanent solution for increasing available space.

Although the ordinance has not resulted in the construction of any parklets, the idea netted positive feedback from the City Council and business owners. The possibility of parklets next to a vehicular travel lane spurred conversation about safety. The availability of parking was not a contentious issue, and staff are seeking a more permanent form of parklets in the future.

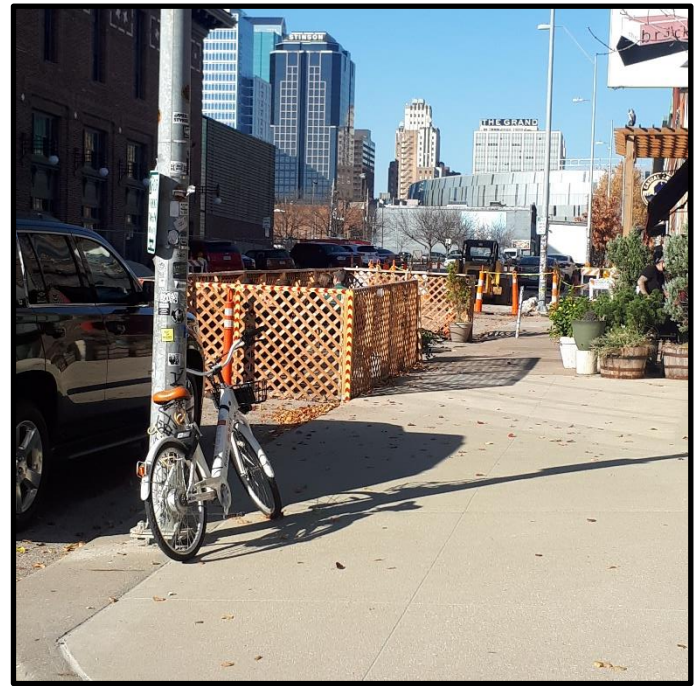


Figure 5. Curbside dining areas in Kansas City, MO

## Kansas City, Missouri – easing permit requirements for sidewalk cafés, street cafés, and parklets

Acting concurrently with the initiatives in other nearby cities that sought to provide outdoor space in the midst of the COVID-19 pandemic, Kansas City, Missouri, enacted a Temporary Outdoor Seating Program that eased requirements for permits on sidewalk cafés, street cafés, and parking lot dining. The program was scheduled to run from May 21 to Dec. 31, 2020. The “easing” that the program promises includes a waived permit fee, and no requirements for signatures, maintenance agreements, bond deposits, and parking space limits. Any installation made needs to have a barrier, be ADA accessible, maintain a pedestrian access route, have retro-reflective strips, one-foot buffers around the installation,

<sup>11</sup> Wankum, Leah, “Shawnee to consider extending sidewalk area with space for outdoor seating downtown during COVID-19 pandemic.” Shawnee Mission Post, <<https://shawneemissionpost.com/2020/06/10/shawnee-to-consider-extending-sidewalk-for-outdoor-seating-downtown-during-covid-19-pandemic-94469/>>



and the business needs to have general liability insurance. The installations cannot be built in ADA/accessible parking spots. They also must be built on corridors with slow moving traffic going 30 miles per hour, maximum.

As of mid-late August 2020, city staff indicated that there were 22 issued sidewalk café permits and 20 street café permits. Like Lawrence, Kansas City staff anticipate permits increasing as summer temperatures go down.

### National case studies

#### Washington, D.C. – commercial loading zones

In 2019, the District collaborated with a San Francisco start-up, curbFlow, to set up nine loading zones in the city, which were operational between Aug. 1 and Oct. 30. Delivery drivers would use the curbFlow app to reserve one of these zones at the curb. The project resulted in double parking and illegal U-turns next to the loading zones dropping 64 percent.

The pilot was discontinued after Oct. 30. An interview with personnel who worked on the project indicated that the project was not scalable due to staffing and enforcement needs.

Sources: The Washington Post<sup>12</sup>, District Department of Transportation<sup>13</sup>, [curbflow.com/dc](https://curbflow.com/dc).

#### Washington, D.C. – Golden Triangle Nightlife Curb Pilot

The District of Columbia tried a number of curbside management initiatives before the 2019 curbFlow pilot, as outlined in a resource by the ITE. One of them involved establishing pick-up/drop-off zones along Connecticut Avenue south of Dupont Circle. This segment of Connecticut Avenue is known for its nightlife, and it was subject to obstructive and dangerous pick-up/drop-off maneuvers in the middle of the street, while the curbside was filled to capacity with vehicle storage. During the pilot, which began in October 2017, stretches of Connecticut Avenue's (and 18<sup>th</sup> Street's) curbside parking were regulated as pick-up/drop-off-only space between the hours of 10 p.m. and 7 a.m.

A December 2019 District Department of Transportation (DDOT) presentation found linked on the website of the Metropolitan Washington Council of Governments (MWCOG) indicates that the pilot was a success and that the DDOT has worked with SharedStreets to identify locations for further pick-up/drop-off zones.

Sources: ITE<sup>14</sup>, MWCOG<sup>15</sup>.

#### New York City, New York – off-peak deliveries

In late 2009 and early 2010, one of the densest cities in the country, New York, experimented with changing the time of freight deliveries to urban commercial areas in order to reduce traffic congestion. These off-peak deliveries occurred in the evening and overnight between 7 p.m. and 6 a.m. Changing the times at which some private firms drop off goods and other firms receive them required the cooperation of those firms, which included Foot Locker, New Deal Logistics, Sysco, and Whole Foods Market. Data was collected using GPS-enabled mobile devices on delivery trucks.

The pilot saw some significantly positive results. Median travel speeds from customer to customer during off-hour delivery increased by 50 percent compared to the a.m. peak period, and by over 100 percent compared to the mid-day

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<sup>12</sup> Shaver, Katherine, "Study: Allowing delivery drivers to reserve curb space reduces double-parking." The Washington Post, <[https://www.washingtonpost.com/local/trafficandcommuting/study-allowing-delivery-drivers-to-reserve-curb-space-reduces-double-parking/2019/11/17/8e569866-062f-11ea-ac12-3325d49eacaa\\_story.html](https://www.washingtonpost.com/local/trafficandcommuting/study-allowing-delivery-drivers-to-reserve-curb-space-reduces-double-parking/2019/11/17/8e569866-062f-11ea-ac12-3325d49eacaa_story.html)>.

<sup>13</sup> "DDOT, curbFlow Research Project Finds High Demand for Pickup, Dropoff Zones," District Department of Transportation, <<https://ddot.dc.gov/release/ddot-curbflow-research-project-finds-high-demand-pickup-dropoff-zones>>.

<sup>14</sup> "Case Study | Washington, D.C. District Department of Transportation," Institute of Transportation Engineers, <<https://www.ite.org/pub/?id=C29F4D5E-FE34-2037-3B96-DE312E1DBBFF>>.

<sup>15</sup> "Nightlife to Network: Piloting 'PUDO' Zones in the District of Columbia," District Department of Transportation, <<https://www.mwcog.org/file.aspx?&A=yYbU3EZwmtxjvWT4dgbXJfODgHnNG9pARmCAddAZsI%3D>>.



and p.m. periods. Time spent in the process of delivery also decreased significantly — median times were as low as 25 minutes, compared to a.m. and mid-day service times were over one hour. Much of the feedback, particularly from delivery drivers, was positive. Negative feedback was related to extra cost on the receiver end or to a carrier having to wait to make a delivery. Many of the Whole Foods Market vendors that participated in the pilot continued delivering in the off-hours. According to a 2010 report, the New York City Department of Transportation (NYCDOT) was looking to expand the pilot's scope.

Cooperation from the receivers of goods will be particularly important in implementing off-hour deliveries, as the carriers of goods may follow their customers' demands. One technique used during the pilot was that of unassisted deliveries, in which goods could be placed in a secure location so that staff receiving the goods did not have to be present very late or very early. This is a good example of curbside management going beyond the curbside itself and requiring a greater degree of engagement with stakeholders. If an area is experiencing a high degree of congestion from freight deliveries, and other curbside management techniques are not feasible or effective, the extra effort may be worthwhile.

Sources: NYCDOT Sustainable Streets Index 2010<sup>16</sup>, Off-peak deliveries pilot final report<sup>17</sup>.

### Seattle, Washington – Final 50 Feet Research Program

The Urban Freight Lab is a public-private partnership housed within the University of Washington's Supply Chain Transportation & Logistics Center. Its Final 50 Feet Research Program produced research in pursuit of goals that would improve efficiency on the last leg of urban parcel delivery. This project intersects with the goals of curbside management in the way reducing congestion and making more productive use of public space dedicated to deliveries.

The Urban Freight Lab has produced a series of research papers, starting in 2018. The first paper involved the geocoding of private interior and exterior loading spaces, which the City of Seattle could then contrast with its existing curb data. That paper also documented the delivery process flows for five buildings in the Center City area of the City of Seattle, starting from where the trucks stopped on the street. This resulted in "the first time that researchers have analyzed both the street network and the city's vertical space... as one unified goods delivery system." Further papers examined the following, and more:

- Criteria for and public interest in common carrier locker systems (self-service, delivery firm-neutral parcel lockers) located at transit stations or transit-oriented development areas.
- A common carrier locker system located within a major Seattle public office building.
- A mapped inventory of alleys in the Center City area, which delivery vehicles often use for delivering goods, and an occupancy study of select alleys.
- Detailed curbside use behavior around study buildings.

The Urban Freight Lab papers note that traffic congestion is significant in Seattle, and that the research is conducted to find ways to alleviate that congestion during the trend of increasing parcel deliveries. The Kansas City area, by contrast, is known for having relatively little traffic congestion. Nevertheless, it is not too early for Kansas City area municipalities to study the urban Freight Lab's work and preserve that quality-of-life aspect, especially as different centers around the metro grow denser.

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<sup>16</sup> "Sustainable Streets Index 2010," New York City Department of Transportation, <[https://www1.nyc.gov/html/dot/downloads/pdf/sustainable\\_streets\\_index\\_10.pdf](https://www1.nyc.gov/html/dot/downloads/pdf/sustainable_streets_index_10.pdf)>, p. 62-65.

<sup>17</sup> Holguín-Veras et al., 2010. "Integrative Freight Demand Management in the New York City Metropolitan Area," <<https://ohdnyc.com/sites/default/files/business-admin-files/Home/ohd-final-report.pdf>>.

Source: Final 50 Feet Research Program<sup>18</sup>.

## Library of resources

This section is partly a bibliography of this paper, but is also functions as a collection of curbside management resources that a future curbside manager can explore for a deeper dive into the topic. If you are viewing this document electronically, you may search the library by using a text search on the following tags:

- Resources/Best Practices
- Articles
- Research/Reports
- Planning Documents
- Products/Services

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Barth, B. (2019, June) *Curb Control*. Planning Magazine. Retrieved December 23, 2019 from  
<<https://www.planning.org/planning/2019/jun/curbcontrol/>>

**Tags:** Articles

Coord. <<https://www.coord.com/>>

**Tags:** Products/Services

Fehr & Peers. (2018, September). *San Francisco Curb Study*. Retrieved December 24, 2019 from  
<<https://www.fehrandpeers.com/curbs-of-the-future/>>

**Tags:** Planning Documents

Fehr & Peers. (2019, January). *Cincinnati Curb Study*. Retrieved December 24, 2019 from  
<<https://www.fehrandpeers.com/curbs-of-the-future/>>

**Tags:** Planning Documents

Holguín-Veras, J., Ozbay, K., Kornhauser, A., Shorris, A., & Ukkusuri, S. (2010, September). *Integrative Freight Demand Management in the New York City Metropolitan Area*. Retrieved August 28, 2020 from  
<<https://ohdnyc.com/sites/default/files/business-admin-files/Home/ohd-final-report.pdf>>

**Tags:** Research/Reports

INRIX Road Rules. <<https://inrix.com/products/road-rules/>>

**Tags:** Products/Services

Institute of Transportation Engineers, *Curbside Management Practitioners Guide*. Retrieved December 23, 2019 from  
<<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>>

**Tags:** Resources/Best Practices

Institute of Transportation Engineers, *Curbside Management Resources*. Retrieved August 11, 2020 from  
<<https://www.ite.org/technical-resources/topics/complete-streets/curbside-management-resources/>>

**Tags:** Resources/Best Practices

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<sup>18</sup> "Final 50 Feet Research Program," Supply Chain Transportation and Logistics Center,  
<<http://depts.washington.edu/sctlctr/research-project-highlights/urban-goods-delivery-0>>

International Transport Forum. (2018, May 24). *The Shared-Use City: Managing the Curb*. Retrieved August 31, 2020 from <[https://www.itf-oecd.org/sites/default/files/docs/shared-use-city-managing-curb\\_5.pdf](https://www.itf-oecd.org/sites/default/files/docs/shared-use-city-managing-curb_5.pdf)>

**Tags:** Resources/Best Practices

National Association of City Transportation Officials. (2017, November). *Curb Appeal: Curbside Management Strategies for Improving Transit Reliability*. Retrieved December 24, 2019 from < <https://nacto.org/wp-content/uploads/2017/11/NACTO-Curb-Appeal-Curbside-Management.pdf>>

**Tags:** Resources/Best Practices

Nelson/Nygaard Consulting Associates. (2014, August) *District Department of Transportation Curbside Management Study*. Retrieved August 11, 2020 from <<https://comp.ddot.dc.gov/Documents/District%20Department%20of%20Transportation%20Curbside%20Management%20Study.pdf>>

**Tags:** Planning Documents

New York City Department of Transportation. (2010). *Sustainable Streets Index 2010*. 62-65. Retrieved August 20, 2020 from <[https://www1.nyc.gov/html/dot/downloads/pdf/sustainable\\_streets\\_index\\_10.pdf](https://www1.nyc.gov/html/dot/downloads/pdf/sustainable_streets_index_10.pdf)>

**Tags:** Research/Reports

Smart Growth America. *Parklet Policy Primer*. Retrieved October 16, 2020 from <<https://www.smartgrowthamerica.org/app/legacy/documents/parklet-policy-toolkit.pdf>>

**Tags:** Resources/Best Practices

SharedStreets. <<https://sharedstreets.io/>>

**Tags:** Products/Services

Supply Chain Transportation and Logistics Center at the University of Washington. *The Final 50 Feet Research Program: Optimizing the Last Leg of the Urban Goods Delivery System*. Retrieved on August 28, 2020 from <<https://depts.washington.edu/sctlctr/research-project-highlights/urban-goods-delivery-0>>

**Tags:** Research/Reports

## Appendix: Curb Productivity Index

The Curb Productivity Index is a curbside management-related performance measure developed by the consulting group Fehr & Peers in a curbside management study they completed in San Francisco for Uber Technologies.<sup>19</sup> It is intended to normalize the “productivity” of curbside space (defined as the amount of people using the space to transition from vehicular travel way to sidewalk) across different modes of travel. Mathematically, it can be defined as:

$$\frac{\text{Activity}}{\text{Time} \times \text{Space}}$$

“Activity” is the number of passengers arriving or departing; “Time” is the dwell time at the curb; “Space” is the amount of curb space occupied by the vehicle of the mode. When the equation is calculated, the unit can be expressed as “passengers per hour-foot,” or:

$$\frac{\text{passengers}}{\text{hour} - \text{feet}}$$

As an example, if TNC drivers dropped off or picked up 20 passengers over loading events that totaled 5 minutes, and the loading zone used was 20 feet long, the equation would look as follows:

$$\frac{20 \text{ passengers}}{5 \text{ minutes} \left( \frac{1 \text{ hour}}{60 \text{ minutes}} \right) \times 20 \text{ feet}} = 12 \frac{\text{passengers}}{\text{hour} - \text{feet}}$$

Since the denominator indicates a single hour and a single foot, Fehr and Peers then takes a result such as the one above and multiplies it by an amount of feet to get an understanding of curb productivity over a more useful and relatable amount of space:

$$12 \frac{\text{passengers}}{\text{hour} - \text{feet}} \times 20 \text{ feet} = 240 \text{ passengers served per hour per } 20 \text{ feet of curbside}$$

There are a few considerations to note when using the Curb Productivity Index:

- The amount of time recorded is strictly dwell time at the curbside during the observation period, not the total time of the observation period. An organization should be conscious of this if it wants to calculate the productivity of the curbside no matter the vehicle dwell time over the whole observation period. Such an alteration may be considered when there are strict separations of curbside uses due to cultural or enforcement factors. An example is a transit stop used by a streetcar; very few private vehicles or TNC drivers will attempt to occupy that curbside space, particularly during peak hours.
- The curb productivity index is a product of the time of day the observations were made. Data collection should be structured so that the curb productivity index addresses the time and place that decision makers and stakeholders are most concerned about and have the capacity to address.
- The Fehr and Peers study provides no examples of this index being used in a commercial delivery context to measure the amount of goods or parcels moved. Curbside managers will need to innovate on it to use it for this purpose.

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<sup>19</sup> “San Francisco Curb Study,” Fehr and Peers <<https://www.fehrandpeers.com/curbs-of-the-future/>>, p. 16.