

Appendix C: Best Practices Literature Review

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## Literature Review - ABSTRACT

Loading and delivery is an essential, but sometimes overlooked component to the urban transportation network. Businesses and consumers need goods and delivery drivers need the ability to provide goods to the market. In busy urban areas, there is often not enough off-street loading space to accommodate most deliveries. This causes competition between freight carriers and other modes of passenger transportation for space within travel lanes and at the curb. If unmanaged properly, this competition for curb space can lead to delays for all modes.

According to the Institute of Transportation Engineers (ITE) “*Curb space is where movement meets access*”. Curb space can be used not only for car/truck parking and loading, but also as the front stoop, sidewalk café, transit hub, freight delivery zone, taxi stand, rain garden, or trash collection area. It serves many purposes throughout the day and makes exchanges and interactions that occur on streets possible. As such, curbs are the points where streets generate value for citizens and cities. Transport systems don’t necessarily generate value through movement, but rather, do so when people or goods stop moving and arrive at their destination. The transition from movement to value-generating activities can happen in many locations, but in the case of most urban streets it happens at the curb.

With the increasing concern to balance the needs for all roadway users, the growth of transportation network companies (TNCs) like Uber and Lyft, as well as online shopping and associated deliveries, the demand for curbside pickups, drop-offs and dwell times is growing dramatically. A study completed by the American Planning Association (APA) in 2019, found that in the past 10 years, the increase in e-commerce caused delivery truck traffic to double. There's currently one internet-based delivery a day per 25 Americans and it's expected to double again in the next five years. The growth in e-commerce delivery has definitely been evident due to the COVID-19 pandemic. With people staying at home all day, many Americans turn to e-commerce and contactless delivery for groceries and other goods, including those who have not typically been online shoppers.

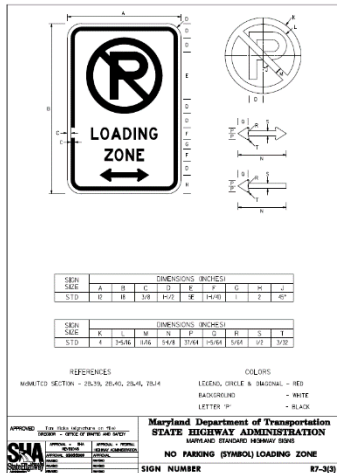
The rise of ride services and the growth in urban goods delivery are challenging traditional ways of managing curb space. Municipalities have a key role to play in managing how these impacts are felt. Here are some examples of how many cities around the world manage loading and delivery within urban areas:



- 1. Designated Loading/Unloading Zones:** Areas within the curb space that is allocated to delivery vehicles, often at specified times of the day. Figure 1 displays an area that’s only designated to loading. Some examples of different types of designated loading zones are as follows:
  - **Smart Zones:** An app that provides delivery drivers and service providers an incentive to load in designated locations where it is safe, efficient, and legal. Smart zones can be tailored to provide time limits, hours of

operations and prices, and drivers can use the mobile app to hold, pay for and extend their smart zone reservation.

- **Shared Use Mobility (SUM) Zones:** Eliminates small sections of street parking in a given area and recreates them as multiuse and multimode "terminals" at the beginning or end of blocks.
- **Flex Zones:** Accommodates different right of-way functions along segments of the roadway.
- **Commercial Vehicle Load Zones:** Locations along the curb for freight goods and services delivery vehicles – everything from package delivery, to food and beverage vendors that service restaurants, to e-commerce deliveries.

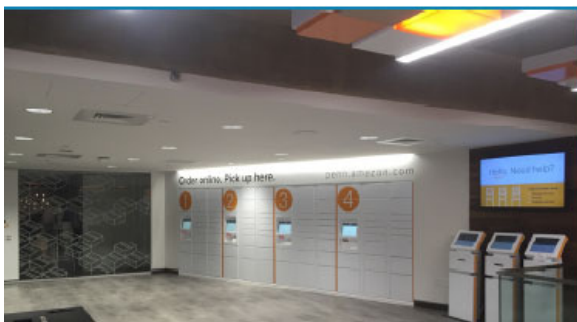


**2. Adequate Signage:** Signs that clearly delineate areas that are solely dedicated to loading and unloading.

**Maryland State Highway Administration (MDSHA) “No Parking (Symbol) Loading Zone R7-3(3):** See Figure 2. Identifies a loading zone only with no parking allowed.

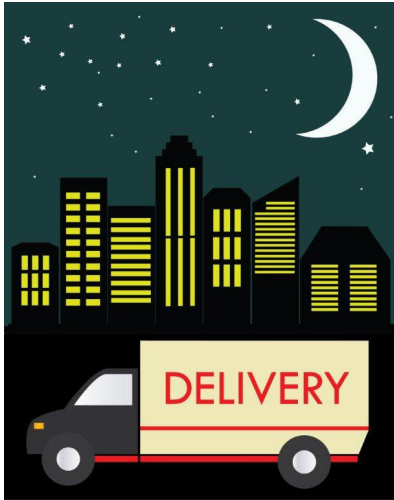


**Commercial Vehicle Loading Sign:** Figure 3 shows a load only sign displayed in the Developing Design Guidelines for Commercial Vehicle Envelopes on Urban Streets report by The Pacific Northwest Transportation Consortium (PacTrans)



**3. Alternate Delivery Sites:** Consolidates trips while improving the security and reliability of deliveries. Neighborhood pick-up point can provide a reliable location to receive packages for consumers. Deliverer and recipient do not need to be at the same place at the same time, thereby reducing the number of failed deliveries (and resulting repeat trips). The truck driver can leave every package in

one place rather than having to go “floor to floor, door to door,” time spent inside the building decreases dramatically, thereby boosting turnover at the load/unload zone.



**4. Scheduling Off-Hour Deliveries:** Shifting delivery times from peak hours like 7 a.m. to 4 p.m. to off-peak hours between 7 p.m. and 6 a.m. The goals of off-peak delivery include reduced truck traffic and congestion at peak hours, improved business operations, and improved air quality.

Ahead of the Curb: The Case for Shared Use Mobility Zones  
**ENO Center for Transportation**

For nearly a century, cities have used curb space designations to serve a set of well-defined purposes: mostly short- and long-term parking, but also freight deliveries, taxi stands, bus stops, and handicap accessibility. In that time, there was little need for innovation at the curb because, for the most part, the structure of trips had not changed.

But the trip dynamics for Transportation network companies (TNCs), like Uber and Lyft, is different from taxis, which are often hailed for quick pickups and, in some cases, have the benefit of waiting at taxi stands.

TNC trips also differ from pick-ups and drop-offs between friends and family. TNC drivers spend several minutes of every hour waiting for passengers to get into their car and then, even once the passenger is in the car, they also must confirm the pickup on their phones immediately and wait for their navigation apps to start.

In short: TNCs do not have a home on our streets, and freight vehicles do not have enough commercial loading zones and parking places to accommodate booming ecommerce. While silver bullets for roadway safety and congestion are in short supply, there is a solution that can help to alleviate some of the congestion, safety risks, and inefficiencies that come with the digital economy.

Enter Shared Use Mobility Zones (SUM Zones), a flexible curb management tool that can help cities reduce congestion, meet their mobility goals, adapt to emerging technologies, and even increase their revenue. This concept, which first appeared in ETW in November 2015, will be the subject of a forthcoming brief from Eno.

The Double Park Shuffle

On city streets across America, the same scene plays out in the same way tens (if not hundreds) of thousands of times per day:

1. A car with an Uber or Lyft logo (perhaps both) slows down near the middle of a block.
2. The TNC driver takes their eyes off the road to look for their passenger and/or a place to pull over.
3. Failing to find either their passenger or a parking spot, the TNC driver flicks on their hazard lights and stops their car.
4. A lane of traffic comes to a dead halt; cyclists must weave between the TNC car and parked cars; horns honk, rude gestures are made, everyone's blood pressure increases.

The result is not just congestion, but also a risk to the safety of the TNC driver, the drivers around them, cyclists, and the TNC driver as they step out into the street to get in the car.

The TNC driver also faces the financial risk of being ticketed for double parking, even if they did not have another choice than to circle the block – which, by the way, also contributes to congestion, wastes gas, increases their greenhouse gas emissions, and may upset a passenger if they take too long to come back around.

SUM Zones are a low cost solution but come with large political obstacles.

Parking is a very political issue in cities. Residents balk at any attempt to take away parking spaces, which are already in short supply in congested urban cores.

But traffic is also political. Cities should with TNCs to determine how many pickups and drop-offs are conducted in a particular area, the data may show that SUM Zones even benefit those who are driving their own cars. This could be done by determining many parking spaces are left open for every person who uses a TNC instead of driving their own car and, perhaps more importantly, the reduction in congestion when TNC drivers are no longer double-parking and shutting down lanes of traffic.

Second, many city budgets are heavily reliant on parking revenue. But some cities and many airports are already establishing TNC fees for pickups and drop-offs that are conducted in their jurisdiction. If a city elected to charge a nominal fee, perhaps \$0.25 or \$0.50, per pickup in a geofenced area where there are active SUM Zones, they could quickly recover the lost revenue from hourly meter parking, which is \$2.30 in Washington, DC. Uber and Lyft have already began working with cities like Washington, D.C. and San Francisco, CA to establish designated zones.

This not only makes the beginning and end of each trip more convenient for passengers and drivers, but also reduces animosity from other road users – and mitigates the risk of political backlashes due to scofflaw drivers.

While silver bullets for roadway safety and congestion are in short supply – or, rather, nonexistent – SUM Zones are a positive step toward reducing congestion, safety risks, and inefficiencies presented by the digital economy.

<https://www.enotrans.org/article/ahead-curb-case-shared-use-mobility-sum-zones/>

Ahead of the Curb with Smart Zones

***American Planning Association, Winter 2021 Edition***

Curbs are rapidly evolving and dense urban areas are feeling the squeeze, particularly when it comes to deliveries. We've all seen a delivery van or on-demand service driver double-parked, pulled over in a bike or bus lane, or stopped in the street. They block traffic or can force cyclists, scooter riders, and pedestrians into oncoming traffic to get around them. It's an accident waiting to happen and difficult to enforce.

Smart commercial loading zones, or "smart zones," are coordinated through an app that provides drivers for delivery and service providers like UPS and Uber Eats incentive to load in designated locations where it is safe, efficient, and legal – all while collecting data for the city. Cities can tailor their smart zones with time limits, hours of operations and prices, and drivers can use the mobile app to hold, pay for and extend their smart zone reservation.

Smart zones provide a regular stream of data on who is loading, for how long, and on what days and times. Cities can then create tools to manage the curb, whether its right-sizing their loading space or incentivizing certain delivery windows, which could open up the space for a variety of other uses.

- **Curbside loading can be managed and tracked via an app**
- **Data collected from the app can be used to identify loading demand patterns and high demand areas**
- **New loading areas and programs can be identified based on data collected through the app.**
- **See also: Omaha, Nebraska Smart Zone curbside loading program.**
- **See also: Mobility Data Company, "Coord"**

## Can Common Carrier Locker Systems Solve Urban Freight Challenges?

### ***Eno Center for Transportation***

With the growth of e-commerce, U.S. cities are seeing more truck traffic than ever. As more of these trucks crowd city streets and compete with one another and with on-demand mobility services for parking space, cities are looking for solutions to reduce freight-caused congestion and boost turnover at commercial load/unload zones. Among many possible solutions, one—common carrier locker systems (CCLS)—seems poised to emerge as a tested and proven favorite.

The idea behind CCLS is to create density that will allow carriers to leave packages in one secure, accessible area. With a locker system, deliverer and recipient do not need to be at the same place at the same time, thereby reducing the number of failed deliveries (and resulting repeat trips). And because the truck driver can leave every package in one place rather than having to go “floor to floor, door to door,” time spent inside the building decreases dramatically, thereby boosting turnover at the load/unload zone.

Seattle-based Urban Freight Lab (UFL) is eyeing a longer pilot at the Tower to collect data on seasonal usage patterns, recruit more participants, and site lockers next to the commercial load/unload zone to further reduce delivery time. They also recommend these programs ensure enough space for expansion (more participants will, of course, require more locker space), establish a time limit for keeping packages in the lockers before they are returned to sender, and integrate the locker system into carriers’ logistics platforms.

### Limitations of CCLS

While the pilot found that CCLS can achieve UFL’s twin goals of reducing the number of truck trips caused by the rapid growth of e-commerce and making urban truck parking space more productive, it also identified some potential limitations. For example:

- five of the seven failed deliveries they identified before the lockers were installed were packages sent to the wrong address, which a locker would not solve (and indeed, a package left in a locker for someone not expecting a package there could linger and take up space indefinitely unless time limits are implemented).
- 60 percent of the parcels delivered after the lockers were installed were oversized (such as pallets of water cooler refill bottles), so many of them would not have fit in the locker.
- 82 percent of the trucks found in the Tower loading bay over the 20-day data collection period were not there for parcel pick-ups or deliveries, but rather for construction, furniture delivery, repair services, etc. UFL’s interest in boosting turnover at commercial load/unload zones will only go so far if they only target parcel delivery trucks.
- UFL found that advance marketing is needed, both to make potential participants aware of the opportunity and also to ensure they participate correctly

Common carrier locker systems like the one piloted at Seattle Municipal Tower have shown promise in their ability to reduce both the amount of time a delivery truck spends in a parking space and the amount of repeat trips it must make. Potential users also seem interested in making use of them when made aware of the opportunity. However, more extensive piloting could provide clarity on how successful these systems are over a longer period of time and with more users.



<https://www.enotrans.org/article/can-common-carrier-locker-systems-solve-urban-freight-challenges/>

## Curb Control

### ***American Planning Association, June 2019 Edition***

In today's urban fabric, few spaces are more contested than the curb.

Jason Schrieber, AICP, a transportation planner at Stantec, a private consulting firm, says curbs are quickly evolving from repositories for a single smog-emitting mode into hyperlocal transportation terminals, with a variety of transportation modes zipping in and out. "Curb demand in this new era is changing from cars, and particularly car storage, to people and active mobility."

To illustrate the social costs of the nation's growing curbside chaos, Greg Rogers, director of government relations and mobility innovation at Securing America's Future Energy — and a former Uber driver — has written about what he calls "the Double Park Shuffle": the daily traffic dance of TNC (transportation network company) drivers. He lists four less-than-graceful steps:

1. A car with an Uber or Lyft logo (or perhaps both) slows down near the middle of a block.
2. The TNC driver takes their eyes off the road to look for the passenger and/or a place to pull over.
3. Failing to find either the passenger or a parking spot, the TNC driver flicks on their hazard lights and stops the car.
4. An entire lane of traffic comes to a dead halt; cyclists must weave between the TNC car and parked cars; horns honk; rude gestures are made; and everyone's blood pressure rises.

The delivery truck situation is similar. In the past 10 years, the increase in e-commerce caused delivery truck traffic to double — there's currently one internet-based delivery a day per 25 Americans — and it's expected to double again in the next five years. A study by the University of Washington's Urban Freight Lab found that delivery trucks in downtown Seattle double-park, or otherwise park illegally, for about half of delivery stops. In Washington D.C., UPS pays more than \$1 million in parking fines annually. Given the brisk pace of the e-commerce delivery business, the fines are apparently not stiff enough to encourage greater compliance. But the costs of congestion, including tailpipe emissions from cars idling or circling for a place to park, must somehow be accounted for.

Transportation planners are currently in the throes of figuring out how to update their methods to think about curb use on a minute-by-minute scale. Of course, any discussion about what's happening on the curb must start with what's happening beyond it, says Schrieber. "The fundamental point for planners is the hugely symbiotic relationship between a curb and the land uses it serves."



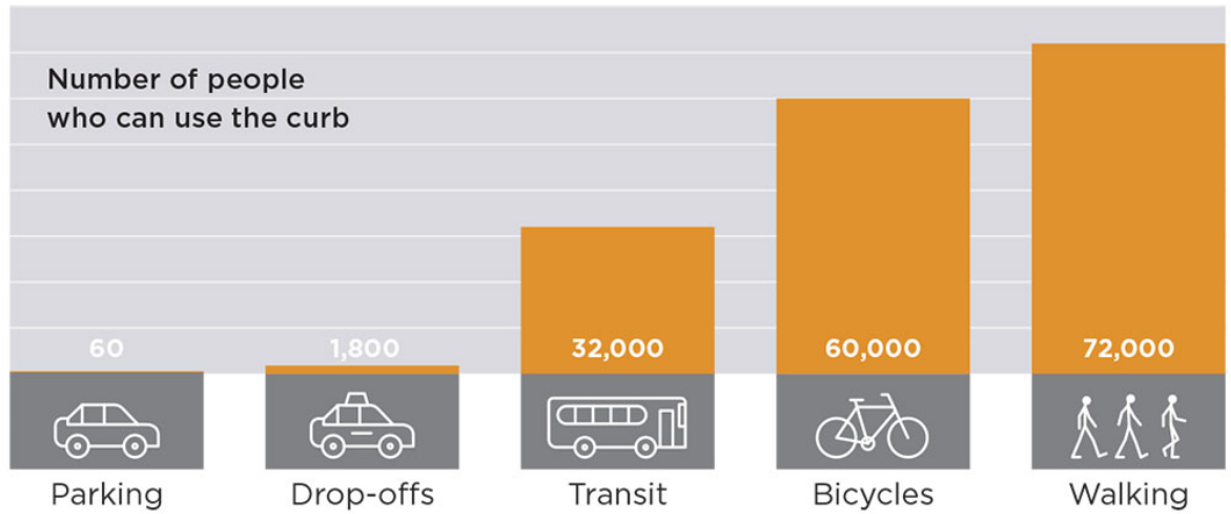
Source: <https://www.planning.org/planning/2019/jun/curbcontrol/>

Buried within all this are even bigger, politically charged questions: Where should standard street parking be restricted, or eliminated, to make way for other curb uses? What circumstances would justify it? By what process is that decided?

The social and economic implications of switching to a terminal model of curb use remain fuzzily defined, but one thing is clear: "Cities are getting a lot of pressure to convert private car parking into a variety of other things," says Smyth.

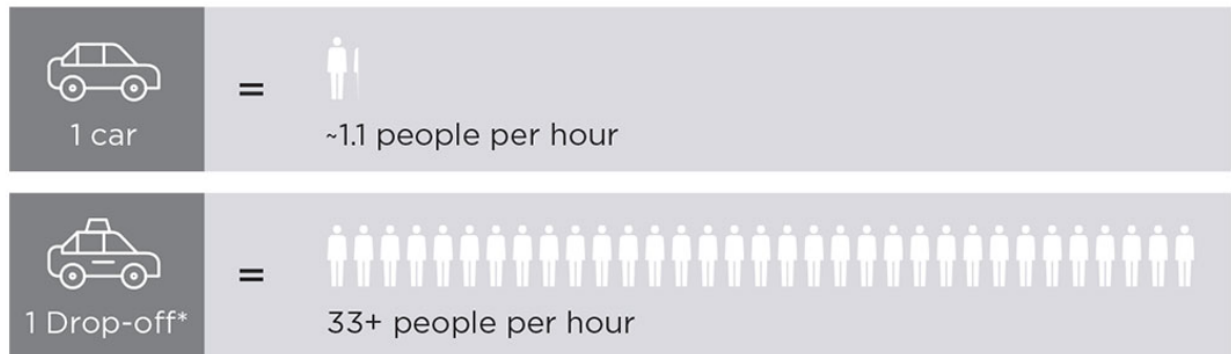
Robust data can fuel the decision-making process, make it more transparent, and encourage stakeholder buy-in. A technology platform could then flesh out some of the details, like setting appropriate rates for a TNC pickup or drop-off that may last 30 seconds or a commercial delivery that might last 30 minutes. It could even be used to collect payment.

## CURBSIDE CAPACITY BY THE BLOCK



Graphics by Haisam Hussein; graphs courtesy Stantec's Urban Places, based on NACTO data.  
 Source: <https://www.planning.org/planning/2019/jun/curbcontrol/>

## A PARKING SPACE IN TIME



Graphics by Haisam Hussein; graphs courtesy Stantec's Urban Places, based on NACTO data.

Graphics by Haisam Hussein; graphs courtesy Stantec's Urban Places, based on NACTO data.  
 Source: <https://www.planning.org/planning/2019/jun/curbcontrol/>

Tangents to the curb discussion are many. Wheeled robots, drones, and electric cargo tricycles may soon reduce the number of diesel-spewing delivery trucks hogging the curb (all three are already in use on a limited scale). Less high-tech and more widespread are delivery lockers, where goods are dropped off at a central neighborhood location, helping to curtail the double-parking shuffle (a study by Urban Freight Lab found that an installation of lockers at an apartment tower in Seattle reduced the time UPS trucks were parked out front by 70 percent).

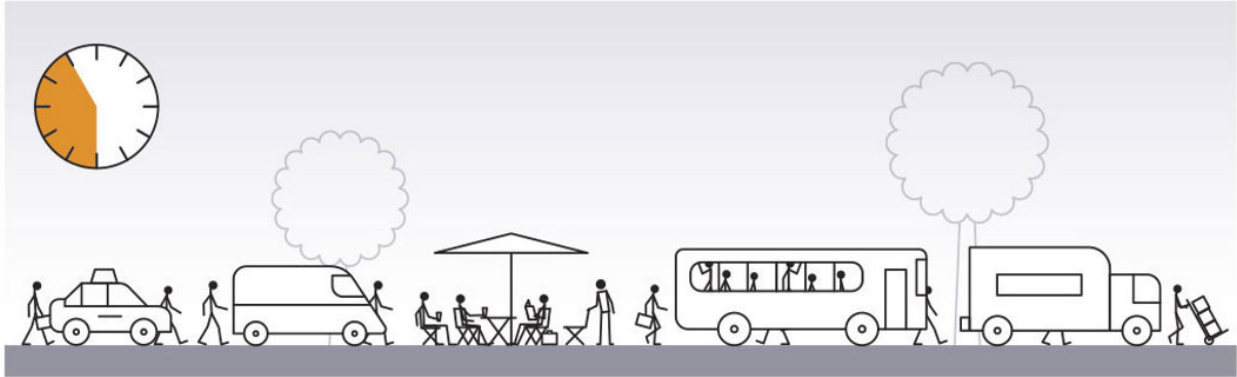




Rendering courtesy Stantec's Urban Places.

Source: <https://www.planning.org/planning/2019/jun/curbcontrol/>

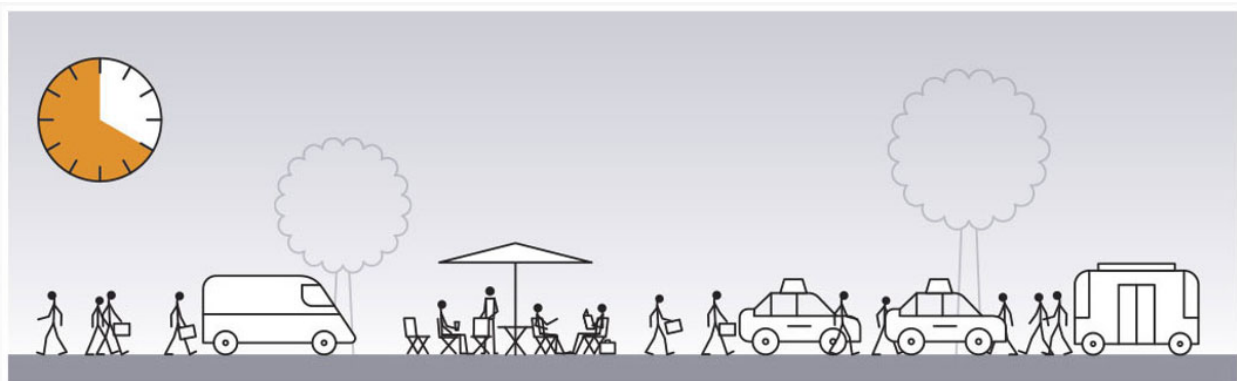
Shared-use mobility zones are an emerging concept that encourages eliminating small sections of street parking in a given area and refashioning them as multiuse and multimode "terminals" at the beginning or end of blocks. The full SUM vision may one day be a commonplace reality, but for now, cities are getting their feet wet with simple initiatives that could lead the way to more dynamic curb management. Curbside flex zones, like those shown below, can play many roles — from public space to loading zones — and can change use over the course of the year, week, or even day.



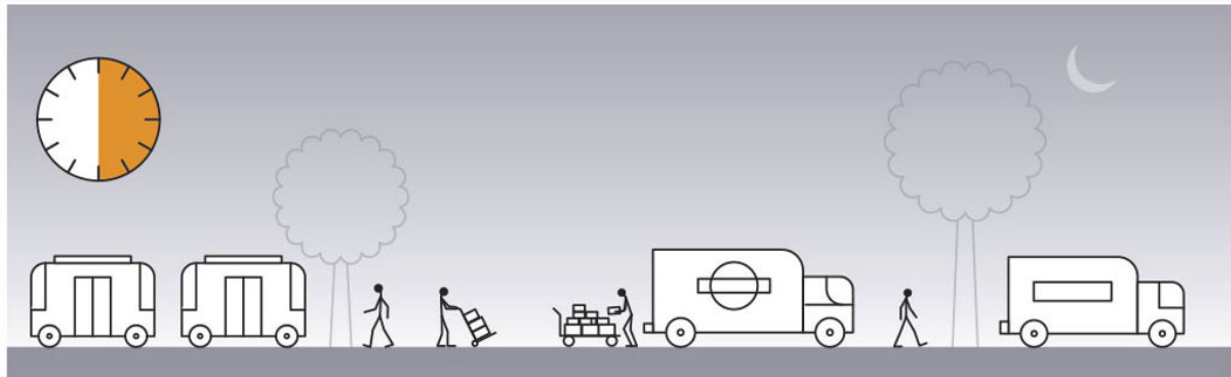
**Morning — 6 a.m. to 11 a.m.:** Before the peak of the morning rush, freight deliveries arrive to stock stores with their goods for the day. By 7:30 a.m., delivery vehicles give way to vehicles dropping off employees, many enjoying breakfast or coffee in a parklet on their way to work. Graphic by [Haisam Hussein](#) based on NACTO data.



**Midday — 11 a.m. to 4 p.m.:** Late morning brings package and mail deliveries to businesses and residents. At noon, the lunch rush begins, and workers head to street vendors for their midday meals. By 2 p.m., most diners are back inside and light delivery activity continues until the evening rush. Graphic by [Haisam Hussein](#) based on NACTO data.



**Evening — 4 p.m. to midnight:** The evening rush stops delivery activity as street and vehicle capacity is shifted to move people instead of goods. Passenger movement continues into the evening as people grab dinner or drinks, pick up children, or head to events. Automated evening and late-night delivery activity allows for easy movement of large goods on underused streets. Graphic by [Haisam Hussein](#) based on NACTO data.



**Nighttime — midnight to 6 a.m.:** Late at night the curb prioritizes freight vehicles. Passenger movement is at a minimum through the early hours of the morning, leaving more curb space for delivery services. Nearby storage lockers increase package delivery efficiency. In the morning, freight makes way for transit vehicles. Graphic by [Haisam Hussein](#) based on NACTO data.

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Designated ride-share pickup and drop-off zones are among the low-hanging fruit for curb interventions. Among the cities experimenting with this approach is Washington, D.C., where curb parking in the nightlife district along Connecticut Avenue has been redesignated for that purpose from Thursday to Saturday nights starting at 10 o'clock. The three-block area, which boasts roughly 100 bars with a combined capacity of more than 17,000 people, had been served by just 60 parking spaces, leaving patrons to stumble into the street after a night of partying to meet double- and triple-parked TNC rides. Now they can meet their ride safely at the curb.

Demand-based metered parking is another trend taking root. In 2010, Seattle began surveying parking space occupancy on an annual basis and adjusting rates up or down (as well as changing the permitted duration and hours of availability) in an effort to even out supply and demand. The goal is to find an equilibrium where one to two spaces remain open on each block at any given time, the equivalent of 70 to 85 percent occupancy. A social media campaign helped spread public awareness about the project, while online maps inform residents about rate information; a "best value" icon on parking signs points drivers to places where it is cheaper to park, but perhaps a bit farther to walk to their destination.

Beyond SUM zones and demand-based curb pricing, one can imagine a future where curb management becomes a tightly choreographed ballet of urban mobility, orchestrated by a symphony of technologies. Perhaps curb metering will advance to become more like the systems for real-time highway congestion pricing now being vigorously debated across the globe.

As autonomous vehicles enter the picture, perhaps humans would no longer need to make decisions about who gets to use the curb when and for how steep a price — algorithms would deliver us where we need to go, in concert with sneakers and steaming noodle bowls, with maximum efficiency, our credit cards charged accordingly.

That day may eventually arrive, but Snyder says that in the meantime, cities have tough choices to make as they endeavor to take tiny steps in that direction. "It will require a lot of expensive infrastructure to get to real-time congestion pricing where your car knows where you are, records the

three minutes that you're at the curb, and the system sends you a bill. And then there's the policy aspects of implementing that. I'm a big proponent of digitizing the curb and pricing it, but a lot of technology is still conceptual at this point."



The movement and delivery of goods is essential to society — and always has been. In the e-commerce age, effective, comprehensive, and thoughtful freight planning is more important than ever, and the need will only grow. In historic or dense urban areas, the demand for deliveries is rising, but the available infrastructure is static without space to expand. The space where the actual delivery occurs, the curb, is heavily under pressure by a growing number of competing uses.

Despite the rise of e-commerce, traditional brick-and-mortar stores are here to stay, and shoppers expect them to be stocked with their favorite commodities, which have to get there somehow. In short, we all depend on trucks to move the goods. But they also emit noise and air pollution, contribute to congestion, and can threaten the safety of other users of the public way. Here's a look at eight approaches to plan for freight in your community before it's too late.

<https://www.planning.org/planning/2019/nov/freightcantwait/>

- At the local level, planners have several tools to manage curbside demand:

- 1. Schedule off-hour deliveries**

Off-hour deliveries aim to reduce daytime congestion with deliveries in the evening and at night, focusing on the underused road capacity at those hours. The strategy doesn't work in all industries, but it is well suited to restaurants and some retail supply chains.

A major challenge to nighttime deliveries is noise, so abatement measures are critical in mixed-use or residential areas. In Europe, strict laws require delivery companies to use vehicles and delivery equipment that operate more quietly. Absent those rules in the U.S., freight companies still can and should train staff not to shout and slam doors. Quieter equipment and directional low-pitch back-up alarms can help, but fleet owners are unlikely to invest in these technologies without clear incentives or regulations such as a municipal noise code.

See also: New York City OHD Program: [OHD program](#)

- 2. Adjust Building Codes and Off-Street Loading Requirements**

Cities can stimulate off-street loading by requiring not only a minimum number of loading docks, but also minimum dimensions, applying the rules to new construction as well as to renovations of apartment, retail, and office buildings.

Some loading docks even feature an enormous lazy Susan to accommodate front-in, front-out movements that improve safety and prevent the need for trucks to reverse in the street and add to congestion. A reservation system can ensure trucks don't all arrive at once, which results in queues and idling vehicles.

Holland, Michigan, is considering the use of a related popular practice: designated delivery zones, including those in the form of common carrier storage lockers in

building lobbies. "Our city is booming, [with several] apartment buildings going up in our downtown area," says Holland mayor Nancy De Boer. "We are willing to accommodate package deliveries by creating a commercial vehicle loading zone at the curb but wish to keep these small and efficiently used. So we are considering strategies that also minimize truck dwell times, such as a mail room or a parcel locker in the lobby (above), to increase the turnover of this curb space." Reserving otherwise leasable space for parcels isn't always an easy sell to building owners. That's where freight-focused building codes and other local requirements can come into play.

### **3. Encourage Collaborative Procurement**

Using a preferred vendor program for tenants in one office building or among companies located in the same neighborhood consolidates freight and therefore limits the number of trucks coming into a city. Besides reducing truck traffic, streamlining the number of retailers used could result in discounts for the tenant groups.

A successful case is the West End Buyers Club in London. "We developed a preferred supplier scheme for the West End of London with Business Improvement District partners across waste, travel, courier services, and fresh office supplies," says Tom Linton-Smith, project manager for the Cross River Partnership. Once the program was in place, the group continued to work with businesses and communities to improve efficiency, and now, sustainability. "CRP is currently working on an ultra-low emission supplier directory," he adds.

### **4. Have a Freight Plan**

A freight plan or truck management plan is a document usually created by a local government that describes how:

- Freight mobility can be improved given the existing infrastructure
- Commerce and industry can thrive, while the negative externalities associated with freight movement are reduced
- Government, the freight industry, and the community can collaborate in an effective partnership

The plans typically aim to simultaneously improve the quality of life for residents and the economic vitality for local businesses by providing for the efficient, environmentally responsible, safe, and equitable movement of goods. The planning process can be long and intense due to the high level of stakeholder involvement required. Shippers, receivers, trucking industry lobbyists, civic associations, and fellow city agencies all need to be involved, and regional coordination with metropolitan planning organizations and neighboring cities is often necessary to arrive at a comprehensive freight strategy with tangible measures.

Every city does it a bit differently. Some plans focus on just trucks, others include more modalities; plans can have different focus areas, such as employment, rather than congestion, or the environment. Inspiration is readily available from around the globe (see list at left). Even UN Habitat has a chapter dedicated to urban goods

transport in its Planning and Design for Sustainable Urban Mobility guidance document.

#### **5. Design a Truck Route System**

Designing a truck route map is a very low-tech, easy-to-realize strategy to channel goods transport and heavy loads to only those roads designed to handle them and away from sensitive locations. In an effective plan, residential neighborhoods would only see a truck if the delivery destination is within that area.

Success depends on information and enforcement. An awareness campaign needs to include maps for carriers that frequent the area and truck route signage. Agencies should provide the information in GIS format so it can be integrated into truck navigation systems. Law enforcement has to ensure that truckers only deviate from the dedicated truck routes if it means taking the safest, most direct, or only way to get to their destination. Their bill of lading, a document showing the truck's loads and their destinations, must support the chosen route.

#### **6. Use Urban Consolidation Centers**

Consolidation is aimed at reducing the impact of deliveries in a specific retail delivery environment. Instead of many trucks bringing a partial load into, for example, a sensitive historic city center, consolidation guarantees that only full trucks go in, with all of its goods destined for that area.

The use of UCCs can increase shipping costs. These can be offset if the time spent waiting for a full load allows stakeholders to address other concerns. For instance, they can perform advance security checks for airport terminal deliveries or unwrap and hang clothes to minimize storage space needed in stores. The practice can also protect inner-city air quality, particularly if low-emission last-mile delivery vehicles are used.

#### **7. Create Dedicated Curb Space**

Dedicated curb space for truck loading and unloading allows for commercial vehicles to park close to their destination, eliminating the need for double parking or circling around the block. This form of curb management can be fitted to the local needs, changing its beneficiary based on the time of day or day of the week. This strategy depends heavily on strict enforcement but can make a big difference.

#### **8. Support Fleet-Specific Programs**

Communities can also tackle many issues at the source: trucks. Cities are integrating safer truck equipment in their contracts with private companies and requiring training for urban driving conditions and interaction with vulnerable road users.

## Primed for Deliveries

***American Planning Association, April 2020 Edition***

Once regarded primarily as a segment of transportation, freight and deliveries are increasingly commanding attention from a wider range of planners, government officials, and policy makers. The rapid rise in e-commerce deliveries and online food and grocery orders is driving many cities to develop a range of strategies to control curbside congestion. E-commerce impacts, however, extend far beyond the curb.





If e-commerce has always been fast-moving and ever-changing, never has that been more clear than during the COVID-19 pandemic. With people staying at home all day, most stores and businesses temporarily shuttered, and restaurants closed to dine-in patrons, many Americans are turning to e-commerce and contactless delivery for groceries and other goods, including those who have not typically been online shoppers.

In the past, travel associated with logistics was segmented into freight, local delivery, and retail traffic, and the last mile of delivery has traditionally been carried out by a shopper or restaurant patron. E-commerce has changed flows in both obvious and subtle ways. The increase in FedEx and UPS trucks is noticeable, particularly in congested urban areas. According to the University of Washington's Freight Lab, Seattle trucks comprise seven percent of vehicles on the road, yet create 28 percent of the congestion.

As e-commerce evolves, traffic modeling will need to consider less obvious changes in package and customer flows. For example, customers can increase convenience and reduce theft risk by retrieving packages through pickup kiosks, package lockers, and even opting for car trunk delivery. What's less clear is how to model and account for these flows.

<https://www.planning.org/planning/2020/apr/primed-for-deliveries/>

- At the local level, planners have several tools to manage curbside demand:
  - knowledge of how to design and execute pilot projects to test new technologies is critical
  - stakeholder engagement is important
  - consider how e-commerce (curbside demand) fits within plans affecting utilities, economic development, and sustainability

TECHNOLOGIES AND TOPICS	REGIONAL PLANS	LOCAL TRANSPORTATION PLANS	LAND-USE PLANS	INFRASTRUCTURE PLANS	OTHER
 AV Trucks	<ul style="list-style-type: none"> <li>Freight management</li> <li>Truck platooning</li> <li>Update TIPs and priority project selection criteria</li> <li>Data and safety (for all categories)</li> <li>Federal coordination</li> </ul>	<ul style="list-style-type: none"> <li>Guidance for AV-to-driver handoff from AV platoons</li> </ul>	<ul style="list-style-type: none"> <li>Interchange design for AVs and EVs</li> <li>Interchange land uses for AV truck handoff</li> <li>Warehouse districts and site plans</li> <li>24-hour, automated warehousing impacts</li> </ul>	<ul style="list-style-type: none"> <li>Communications infrastructure for vehicle connectivity</li> <li>AV-ready lane markings and signage</li> </ul>	<ul style="list-style-type: none"> <li>University and industry partnerships</li> <li>Proactively plan for mobile retail and distribution and warehousing</li> <li>Funding and revenue</li> </ul>
 AV Delivery Vans	<ul style="list-style-type: none"> <li>Local pilot candidates</li> <li>E-commerce and AV delivery forecasts</li> <li>Hybrid passenger and goods pilot projects</li> <li>Vehicle miles traveled</li> </ul>	<ul style="list-style-type: none"> <li>AV delivery routes</li> <li>Circulation (including hybrid van and drone vehicles)</li> <li>Trip generation update</li> <li>Performance metrics</li> </ul>	<ul style="list-style-type: none"> <li>Campus plans</li> <li>Warehousing and microwarehousing</li> <li>Loading dock design changes</li> <li>Fleet electrification</li> </ul>	<ul style="list-style-type: none"> <li>AV-ready lane markings</li> <li>Curbside management</li> <li>Short-range communications</li> <li>Traffic control upgrades</li> </ul>	<ul style="list-style-type: none"> <li>Industry partnerships for delivery load optimization</li> <li>Campus partners</li> </ul>
 Air Drones	<ul style="list-style-type: none"> <li>E-commerce and AV delivery forecasts</li> <li>Drone delivery scenarios</li> <li>Fly/no-fly zone mapping</li> <li>Federal (FAA) coordination</li> </ul>	<ul style="list-style-type: none"> <li>Safety assessments</li> <li>Urban flight corridors</li> <li>Performance metrics</li> <li>Alignment with emergency response</li> <li>Permitting (companies, vehicles, fleet size)</li> </ul>	<ul style="list-style-type: none"> <li>Architecture for drone deliveries</li> <li>Rooftop landing pads and allowable uses</li> </ul>	<ul style="list-style-type: none"> <li>Communications infrastructure for flight</li> <li>Coordination with utilities and existing infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Partnerships to reduce risks related to package release failures</li> <li>Possible noise pollution</li> <li>Partnerships on flight paths (e.g., utility corridors)</li> </ul>
 Ground Drones (deliverybots)	<ul style="list-style-type: none"> <li>E-commerce and AV delivery forecasts</li> </ul>	<ul style="list-style-type: none"> <li>Allowable travelways (e.g., sidewalks)</li> <li>Travelway priorities</li> <li>Performance metrics</li> <li>Permitting (companies, vehicles, fleet size)</li> </ul>	<ul style="list-style-type: none"> <li>Store and restaurant designs for ground drones</li> <li>Campus plans</li> </ul>	<ul style="list-style-type: none"> <li>Short-range communications (small cell and Internet-of-Things)</li> <li>Regulations for sidewalk use</li> <li>Geofencing</li> </ul>	<ul style="list-style-type: none"> <li>Sidewalk maintenance roles, responsibilities</li> </ul>

Source: <https://www.planning.org/planning/2020/apr/primed-for-deliveries/>

Curbside Management Resources  
**Institute of Transportation Engineers**

Curb space is where movement meets access. However, this valuable and flexible public space is not always optimized for its highest and best use. Curb space can be used not only as car parking and loading, but also as the front stoop, sidewalk café, transit hub, freight delivery zone, taxi stand, rain garden, or trash collection area. It serves many purposes throughout the day and makes possible the exchanges and interactions that occur on great streets. Curb space has historically been a reliable revenue source for municipalities through parking fees, and a key indicator for real estate and retail value. The curb space is usually contested; reassigning curb space for new purposes is often politically fraught, in part because use of the curb is competitive and viewed as zero-sum.

These rapidly expanding markets have exposed significant new challenges that must be addressed through planning, design, and policy. Public agencies must take proactive steps to design, measure, price, and manage their curb space, and they must do so in collaboration with transit agencies, private mobility operators, tech sector innovators, and key local and governmental stakeholders.

With the increasing concern for balancing the needs for all roadway users, and the growth of transportation network companies (TNCs) like Uber and Lyft, as well as online shopping and associated deliveries, demand for curbside pickups, drop-offs and dwell times is growing dramatically. Curbside Management seeks to inventory, optimize, allocate, and manage curb spaces to maximize mobility and access for the wide variety of curb demands.

The guide considers regulatory, operations, and technology strategies to optimize curb access and usage, and features case studies for quick reference. The purpose of this document is to provide guidance on best practices for curb space allocation policy and implementation based primarily upon the outcomes of tested strategies. It presents a framework and toolbox for analyzing and optimizing curb space in this time of change with the aim of prioritizing and maximizing community values and safety.

The guide was assembled based on an initial white paper by the National Association of City Transportation Officials (NACTO), case study surveys of NACTO and ITE members, as well as presentations and workshops at key conferences in 2017/2018.

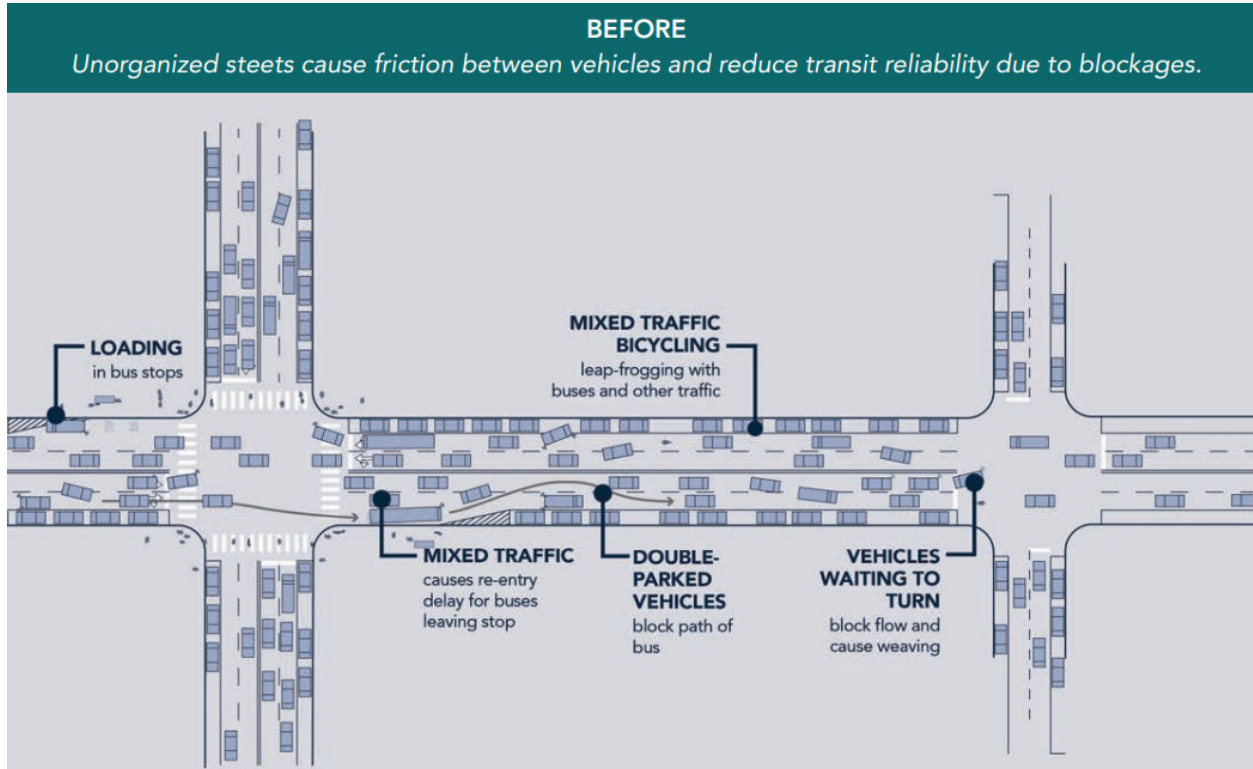
- <https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>
- <https://www.ite.org/pub/?id=C29F4D5E%2DFE34%2D2037%2D3B96%2DDE312E1DBBFF>

**Planning Considerations**

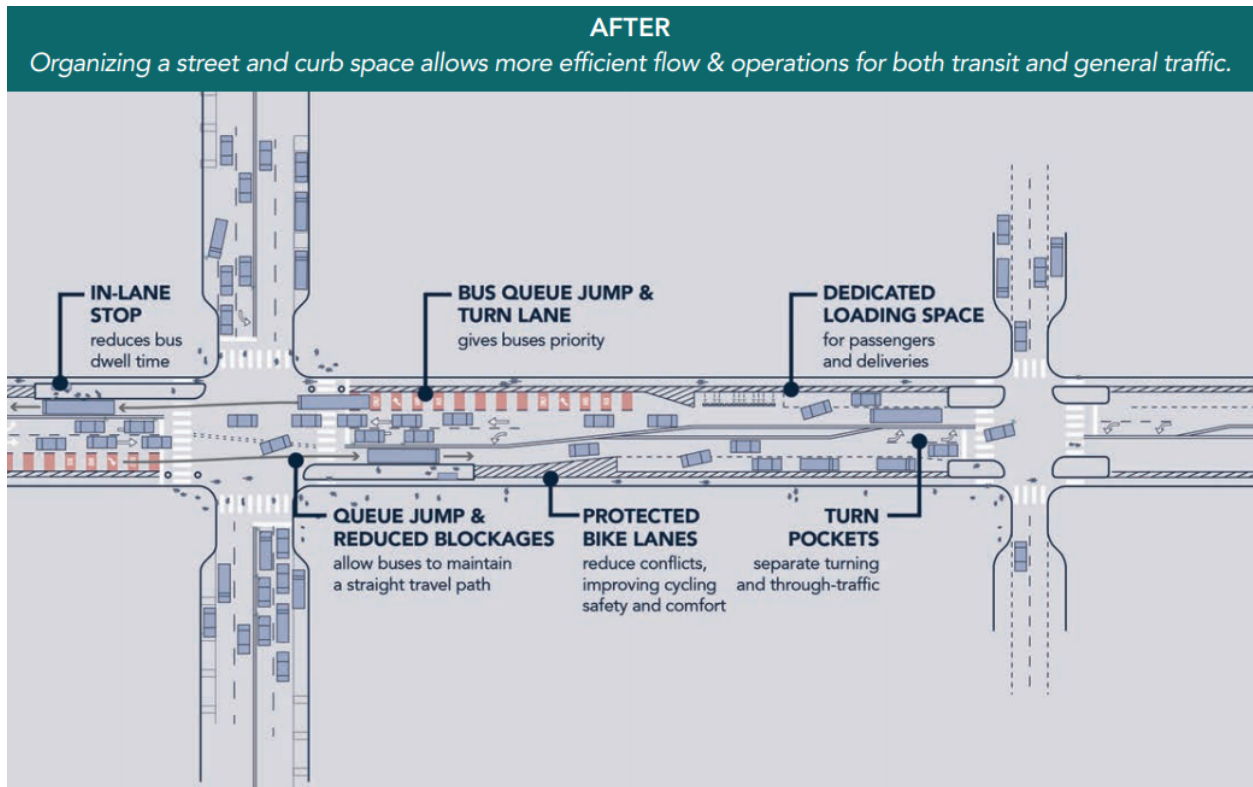
Curbside management is fundamentally about creating an organization scheme that improves mobility and safety for all via prioritized and optimized curb space use. Curbside management exists at the nexus

of transportation, land use, and economic development. Its complexity arises from interlocking demands that are both political and logistical, weaving together a dense set of challenges including multimodal safety, ADA compliance, parking policy, congestion and trip generation, urban freight movement and delivery, and emerging mobility options.

Curbside space is flexible—while physically moving the curb usually requires expensive capital construction, curb use can be changed quickly, temporally, and iteratively. Planners and engineers have a diverse toolbox available to address the dynamic challenges of curbside management. “Paint-and-plastic” treatments can establish safer places to bike and more efficient routes for transit quickly and at relatively low cost. Low-tech signage and high-tech apps are in widespread use to establish priority access by time-of-day, such as off-peak freight delivery and peak-hour transit. Accurate pricing for curb use is critical to managing demand and congestion, and designation of loading and parking zones can help to organize emerging mobility options like dockless bike share and e-scooters, as well as for hire vehicle pick-ups and drop-offs.



Source: NACTO Curb Appeal (<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>)



Source: NACTO Curb Appeal (<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>)

### Available Tools and Treatments

The toolkit described here is intended to serve as a reference during the treatment selection process, but no single treatment is likely to result in significant change in use of the right-of-way on its own. These treatments are intended to be used in coordination and/or combination with one another to serve the land uses, activity demands, and modal priorities identified within a curbside management plan.

- **Flex Zones**

Rather than designating fixed uses for all portions of the roadway, agencies can designate flexible areas – called “flex zones” – to accommodate different right-of-way functions along segments of the roadway. Flex zones can be used to serve different purposes through the following types of implementation:

- Multiple functions served simultaneously in the same space, such as in combined commercial and passenger loading zones
- Different functions served at different times in the same space through time-of-day restrictions, such as a peak-period travel lane which is used for off-peak loading or parking
- Multiple functions served simultaneously in different spaces along the road, such as the conversion of some on-street parking to provide designated loading zones, parklets, and curb extensions along the curb on the same block face

The implementation of flex zones allows efficient use of the curb space and entire roadway based upon the varying demands at different times and locations. This is especially beneficial for highly peaked curbside demands.



- **Layered Network Approach to Modal Prioritization**

A common issue that results in congestion and crashes in dense urban cores is the interplay of different modes and uses attempting to utilize the same space on the same roadway. A layered network approach promotes the designation of different priorities along different segments in close proximity to one another with the goal of allowing the overall network to serve all users effectively even though any given individual roadway segment may not. An example of this approach would be the designation of a roadway corridor to prioritize transit and transit-supportive modes while identifying separate parallel corridors to prioritize vehicular throughput and access needs, respectively.

- **Living Previews**

“Living previews” are the temporary installation of some or all of a proposed improvement project. Also known as pop-ups, living previews allow residents to observe, interact, and comment on the project in a manner that typically yields greater participation and better represents the proposed treatments. Staff can be present on-site to collect real-time feedback from participants in the living preview during anticipated times of high participation.

Treatments which make ideal candidates for living previews include protected bicycle facilities, curb extensions, parklets, roundabouts, and road ‘right sizing’ projects. In San Francisco, a series of curbside management treatments such as commercial and passenger loading spaces, separated bikeways, and parklets were tested through a living preview along a segment of Taylor Street as a key component of the SF Vision Zero Plan (Vision Zero SF).

Living previews have a great deal of benefit for technical stakeholders, including agency engineering staff, as on-the-fly design modifications can be made to ensure the proposal operates as well as possible. They can allow for coordination and testing of actual design vehicles with emergency service providers. Project evaluation can also be done during the living preview event to collect data on how the facility is used, including speed data, volumes, and community preference and perception.

- **Access to Loading/Unloading Zones**

One of the most fundamental goals of a curbside management plan is to maximize efficiency of the roadway by streamlining access to the curbside for loading and unloading activities. Some strategies for de-cluttering loading/unloading zones are unique to passenger access or freight access, but many are simultaneously applicable to both in most contexts.

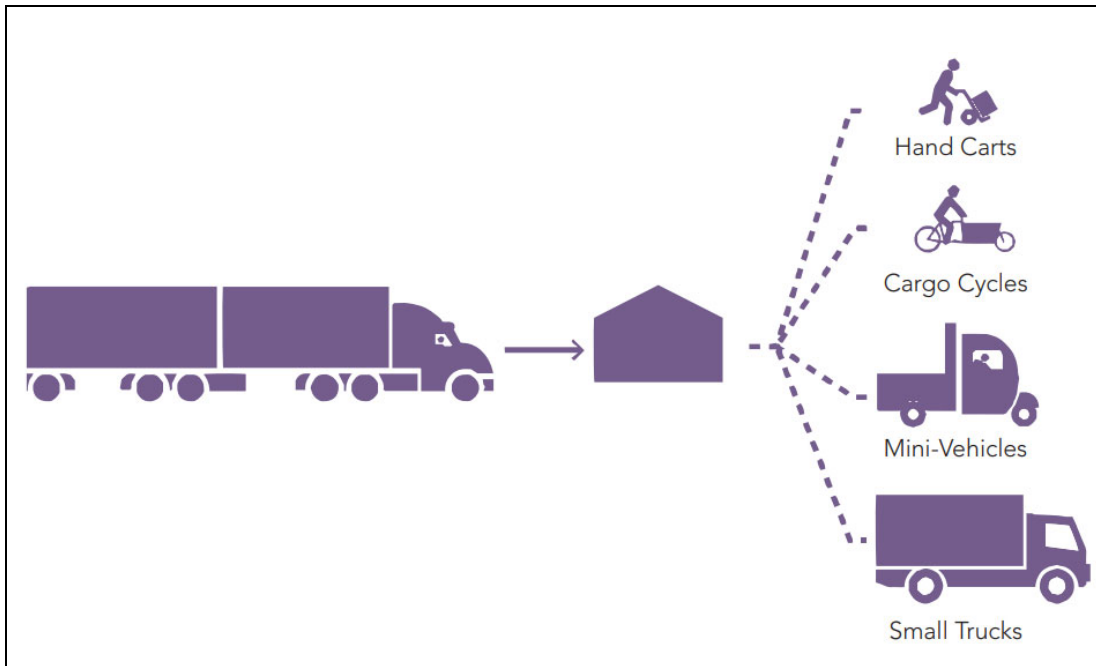
- **Passenger Access**

Access to the curbside for passenger pick-up and dropoff activities has long been an important consideration in the built-up areas. Once primarily an issue for taxis, the growth of for-hire vehicle activity and forthcoming automated vehicle demands make the provision of adequate passenger loading and unloading zones critical to a curbside management plan.

- **Freight Access**

Reliable access to freight loading and unloading is important to facilitate commerce and avoid blockages to travel lanes due to undesirable truck stopping. This is especially true with the growth of internet retail spurring increases in package shipments which is creating

significantly greater demand for delivery access. As a result, it is becoming increasingly important to designate loading zones not only in commercial or industrial areas, but also in residential areas where the frequency of package deliveries may result in blockages for other curbside uses. The strategies included here seek to take advantage of alternate delivery strategies and schedule flexibility to ensure availability of curb space for freight activity when it is needed.



Source: NACTO Urban Street Design Guide  
(<https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>)



Source: <https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>

Curb Appeal: Curbside Management Strategies for Improving Transit Reliability  
**National Association of City Transportation Officials**

Urban curbsides, including parking and loading regulations, have conventionally been based on the immediately adjoining building: meters in front of shops, loading zones near supermarkets, no-parking areas at warehouses, unmetered parking in residential areas. But this practice assumes cars are the primary mode of transportation on a street, leaving cities to choose between local uses and mobility—because through-moving cars do little to support, and much to harm, local business and residents.

Now, cities across North America are recognizing the value of their curbsides as flexible zones. To make corridor-level changes possible, leading cities are adopting and acting on policies that prioritize reliable transit and safe bicycling infrastructure first, followed by other important uses of the curb like deliveries, passenger pick-ups, green stormwater infrastructure, and small public spaces—as well as managed parking. This policy foundation supports transit project managers and designers in making better decisions about curbside uses, and sets a clear expectation that transit is a priority in street design.

This paper provides examples of how cities have successfully changed curb use to support transit. It is focused on the types of busy, store-lined streets where high-ridership transit lines often struggle with reliability. These key curbside management strategies support reliable transit and safer streets in one of two ways: either by directly making room for transit, or supporting transit projects by better managing the many demands on the urban curb.

<https://nacto.org/wp-content/uploads/2017/11/NACTO-Curb-Appeal-Curbside-Management.pdf>

**MOVING LOADING AND ACCESS NEARBY**

Buses, rail, and bikes use curb space for very short amounts of time per rider, but need space on main streets. Freight loading, for-hire passenger access, carshare, drop-offs and pick-ups in private cars, and short-term car parking are also important activities, but can be moved down the block or around the corner from destination buildings on a transit street.

- **TRADING PROXIMITY FOR TIME AT THE CURB**

Most curbside users do not need to park immediately in front of a specific building. Recognizing this, cities can assign curb space to uses based on feasible distances from their destination, reserving the curb on main streets for very short-term uses. Some delivery drivers making multiple deliveries in one area will favor a slightly longer walk to destinations if they are given dedicated spaces and can park for longer; some businesses, even those making deliveries of perishable food, prefer the "park once and walk" model to the alternative of parking illegally at a destination.

The increasing use of direct-to-consumer freight has increased the already significant presence of freight loading on urban streets. Freight loading zones in dense residential areas, in addition to conventional commercial loading zones, can help relieve the pressure on transit stops and reduce bus blockages. Cities can also design wider bikeways that support package and food deliveries by bike, can create reservable loading zones that allow freight companies

to "park and walk" instead of driving door to door, and should explore off-peak freight delivery incentives for busy mixed-use environments.

- Setting Fines

In setting fines for transit lane or parking violations, the lowest effective fine should be used. Data from multiple cities shows that, in most contexts, consistently enforced but relatively low fines are sufficient to deter violations from non-commercial users. Several cities use higher fines in downtown districts—for example, fines for parking infractions are 50% higher in Pittsburgh's Downtown and Oakland business districts compared to the rest of the city—or charge higher fines to commercial users with repeated infractions.

- **PLANNING FOR THE FUTURE**

The demands placed on curbsides will continue to change as technological and business practices change, but cities will remain in the position of determining how curbsides are allocated, and whether transit is sustained and improved as a result. The introduction of automated vehicles may increase the number of curbside passenger drop-offs while diminishing the importance of on-street parking, leading to reductions in conventional curbside parking. If for-hire vehicle travel becomes significantly less expensive per mile, curbsides on transit streets

will be under significant and immediate pressure. As the rise of for-hire vehicles has demonstrated, regulating the curb is an indispensable component of a successful urban street management strategy. Cities that begin prioritizing transit in curbside regulation today will be one step closer to managing curbs in a way that incentivizes transit and shared autonomous vehicle use rather than single-occupancy or zero occupancy vehicle travel.

Developing Design Guidelines for Commercial Vehicle Envelopes on Urban Streets  
**University of Washington, Oregon State University, and**  
**The Pacific Northwest Transportation Consortium (PacTrans)**  
**US Department of Transportation Research and Innovative Technology Administration (RITA)**

This report presents research to improve the understanding of curb space and delivery needs in urban areas. Observations of delivery operations to determine vehicle type, loading actions, door locations, and accessories used were conducted. Once common practices had been identified, then simulated loading activities were measured to quantify different types of loading space requirements around commercial vehicles. This resulted in a robust measurement of the operating envelope required to reduce conflicts between truck loading and unloading activities with adjacent pedestrian, bicycle, and motor vehicle activities.

A bicycling simulator experiment examined bicycle and truck interactions in a variety of CVLZ designs. The experiment was completed by 50 participants. The bicycling simulator collected data regarding a participant's velocity, lane position, and acceleration. Three independent variables were included in this experiment: pavement marking (No, Minimum, or Recommended CVLZ), Courier Position (none, behind vehicle, on driver's side), and Accessory (none or hand truck). The results support the development of commercial loading zone design recommendations that will allow our urban street system to operate more efficiently, safely, and reliably for all users.

[http://depts.washington.edu/sctlctr/sites/default/files/research\\_pub\\_files/SCTL-PacTrans-Commercial-Vehicle-Envelope-Final-Report.pdf](http://depts.washington.edu/sctlctr/sites/default/files/research_pub_files/SCTL-PacTrans-Commercial-Vehicle-Envelope-Final-Report.pdf)



**Figure 2.1** Commercial vehicle loading zones signage (SDOT 2015a)

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Source: Developing Design Guidelines for Commercial Vehicle Envelopes on Urban Streets, Page 4

The Maryland Manual on Uniform Traffic Control Devices (MdMUTCD) is the combined document of the national set of traffic control device standards and guidance promulgated by Federal Highway Administration (FHWA) rulemaking on December 16, 2009 and Maryland Supplement to the MUTCD.

<https://www.roads.maryland.gov/mdotsha/pages/index.aspx?PagelId=835>

pages 122 - 128

- **Maryland State Highway Administration “No Parking (Symbol) Loading Zone R7-3(3)**
- Section 2B.46 Parking, Standing, and Stopping Signs (R7 and R8 Series)
  - 01. Signs governing the parking, stopping, and standing of vehicles cover a wide variety of regulations, and only general guidance can be provided here. The word “standing” when used on the R7 and R8 series of signs refers to the practice of a driver keeping the vehicle in a stationary position while continuing to occupy the vehicle.
  - 01a. Sections 11-144, 11-160 and 11-162 of the Maryland Vehicle Law provide the legal definitions of "parking", "standing" and "stopping". In all three definitions these terms apply whether or not the vehicle is occupied.
  - 01b. When parking is prohibited, vehicles can still be left at the curb long enough to load or unload either property or passengers. For commercial vehicles, or others appropriately identified, this is generally interpreted to include delivery of property into, or pick-up from, an adjacent building. The designated curb space becomes, in effect, a loading zone.
  - 01c. When standing is prohibited, vehicles can stop only long enough to discharge or pick up passengers. Such a rule can be imposed only when a ban on parking itself would not be sufficient for operational needs. But a ban on standing, especially during peak travel hours, can be very useful to free up the curb lane when needed for moving traffic.
  - 01d. A No Stopping rule is the most stringent and should be used sparingly. It bans stopping for any purpose whatsoever except, of course, to avoid conflict with other traffic or in compliance with the directions of a police officer or a traffic control device.

SIGN SIZE	DIMENSIONS (INCHES)									
	A	B	C	D	E	F	G	H	J	
STD	12	18	3/8	1-1/2	5E	1-1/40	1	2	45°	

SIGN SIZE	DIMENSIONS (INCHES)									
	K	L	M	N	P	Q	R	S	T	
STD	4	3-5/16	11/16	5-1/8	37/64	1-5/64	5/64	1/2	3/32	


  

REFERENCES

MdMUTCD SECTION - 2B.39, 2B.40, 2B.41, 7B.14

COLORS

LEGEND, CIRCLE & DIAGONAL - RED  
 BACKGROUND - WHITE  
 LETTER 'P' - BLACK

APPROVED <i>Toni Hicks</i> (signature on file) DIRECTOR - OFFICE OF TRAFFIC AND SAFETY		<b>Maryland Department of Transportation</b> <b>STATE HIGHWAY ADMINISTRATION</b> MARYLAND STANDARD HIGHWAY SIGNS <b>NO PARKING (SYMBOL) LOADING ZONE</b> <b>SIGN NUMBER R7-3(3)</b>		
	APPROVAL - SHA REVISIONS APPROVAL 03/02/2009 APPROVAL REVISED REVISED REVISED			APPROVAL - FEDERAL HIGHWAY ADMINISTRATION APPROVAL REVISED REVISED REVISED

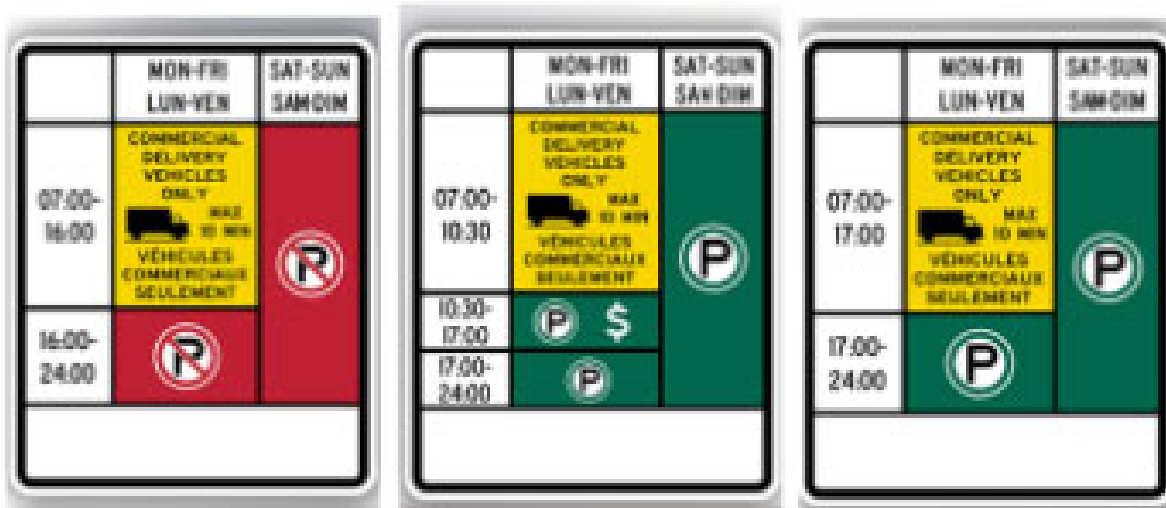
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[http://apps.roads.maryland.gov/businesswithsha/bizStdsSpecs/desManualStdPub/publicationonline/oots/SignBook/pdf/R7-3\(3\).pdf](http://apps.roads.maryland.gov/businesswithsha/bizStdsSpecs/desManualStdPub/publicationonline/oots/SignBook/pdf/R7-3(3).pdf)



Queen Street Flex and Loading Zone Pilot Project  
**City of Fredericton-Fredericton, NB Canada**

Flex loading zones are now in place throughout the downtown. Offering better access for business to products and merchandise, the change also results in more customer parking on evenings and weekends.

<https://www.fredericton.ca/en/roads-parking/parking-facilities/queen-street-flex-and-loading-zone-pilot-project>



- Red signs mean loading activities only between 7:00 am and 4:00 pm.
- These green signs mean parking is available after 10:30 am.
- These green signs mean parking is available after 5:00 pm.

Commercial license plates are no longer accepted as valid when parked in a loading zone.

New loading zone regulations mitigate unlawful use of loading zones by commercial vehicles that are not actively loading or unloading.

The three requirements that must be met to park in a loading zone are:

- the vehicle has commercial signs prominently and permanently affixed to the vehicle (and includes magnetic signs) establishing that the vehicle is used for commercial purposes other than a taxicab;
- the owner or driver of the vehicle is actually engaged in loading or unloading of merchandise from the vehicle; and
- the vehicle occupies the loading zone for a maximum continuous period of not more than 10 minutes.

Commercial license plates are no longer accepted as valid when parked in a loading zone.

## SECTION TWO: CASE STUDIES IN THE UNITED STATES

### Nostrand Avenue / Rogers Avenue

#### ***New York City Transit***

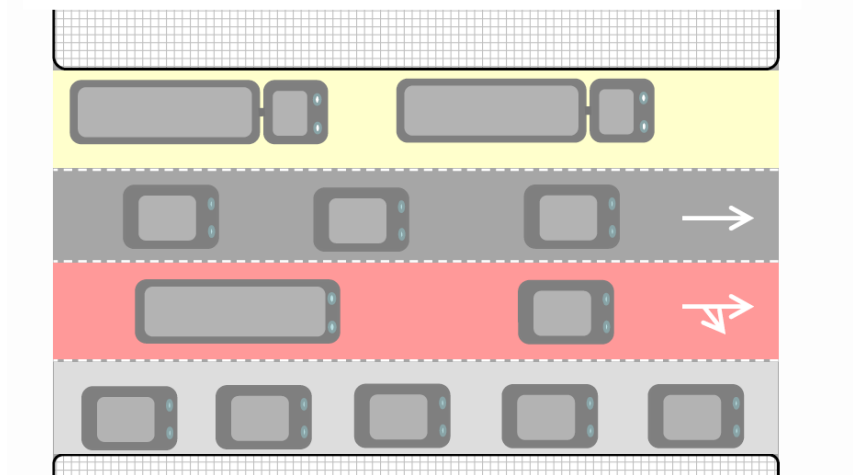
#### ***New York, New York***

On Nostrand Avenue in Brooklyn, NYC DOT conducted surveys of local merchants, finding that some preferred relatively nearby loading zones for short delivery times of 30 minutes or less, while others would accept loading zones farther away if longer loading times were available. Similarly, drivers seeking on-street parking can be diverted to metered spaces on side streets, where they may be charged less. These changes free up space on the transit street, supporting projects in which a curb needs to be fully cleared for transit lanes.

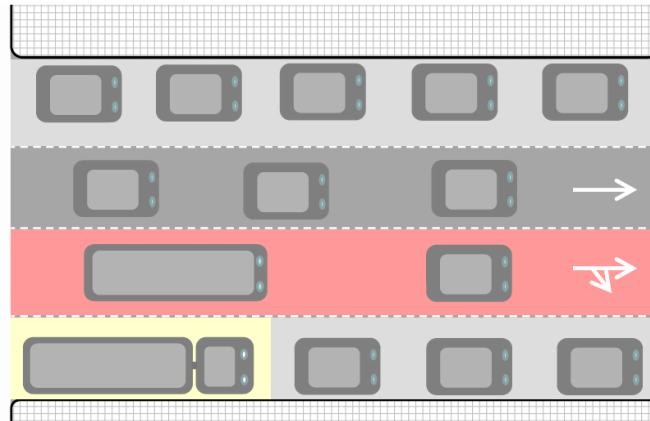
NYC DOT surveyed Nostrand Ave merchants to ask where they would prefer loading zones with varying levels of restrictions: one loading zone per block with a 1-hour time limit; a spot in front of a particular business with a 15-minute time limit; or a spot on a side street available all day.

- **Delivery Windows on Alternating Curbs**  
Create Delivery Zones for midday loading in commercial areas:
  - 10 AM – Noon on East Curb
  - Noon – 2 PM on West Curb
  - As Needed, Short Segments All Day or Midday

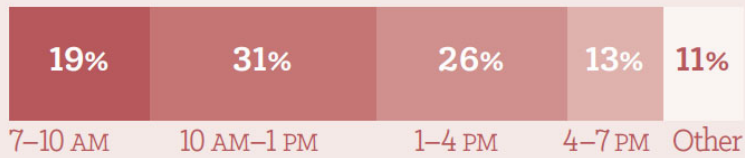
#### Delivery “Windows” on Alternating Curbs, 10 AM to Noon on East Curb, Noon to 2 PM on West Curb



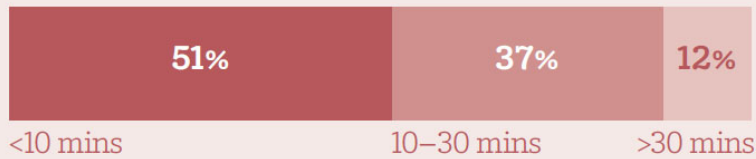
## Delivery Zones on Part of Curb, All Day or Midday



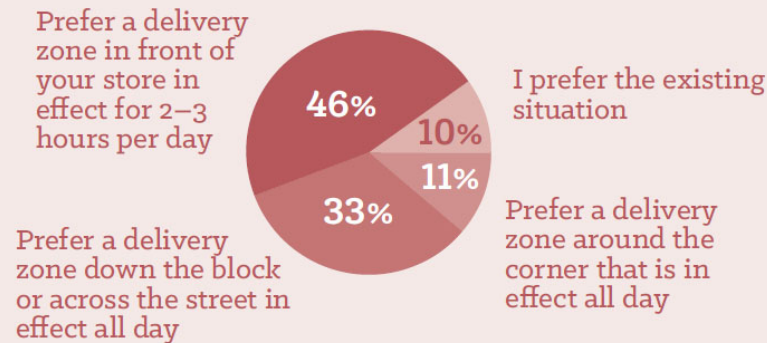
### Timing of merchant deliveries



### Delivery duration on Nostrand Ave



### Nostrand Ave delivery zone requests

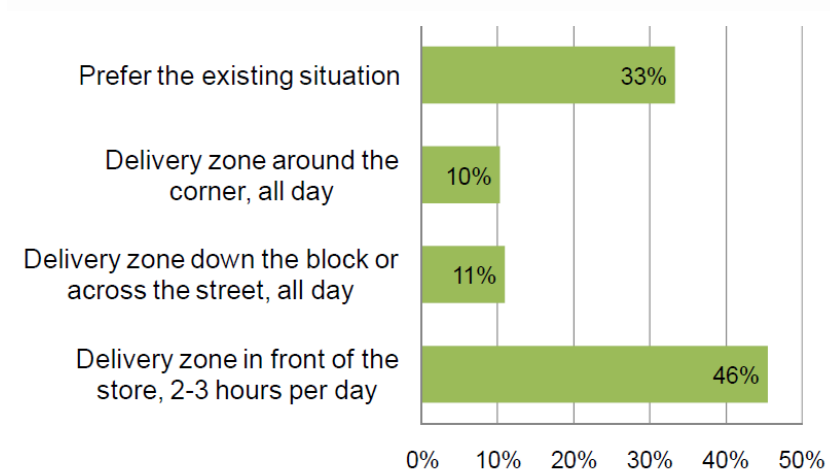


Source: <https://nacto.org/wp-content/uploads/2017/11/NACTO-Curb-Appeal-Curb-Side-Management.pdf>



Source: [http://www.nyc.gov/html/brt/downloads/pdf/201109\\_brt\\_nostrand\\_cac4.pdf](http://www.nyc.gov/html/brt/downloads/pdf/201109_brt_nostrand_cac4.pdf)

### Merchant Preferences for Delivery Zones



Source: [http://www.nyc.gov/html/brt/downloads/pdf/201109\\_brt\\_nostrand\\_cac4.pdf](http://www.nyc.gov/html/brt/downloads/pdf/201109_brt_nostrand_cac4.pdf)

## Park Omaha: Smart Zones

### ***Parking and Mobility Division, Department of Public Works Omaha, Nebraska***

Omaha has launched five “smart zones” at key downtown intersections that are frequent stops for deliveries, as part of a three-month pilot project with transportation technology firm Coord. Delivery and other drivers using the zones will access them via a mobile app, which will bring improved coordination among delivery services, the city and the businesses being served.

“The current delivery situation in downtown Omaha is a little bit chaotic,” said Holly Barrett, executive director of the Omaha Downtown Improvement District, in comments explaining the pilot program in a video posted to YouTube. “What we’ve got going on is we’ve got all sorts of different kinds of trucks coming in, at all sorts of different times of day, and they are blocking cars that are already parked. They are blocking access to open spots, and they’re creating safety hazards for pedestrians and for automobile traffic.”

Intelligent curb management introduces an opportunity to not only improve the choreography of the delivery and parking system, but to open up more opportunities to monetize the curb, priced for various uses and times of use.

Pilot projects like this one often function as testbeds to not only kick the tires on technology solutions like the one offered by Coord, but to try out new policy ideas, say observers.

“The point of doing the pilot in the plan is to actually help build that muscle and create those standard operating procedures with the full team,” said Kris Carter, co-chair of the Boston Mayor’s Office of New Urban Mechanics, during a recent panel discussion around curb management, hosted by Populus, another digital platform to better manage curbs and streets.

“It’s imperative for cities to look at the changing use of the curb from vehicular parking to a more dynamic relationship between the street and the property owner,” said Smith in an email. “As such, cities will need to rethink how to manage the curb through monetization and allow those who need curb access the ability to get it.”

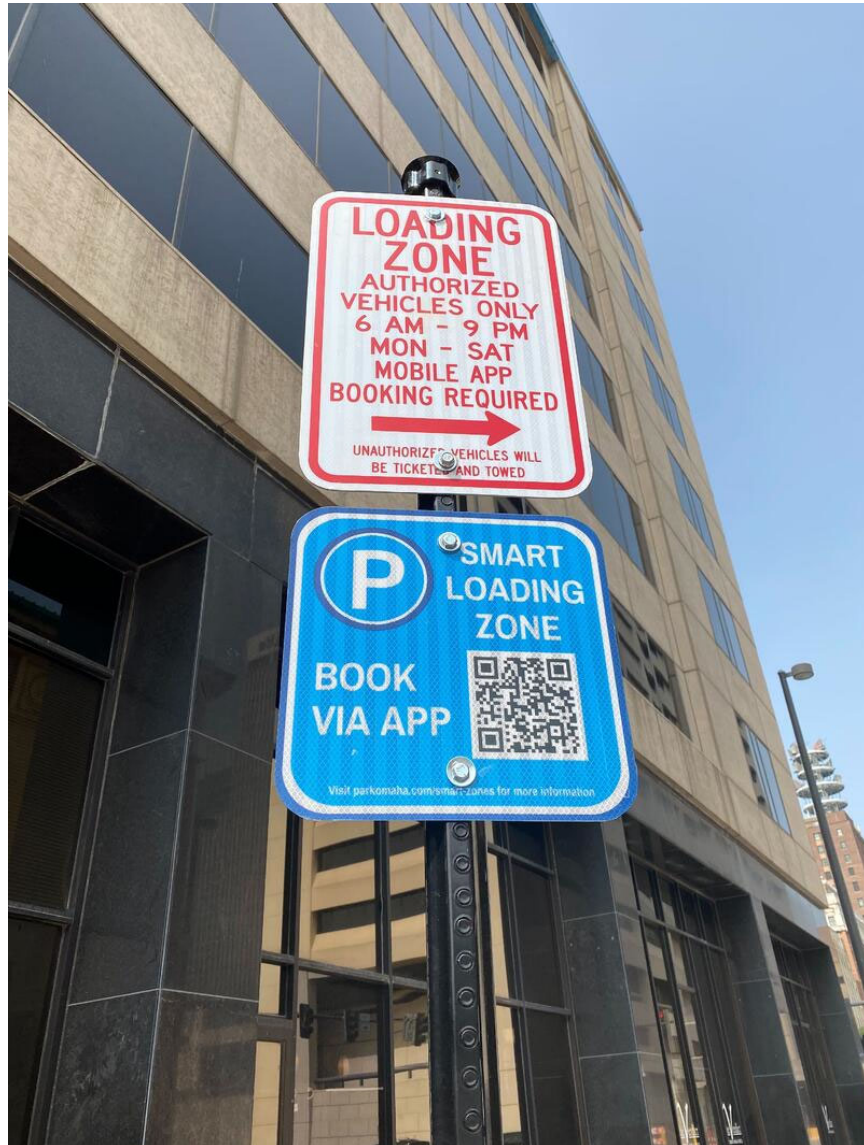
1. <https://www.parkomaha.com/news/announcements/78-city-of-omaha-launches-city-s-first-ever-smart-zones-to-better-manage-the-curb>
2. <https://www.govtech.com/transportation/Omaha-Neb-Turns-to-Smart-Zones-to-Better-Manage-Curbs.html>
3. <https://www.coord.com/blog/omahas-first-smart-zones>

- **What’s a Smart Zone?**

Smart Zones are spaces along the curb dedicated to loading and unloading for certain hours of the day. They are clearly marked with signage, and drivers use a mobile app (Coord Driver) to see real-time Smart Zone locations and availability. As they approach their destinations, drivers can hold and then book time in a Smart Zone.

- **Why Smart Zones?**

Smart Zones are designed to provide delivery and service vehicle drivers with the information and incentives to load in locations where it is safe and permitted. Well-managed loading zones can reduce double-parking and other behaviors that create safety hazards and impede traffic flow, making downtowns more convenient, safe and pleasant to visit.



Source: <https://www.coord.com/blog/omahas-first-smart-zones>



Source: <https://matr.net/news/omaha-neb-turns-to-smart-zones-to-better-manage-curbs/>

Designing for Truck Movements and Other Large Vehicles in Portland  
**Portland, Oregon**

This design guide includes a discussion of design considerations, an explanation of truck operating requirements, and a tool kit of potential design solutions. The purpose of these guidelines is to continue to improve the safety and accessibility of City streets for all users.

[https://nacto.org/docs/usdg/designing\\_truck\\_movements\\_large\\_vehicles\\_portland\\_portland.pdf](https://nacto.org/docs/usdg/designing_truck_movements_large_vehicles_portland_portland.pdf)



- Better Market Street – Existing Conditions & Best Practices

### ***San Francisco, California***

The Better Market Street Existing Conditions & Best Practices documents lay a foundation for the informed, inspired, and integrated design of Market Street which will follow. It is a resource of layered information, drawn from a variety of design and transportation sources, enriched by new investigation and organized to focus on this study area and its key challenges and opportunities. It looks in detail at the Market Street corridor, considers Market Street in the context of the City and surrounding districts, and steps back to consider international best practices.

The Best Practices document summarizes best practices approaches for a wide variety of challenges and opportunities for improvements to Market Street. The best practices approaches focus on those areas that would help the Market Street corridor become a Great Street, one with a strong identity; a high priority on mobility, pedestrian amenity and public space; and an active street life.

Introduction:

[http://www.bettermarketstreetsf.org/docs/BMS\\_P2-0\\_BestPractices\\_12072011.pdf](http://www.bettermarketstreetsf.org/docs/BMS_P2-0_BestPractices_12072011.pdf)

Loading and Delivery Management:

[http://www.bettermarketstreetsf.org/docs/BMS\\_P2-4\\_BestPractices\\_12072011.pdf](http://www.bettermarketstreetsf.org/docs/BMS_P2-4_BestPractices_12072011.pdf)

- **Key Points of the document**

Freight delivery is an essential and often overlooked function of the urban transportation system. Stores and customers need goods, and shippers need to be able to get goods to market. However, in busy urban commercial areas there is often not enough off-street loading space to accommodate most deliveries, and freight carriers compete for space in travel lanes and at the curb with all modes of passenger transportation. Unmanaged, this competition for space can lead to delays for all modes. These competing priorities are important considerations for Market Street, first, because there are many businesses along Market that must receive deliveries, and second, because illegally parked trucks frequently delay transit and bicycle travel on Market Street.

- **Right-of-way Allocation**

Configurations could either increase or decrease the number of dedicated loading spaces, or they could include approaches that convert part of the right-of-way to space shared by other types of users, either with a “shared space” concept or with “flex lanes.” However, loading bays reduce sidewalk space and can create conflicts between delivery vehicles, transit vehicles and cyclists.

- **Management Approaches**

Potential management approaches include time-of-day restrictions on delivery, graduated fees for use of loading bays, and enhanced enforcement programs. Each of these approaches, however, would impose some sort of burden on delivery vehicles in terms of reduced flexibility or increased cost.

- **Nearby Delivery**

To reduce the total number of large truck trips for deliveries while still accommodating the needs of stores and freight carriers, deliveries could be

consolidated in a nearby common location. This strategy could improve operations where curbside space is limited, however, it could shift the burden, to another street and create problems with the “last mile” of delivery.

- **Comprehensive Planning**

Several large North America cities, including New York, Washington DC, and Los Angeles, have made improvements to curbside freight delivery through coordinated planning efforts. These plans have analyzed delivery data in detail, produced wide ranging recommendations, and implemented policy changes in partnership with businesses, freight carriers, and other stakeholders.

*Curbside Pickup-Dropoff (PUDO) Program*  
**DC Department of Transportation, Washington, DC**

In August 2019, DDOT partnered with curbFlow, a mobility company that coordinates commercial operator pickup & drop-off activity to available curbside space in real time. As part of the project, curbFlow will research and analyze the demand at nine locations throughout the District where commercial loading and PUDO activities for delivery services often leads to double parking and other dangerous behavior.

"The curbside is an oft-forgotten but critical element of our city landscape," said Ali Vahabzadeh, Founder and CEO at curbFlow. "We're excited to work with DDOT in using data-driven solutions to reduce double parking traffic, help make our streets safer and more sustainable, while making sure merchants get their goods delivered in a timely manner."

The commercial delivery landscape has changed significantly in recent years with the advent of delivery apps for food and other goods. The data will enable DDOT to get a better understanding of the commercial demand for the curbside when many companies are now using private vehicles for delivery through app services. Once the research period has concluded DDOT will evaluate the data to determine next steps for citywide curbside usage policies.

- <https://ddot.dc.gov/release/ddot-announces-next-innovation-curbside-management-program>
- <https://www.smartcitiesdive.com/news/dc-launches-curbside-pilot-for-commercial-deliveries/557508/>
- DDOT launched its first curbside pilot in 2017 in partnership with the Golden Triangle improvement district (BID). In that district, it transformed curbside, daytime parking spaces into ride-hailing PUDO zones on weekend nights to improve safety and cut down on traffic jams caused by double parking.
- Although non-branded vehicle drivers need to complete their business transactions as quickly and safely as employees in prominently labeled trucks and vans, they can run into trouble when trying to park in traditional commercial loading zones. That can lead them to double park in bike or vehicle travel lanes, causing congestion and hazards.
- The loading zones that DDOT sets up for its new pilot will be used by both branded and personal vehicles used for commercial services. Insights gathered during the program could lead to the agency implementing new curbside regulations to enhance traffic flow and increase safety.

The Philadelphia Delivery Handbook addresses the goal of laying the groundwork for fostering a delivery-friendly city. One where deliveries are executed in ways that are equally as conducive and sensitive to business interests as they are to individual communities.

<https://www.dvrpc.org/Reports/16012.pdf>

### **Deliveries by Design (Off-street Parking)**

Land development strategies that seek to internalize delivery facilities can help to alleviate conflicts and improve the total capacity of right-of-way dedicated to other uses. Implementation of delivery considerations into the development process can create opportunities for buildings to design alleys, off-street loading bays, and even internal or underground delivery facilities. Provisions for off-street loading are required as a part of the City of Philadelphia Zoning and Planning Code under § 14-806. The City mandates that new construction provide off-street loading spaces. The requirements are spelled out in the zoning ordinance and are based on the Gross Floor Area of construction, but for illustrative purposes let us consider two office building examples.



### **Curb-side Orchestration (On-street Parking)**

Strategies for Accommodating Deliveries at the Curb:

- Provide the appropriate amount of loading zones to support the commercial activity and character of the street.
- Provide longer loading spaces to accommodate multiple vehicles and allow for better access.
- Assign preference to end-of-block loading zones.
- For mid-block loading zones, provide curb cuts and ramps to allow access for hand trucks and pallet jacks.
- Provide a buffer of at least five feet between loading zones and curbside bike lanes.

- For streets with wide sidewalks, develop shared-use space delineated by striping or textured pavements and pedestrian protection devices.
- Provide longer-term parking for general contractor vehicles (e.g., construction and utilities) that is separate from loading zones (and which may not be located immediately in front of a particular building)

### **Carpe Noctem (Seize the Night)**

No one likes sitting in traffic or circling the block for parking. When it comes to truck deliveries in urban areas, these challenges translate into impacts on business operations.

One freight demand management strategy to address these conflicts is the adoption of off-hours deliveries. By encouraging off-hour deliveries, freight delivery activity can be shifted to a period of the day when roads are less congested and loading facilities are more easily accessible. Carriers and receivers have a higher reliability of on-time deliveries, ensuring fewer lost hours waiting in traffic or manning a loading dock awaiting a delivery. This also ensures products arrive when they are expected, preventing a disruption to business operations.

Off-hour programs largely depend on the willingness and ability of a business to receive shipments during non-traditional hours. Education and incentive programs are crucial to help implement this demand management strategy and to instill an awareness among receivers and building operators about the important role they can play to better support deliveries and pick-ups

### **Consolidated Deliveries and Pick-ups**

Individual businesses may receive multiple deliveries each day, resulting in higher total logistics costs. In addition, it is common for multiple delivery vehicles from the same company to make deliveries along the same corridor at different times during the day.

How it Works: Consolidation from Multiple Shippers Receiver:

A wants to reduce the current practice of receiving one delivery a day from six different shippers. Receiver A works with the shippers to coordinate the consolidation of all shipments. The result is a single daily delivery of all shipments to Receiver A. This initiative can be implemented by shippers as well as receivers.

Consolidation from a Single Shipper:

Multiple receivers located on Corridor X determine that they have an opportunity to reduce the quantity of trucks making deliveries from Shipper A. Through a coordinated scheduling tool provided by Shipper A, the receivers collectively agree to take receipt of deliveries at the same time of day, resulting in just one trip to the corridor by Shipper A.

### **Alternate Delivery Sites**

Offering alternate delivery sites is an effective means to consolidate many trips to residential locations, while improving the security and reliability of deliveries. Neighborhood pick-up point can

provide a reliable location to receive packages for consumers. Automated Parcel Systems also provide a fully automated, secure point of access for customers.

### **A Healthy Mix of Vehicles**

Smaller, more urban-scaled trucks and vans pose less of a danger to pedestrians and cyclists. These vehicles are often more “friendly” to dense urban environments, consuming less space and producing less noise than larger freight vehicles. While smaller vehicles can enhance the livability and safety of these environments, there is an efficiency trade-off in smaller vehicles. As a result, a shift in vehicle size can often mean an increase in vehicles needed to handle the same number of deliveries and pickups.

For many delivery types, modal shift and downsizing of vehicles may simply not be feasible. However, carriers and communities can seek to enhance the safety of larger freight vehicles through innovative safety technologies, such as truck side-guards and high visibility cabs, allowing for safer interaction with other road users.

### **Making Safety a Top Priority**

General Safety Tips:

- Stay on designated routes and in designated lanes/spaces.
- Keep to the right and pass on the left (as a general rule).
- At intersections, be on high alert and make full stops at red lights and stop signs.
- Anticipate other travelers and types of users and be cognizant of their blind spots.
- Use clear signaling to convey where you intend to maneuver.
- Be courteous and defensive...not aggressive or distracted!

Truck Driver Tips

- When making temporary stops, use assigned locations.
- Don't block bike lanes, crosswalks, curb ramps, or sidewalks.
- Don't obscure the visibility of stop signs and traffic signals.
- Use turn signals well in advance of turning or changing lanes.
- Take extra precautions when backing up or re-entering traffic.

Cyclist Tips

- Wear brightly colored clothing, a helmet, and proper shoes.
- Don't use headphones or phones while riding.
- Equip your bicycle with bright lights, reflectors, and a bell.
- Be aware of the blind spots of trucks, and anticipate a truck's turns and movements.

Parking Management Manual Truck Loading Zones (TLZ)  
**[Portland Bureau of Transportation– Portland, Oregon]**

On-street truck loading zones (TLZ) allow for the efficient delivery of freight to businesses. Effective TLZ management is necessary to ensure that businesses can receive on-time deliveries and operate effectively in constrained urban environments. The physical design of urban streets poses a number of challenges for accommodating a broad range of transportation modes and a diversity of street users. Many of these challenges are a consequence of competing demands and desires within the street and a need to balance the needs of diverse ground floor uses, such as retail and dining, with upper floor office and residential uses.

<https://www.portlandoregon.gov/transportation/article/664196>

Policy goals for TLZ management would include:

- Enhance mobility and accessibility in business districts; prioritizing an engaging and attractive pedestrian experience.
- Reinforce an area’s identity, unique sense of place, and balance of diverse access needs.
- Strengthen commerce and economic vitality.
- Create streets that are well planned, managed, adaptable, and readily maintained.

Some key outcomes for managing urban loading areas include:

**•Establish truck loading zones in areas that are as close to the receiving areas of shipping/receiving businesses as possible** to reduce delivery/pick-up time and disruptions to pedestrian and vehicular traffic that could result from moving goods to and from the truck.

**•Designate truck loading zones to balance the various user demands.** Depending upon the other land uses present in the district, there may be competing demands for curbside space (i.e., shoppers and business patrons may need on-street parking during business hours, while residents may demand on-street parking overnight). Truck loading zones should be established to meet freight needs while being sensitive to other demands for curbside space.

**•Consider greater use of “combination zones” to maximize the efficiency of truck loading zones to meet demand and capture capacity in periods of low or non-use for freight delivery.** Any parking stall is not efficient if it is restricted from use when it is not needed. Combination zones allow spaces to serve TLZ functions during designated periods and to be used as timed zones for visitor or residential uses at other times of the day. This increases overall efficiency of TLZs and helps to mitigate conflicts between competing users.

**•Enforcement of parking and loading rules should be rigorous.** To ensure that curbside truck loading space is used effectively without impacts to traffic operations and safety, enforcement of parking and loading rules is critical. Enforcement of time limits and vehicle types allowed to park in the loading zones discourages parking by passenger vehicles in these loading zones during designated TLZ hours. When trucks are unable to find an appropriate place to load or unload, they may find alternative means of making their deliveries or pickups by double-parking, blocking travel

lanes or driveways, or parking in other configurations that disrupt traffic flows and could present unsafe conditions for passing traffic.



## Improving the Efficiency of Truck Deliveries in NYC

### ***New York City Department of Transportation – New York City, New York***

NYC DOT piloted an Off-Hour Deliveries Program between 2007 and 2010. Participants in the program agreed to shift delivery times from peak hours (between 7 a.m. to 4 p.m.) to off-peak hours (between 7 p.m. and 6 a.m.), with the goals of reduced truck traffic and congestion at peak hours, improved business operations, and improved air quality.

<https://www1.nyc.gov/html/dot/downloads/pdf/truck-deliveries-ll189.pdf>

The pilot program yielded positive feedback from receiving companies, carriers, and truck drivers – with some participants implementing the off-hour policy at a number of their locations. Overall:

- Delivery speeds in Manhattan increased by 50% during off-hours than during the morning (8 a.m.-10 a.m.) and by 130% as compared to the midday (10 a.m. – 4 p.m.) and evening (4-10 p.m.)
- Median service times during off-hour deliveries were as low as 25 minutes for one delivery, as compared to over one hour during peak hours.
- The average service time at each individual stop was 30 minutes during the off-hours period, while drivers spent roughly 3 times longer at each stop during the day due to longer walks, wait at freight elevators, and other sources of delays.
- Making deliveries in the off-hours not only reduces operational costs but can lead to highly reduced parking fines. This is a major issue as parking fines that are incurred range on average between \$500-\$1000 per truck per month.

#### **Receiver Benefits:**

Receivers spent less time during store hours to receive deliveries, and more time with customers.

- Goods delivered outside of store hours
- Goods prepared before store opens
- More certainty on truck travel times
- Reduced delivery costs

#### **Transporter Benefits:**

- Efficient deliveries
- Reduced transit time and fuel costs
- Less parking and headaches
- More predictable delivery headaches
- Improved truck utilization
- Reduced delivery costs

Improvements to Commercial Goods and Services Delivery In Belltown  
**Seattle Department of Transportation – Belltown, Washington]**

The Seattle Department of Transportation (SDOT) is launching a new project in Belltown to improve commercial goods and services delivery to area businesses and residential buildings. In partnership with the University of Washington's (UW's) Supply Chain Transportation and Logistics Center, we are working to:

- Expand and improve access to Commercial Vehicle Load Zones
- Install equipment at the load zones to collect vehicle parking data and provide it to commercial delivery operators

[https://www.seattle.gov/Documents/Departments/SDOT/ParkingProgram/Belltown\\_CVLZ\\_Folded\\_Mailer\\_Final.pdf](https://www.seattle.gov/Documents/Departments/SDOT/ParkingProgram/Belltown_CVLZ_Folded_Mailer_Final.pdf)

[https://www.seattle.gov/Documents/Departments/SDOT/ParkingProgram/GoodsMorningDeliveryPilot\\_Flyer\\_fin.pdf](https://www.seattle.gov/Documents/Departments/SDOT/ParkingProgram/GoodsMorningDeliveryPilot_Flyer_fin.pdf)

**What are Commercial Vehicle Load Zones?**

Commercial Vehicle Load Zones (CVLZs) are locations along the curb for freight goods and services delivery vehicles – everything from package delivery, to food and beverage vendors that service restaurants, to e-commerce deliveries. Typical signs are yellow with black text to indicate commercial vehicle loading from 7 AM to 8 PM, Monday through Saturday, with yellow paint on the curb. As Seattle continues to experience rapid commercial and residential growth, demand for curbspace in the form of deliveries, parking, passenger pickup & drop off, transit and others has increased significantly. SDOT's Curbside Management Team is working to prioritize urban goods delivery in Belltown and other neighborhood business districts.

**Partnering with the University of Washington**

SDOT is a member of the University of Washington's (UW's) Urban Freight Lab. The Urban Freight Lab is a partnership that brings together private industry, academic researchers, and transportation agencies to test and solve urban goods delivery problems in Seattle and elsewhere. The UW received a Department of Energy grant to fund much of this project. Recent UW research shows that many CVLZs in the downtown area have greater than 90% occupancy rates, and that only 13% of buildings in the downtown area have dedicated loading docks. In places like downtown and Belltown, getting goods and services delivered requires available curb space.

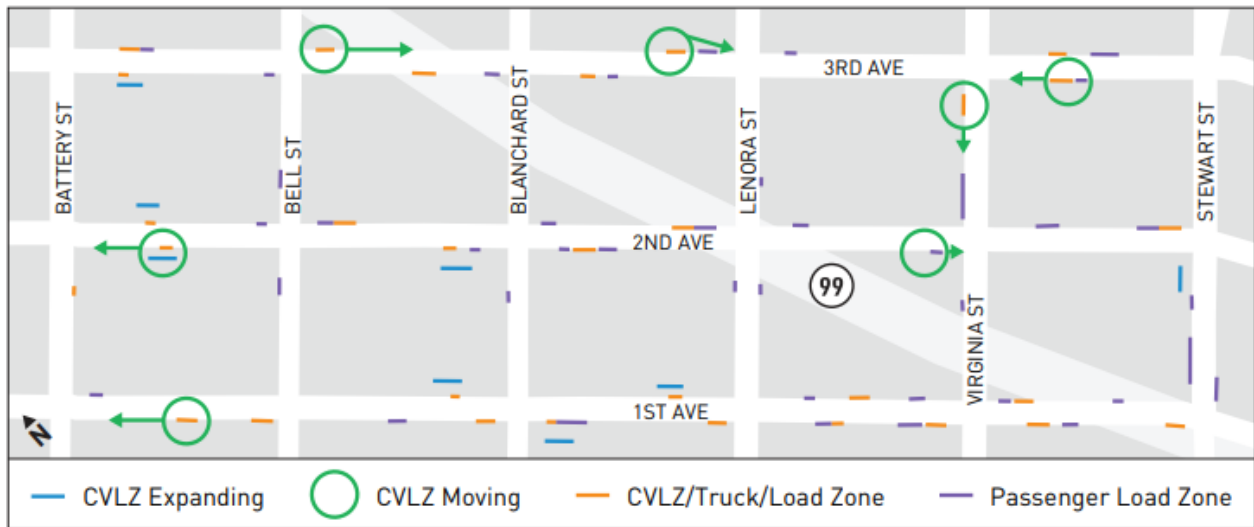
**What is SDOT doing to improve Goods Delivery in Belltown?**

We worked with our partners to better understand what the requirements are for effective urban goods delivery. These include:

- Make the CVLZ length at least 35 feet so that box trucks can fit.
- Locate the zone at the far side of the intersection or next to an alley or driveway so that delivery vehicles can drive straight into the space versus trying to back-in or parallel park a truck into a mid-block space.
- Locate passenger load zones and commercial vehicle load zones adjacent to each other.
- Remove as little short-term customer parking as possible.

To this end, SDOT is planning to extend and adjust 29 CVLZs on blocks in Belltown between 1st Avenue and 3rd Avenue, and from Virginia Street to Battery Street. Please see the map.

Installing vehicle detection sensors at CVLZs SDOT and the UW are working collaboratively to install vehicle detection sensors in this area. Vehicle detection sensors anonymously perceive whether vehicles are present at the CVLZs and how long the vehicles stay. The data collected is sent in real-time to the UW and project partners, who are building a mobile application that freight delivery drivers can use to see whether a CVLZ is open and available for their use. Consistent with Seattle's Surveillance Ordinance, the sensors do not collect any identifiable information specific to the vehicles parked in CVLZs, or their owners or drivers.



## Urban Freight Integration with Protected Bike Lanes

### ***[Chicago Department of Transportation – Chicago, Illinois]***

The City of Chicago is a leader in promoting and implementing context sensitive street design solutions. In 2006, the City adopted a complete streets policy to accommodate and balance the needs of all transportation system users, including freight operators, as part of transportation project planning and delivery. In 2013, the City released its Complete Streets Design Guidelines to help implement the 2006 policy. Recognizing the need for sufficient and safe commercial loading and unloading zones, the City included integration of these zones in their protected bicycle lane designs. Protected bicycle lanes (also referred to as separated bicycle lanes by the Federal Highway Administration) use physical barriers and visual cues such as bollards, curbs, pavement markings, and parked cars to separate bicyclists from motorists and freight operations, helping improve safety for all transportation system users. These facilities help deconflict curbside truck deliveries and can also benefit truck movements along a corridor by separating freight and bicycling activities with a physical buffer and providing a clearly delineated space for each. Since 2012, the Chicago Department of Transportation (CDOT) has installed several protected bicycle lanes integrated with loading zones along several commercial corridors in the downtown area. CDOT also installed a modified version of a protected bike lane, buffered only by pavement markings, on a key truck route along Elston Avenue.

<https://ops.fhwa.dot.gov/publications/fhwahop16080/fhwahop16080.pdf>

#### **Key Accomplishments:**

- CDOT has integrated freight and loading zones into different types of protected bike lane projects: with loading zones at curbside sites, and along a key truck route to improve safety for freight operators, bicyclists, and other roadway users.
- The bike lane/loading zone implementation clearly delineated truck-to-curb access. CDOT also used nationally adapted outreach materials for truck operators on how to safely cross protected bike lanes at loading zones.
- The bike lane/truck route implementation led to several safety improvements, including a reduction of speeding motorists from 60 percent to 48 percent, 48-62 percent increase in bicycle ridership, and a 5 percent reduction of the bicycle crash rate.

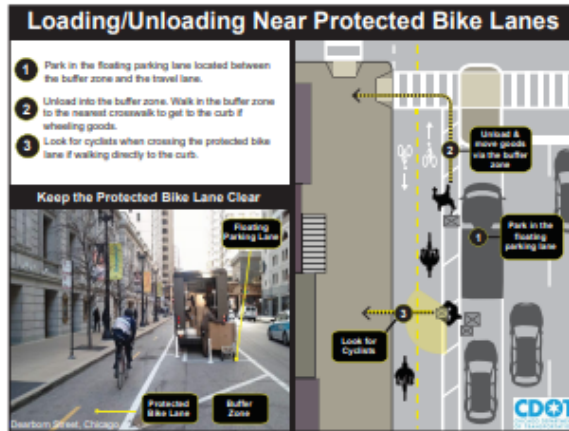


Figure 2. Educational flyer for truck drivers on how to safely deliver from new loading zones across the protected bike lane. (Source: CDOT)

## SECTION THREE: INTERNATIONAL CASE STUDIES

### Best Urban Freight Solutions Consortium: Good Practice Guide **European Union Directorate-General for Mobility and Transport**

Best Urban Freight Solutions (BESTUFS) was a coordination activity on behalf of the European Union Directorate-General for Mobility and Transport ([https://ec.europa.eu/transport/index\\_en](https://ec.europa.eu/transport/index_en)) to encourage the cooperation between domain experts, research institutions, urban transport operators and city administrations in order to identify and disseminate the Urban Freight Solutions (UFS) which are considered as best practices within Europe.

New urban freight solutions are attracting more and more attention because of the following main three reasons:

- First, due to the fact that the installed urban goods transport procedures negatively affect the quality of life in cities;
- Second, because structural changes take place in urban areas both from the city infrastructure and policy point of view (for instance pedestrian and parking zones) but also from a commercial viewpoint (e.g. shopping malls and emerging e-commerce);
- Third, because technology related innovations (e.g. low emission vehicles, small containers, less expensive transshipment, or EDI) are swiftly entering the market and are becoming competitive in price compared to the established technologies.

The concept of public/private partnerships was introduced in order to establish improved urban goods transport solutions. These partnerships were sometimes successful but also often failed, because the willingness alone does not directly lead to a solution. The direction towards a 'best urban freight solution' must be given in order to turn public/private partnerships into a successful co-operation.

Objectives:

BESTUFS aimed to identify and disseminate best practices with respect to urban freight transport. The concept of a thematic network aimed at the co-operation of experts and projects with already existing or just emerging experiences and expertise and at the collection and analysis of existing project results of national and European projects - rather than starting new research activities.

The main objectives of BESTUFS were:

- to establish and maintain an open European network between urban freight transport experts, user groups/associations, ongoing projects, interested cities, the relevant European Commission Directorates, system/technology providers and representatives of national transport administrations; the network focusses on the movement of goods in urban areas,
- to create a permanent and dynamic concertation activity during the period of the 5th Framework Programme,
- to identify and structure the various themes which build the UFS domain and which have relations and influence to it; to present projects and best practices in view of this scheme,

- to support the clustering of projects on European level and to integrate projects and clusters into the network,
- to collect, compare and summarise available experiences and results of projects and initiatives in the UFS domain mainly of Europe but also - if easily obtainable - of the USA and other countries,
- to identify and describe best practices and success criteria within the UFS domain,
- to disseminate experiences, project relations, best practices and success criteria to a broad public of interested actors, thereby aiming at the transferability of solutions,
- to establish links and co-operations with other relevant thematic networks (treating different themes) on European level in order to share and integrate the results (regarding overlapping themes) and to avoid duplication of work,
- to establish links and co-operation with national thematic networks (treating the UFS domain) in order to share and integrate results and
- to support the co-operation between actors in the UFS domain by providing information and by providing contacts.

The general idea behind the thematic networks was to encourage the co-operation between domain experts, research institutions and further interest groups on a European level.

[http://www.bestufs.net/download/BESTUFS\\_II/good\\_practice/English BESTUFS Guide.pdf](http://www.bestufs.net/download/BESTUFS_II/good_practice/English_BESTUFS_Guide.pdf)

## The Shared-Use City: Managing the Curb **International Transport Forum**

The International Transport Forum at the Organisation for Economic Co-operation and Development (OECD)<sup>1</sup> is an intergovernmental organisation with 59 member countries. ITF acts as a think tank for transport policy and organises the Annual Summit of transport ministers. ITF is the only global body that covers all transport modes. It is administratively integrated with the OECD, yet politically autonomous.

This report discusses how to manage growing competition for curb access in cities. The rise of ride services and the growth in urban goods delivery are challenging traditional ways of managing curb space. We describe how curb use is changing, how our capacity to monitor its use may need to evolve and discuss what the future of the curb may look like. We explore the implications of a large-scale uptake of ridesharing services and other innovative mobility options in urban settings for street design and pricing. Growing competition for that scarce resource makes the parking of private vehicles at the curb in dense urban cores less and less tenable. The increasing diversity of those who pay for the curb and those who benefit from its use requires new approaches.

This study looks at the potential for a shift away from curb use focused on street parking to more flexible allocation that includes pick-up and drop-off zones for passengers and freight. It presents the results of quantitative modelling of alternative curb-use scenarios and discusses their relative efficiency, contribution to wider policy objectives and implications on city revenues. The work builds on a workshop held in September 2017, and outreach to numerous experts. It also provides insights from a modelling exercise to quantify the impact of re-allocating curb space from parking to pick-up and drop-off zones.

### **The curb as interaction space**

The curb materializes the interface between the transport function of the street and its other uses. As such, curbs are the points where streets generate value for citizens and cities. This is because transport systems don't necessarily generate value through movement per se, but rather, do so when people or goods stop moving when they arrive at their destination. The transition from movement to value-generating activities can happen in many locations – the home driveway, the quay of a metro or rail station (and the city beyond), the port crane and – in the case of most city streets – at the curb.

### **Rethink streets and their curbs as flexible, self-adjusting spaces and plan accordingly**

With new technologies, new rules and new use cases, curbs are no longer static, inflexible installations. Instead, curb use will resemble dynamic, highly flexible, self-solving puzzles. The move from a “parking city” to a “pick-up and drop-off city” is only one part of a broader shift to re-think and manage streets and curbs as flexible-use and self-adjusting spaces. This will require changes in how these spaces are designed, regulated, monitored and priced.

### **Manage curb space dynamically so it adapts to different uses and users**

The flexible allocation of curb space for different uses over the course of the day is not in itself new.

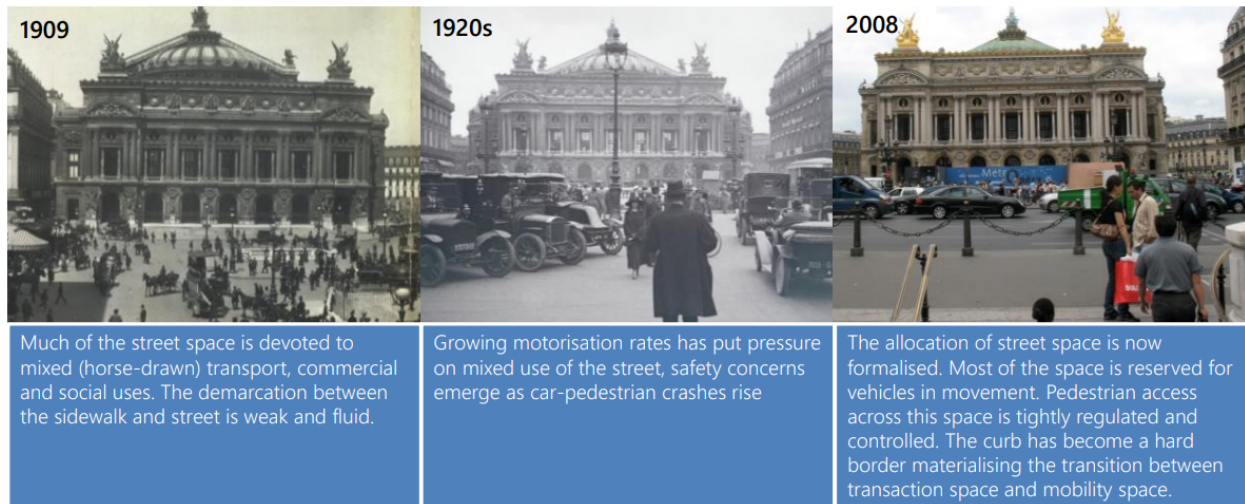
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<sup>1</sup> The Organisation for Economic Co-operation and Development (OECD) is an international organisation that works to build better policies for better lives. Our goal is to shape policies that foster prosperity, equality, opportunity and well-being for all. We draw on 60 years of experience and insights to better prepare the world of tomorrow.



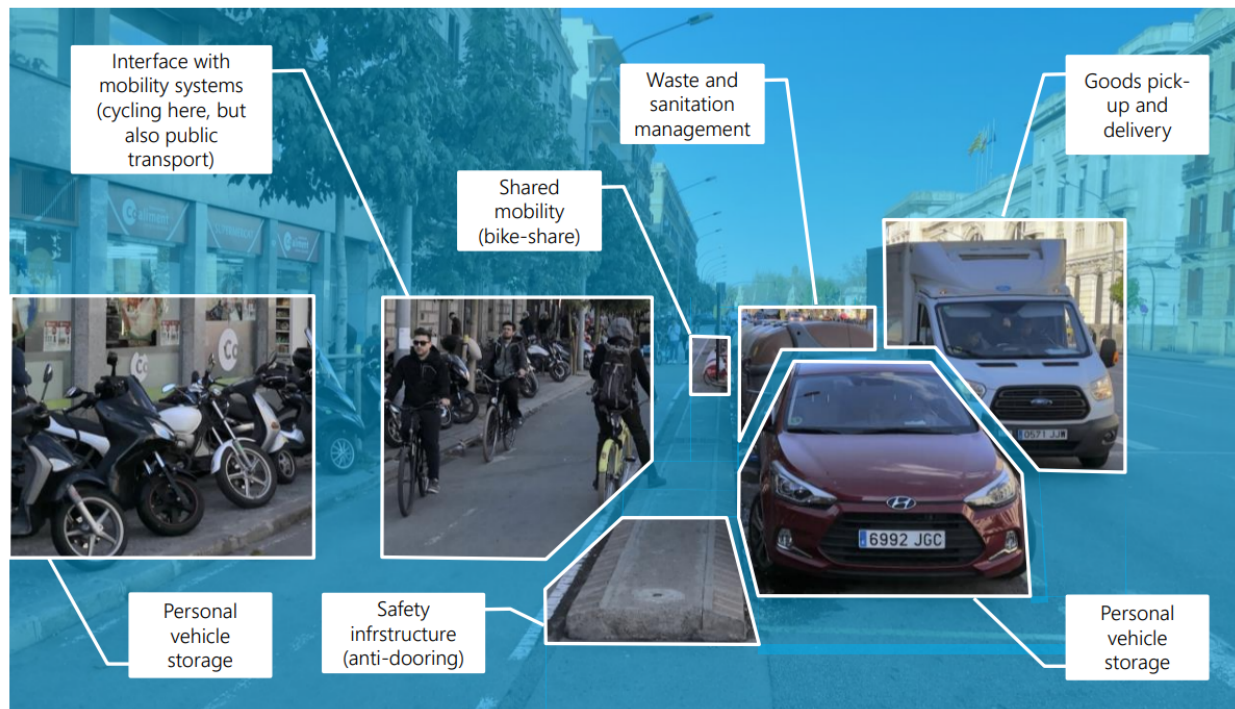
Flexibility targeting new mobility services specifically is much less common, however. Current live trials and the results of our modelling exercise, suggests this is likely to change. Technology will bring flexible use of space to the curb and help manage it. Over the longer term, curb and streets should be designed for such dynamic and flexible use.

Figure 1: **The evolution of the street and the curb – Place de l’Opéra, Paris**



Source: [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)

Figure 2: **The curb environment encompasses many heterogeneous uses: Example from Barcelona**



Source: [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)

### The curb tomorrow: Pick-up drop-off city to flex use city

A strategic vision for the use of street space, as noted previously, should serve as the bedrock for future curb space management and re-allocation policies. Cities have numerous options to choose

from regarding what uses they wish to prioritize and how these might be given space at the curb when they seek to build on this vision

- Guideline 1: Maintenance and Operations - “The Self-Coordinating Street”  
Congestion, conflicting uses, infrequent and un-coordinated maintenance activities and multiple siloed stakeholders within and outside of governments complicate effective street and curb management. In the future, the street (and the curb) should be self-aware and self-coordinating mixing sensing technologies and flexible, on-the-fly, adjustments enabled by design for multiple, rather than single, uses. Curb-space becomes a flex-use zone that adjusts over the course of the day based on demand and desired outcomes.
- Guideline 2: Distribution of Space and Assets - “The Open Street”  
Rigid allocation rules favor some uses, like through traffic for individually-driven cars, that in some parts of cities, crowd out other uses and other potential users of street and curb space. The cumulative impact of these micro-exclusions are cities and neighbourhoods that feel cramped for people although space is available for all. In the future, many urban streets, especially where demand for multiple uses are greatest, are open ecosystems that reflect the fluid nature of urban life. Rigid separations between different functional spaces are minimised, the street accommodates planned and spontaneous uses with real-time issuance of permissions and permits. Adjustments in space allocation account for past experience and citizen inputs.
- Guideline 3: Social Inclusion and Access - “The Everyman’s Street”  
Streets serve to connect parts of the city to each other (for those in vehicles) but often serve as barriers to people interacting with each other. This is the result of prioritizing vehicles over people, limited availability of transport options and poorly designed street environments. In the future, the street actively accommodates its daily users irrespective of whether they are passing through or if they spend time there. Multiple transport modes are given room with the highest priority given to the most efficient and those best aligned with the outcomes desired by people and the elected authorities that represent them. Seamless and rapid transfers are the rule, accessibility is guaranteed for all and rules of street and curb use are conveyed in human and machine-readable language.
- Guideline 4: Sustainability and Resilience - “The Strong Street”  
Today, streets can be noisy, polluted places where many of the negative side-effects of living in urban spaces are concentrated. They are also places that are subjected to major environmental stressors (storm bursts and other flooding risks, heat damage, etc) that can lead to disruptive failures and closures. In the future, the street is design and managed to deliver better overall health and resilience (for humans and for nature). The street environment is designed to support health-enhancing uses and to minimize the exposure of people to environmental and health risks. The sustainable street integrates elements of ecosystem resilience to manage and mitigate flooding and heat risks. Sensor technology and predictive intelligence enables the street to anticipate risks and adjust its use – or warn users. The strong street also monitors its performance over time and uses this information to adapt to changing circumstances or better deliver health and resilience outcomes.
- Guideline 5: Street Edges and Buildings - “The Supported Street”

With widespread motorisation, the “movement” aspect of streets has largely taken the upper hand over the “place” aspect, even in those contexts where this has reduced social, safety and liveability outcomes. Streets serve multiple purposes and support multiple outcomes across very different contexts and viewing them solely as conduits for traffic in all circumstances and all places is a reductive approach that some authorities have questioned as the examples of TfL and Seattle provided earlier illustrate. Further examples include: FL, Paris, NYC, SF, Berlin, Barcelona, CPH). In the “street as pipe” paradigm, the built environment is seen as secondary and largely unrelated to the value that streets provide – except as destination for (vehicle trips). The street of the future is actively supported and integrated into its surrounding environment. Where density, attractivity and diversity of uses are greatest, this will mean that the built environment serves as an “active” edge to the street environment. Here, transparency, open ground floors, diverse services, frequent scale and texture changes amplify the opportunity for people to linger, shop, socialize and navigate. Technology helps the street accentuate the feeling of activity that improves safety and use of the built environment enables new, sometimes temporary, uses.

### **Rethinking streets and curbs as flexible, self-adjusting spaces**

Beyond enhanced stakeholder engagement, these guidelines imply a fundamental re-conceptualization of public space – streets and curbs included – away from static and inflexible installations and more as highly flexible and self-solving puzzles (Thayne, J.; Andersen, 2017). The push to move from a parking city to a pick-up and drop-off city is only one part of a broader shift to re-think and manage streets and curbs as flexible-use and as self-adjusting assets and spaces.

As cities begin to consider, and eventually plan and operationalize this shift, they will have to ensure that their street networks and the transport services that operate on, adjacent to and underneath deliver on a broad set of public policy goals.

- First among these is safety. Streets must be safe for all users and expressly designed to deliver high levels of safety despite errors that people or machines may make. This means integrating speed management, separation where necessary and safety-centric vehicle and technical system design.
- A second priority is that the transport system must deliver high levels of access for all, irrespective of income, sex, ability or age. Efficiency, in the use of space and in the movement of people and goods should be a central concern and re-balancing the use of streets and curbs should favor the most efficient uses – or those that contribute to other policy goals. In this respect, the street should make room for active mobility – cycling and walking – as these deliver significant health outcomes in addition to their transport function. Real-time management of street and curb space enable policy to be delivered more consistently and effectively – integrating technology into monitoring street use and space allocation should be a priority.

All these goals should be expressly set out in a vision that enables authorities to ensure that public benefit guides engagement with, and the regulation of, private actors. In some cases, the result may be more flexible, lighter but more effective forms of regulation (NACTO, 2017).

### **Integrating multiple flexible service delivery models**

The mobility ecosystem in many developed cities is becoming more diversified. Cities that for decades have accommodated cars and public transport on the streets are giving more space to pedestrians and cyclists and are seeing an increase in both single and shared ride services as well as in more

flexible forms of public transport. At the same time, the already-diverse mobility ecosystems in many emerging contexts are becoming more formalized and there is convergence towards a few archetypal single and shared transport modes. This diversity should be accommodated on the street and at the curb in accordance with cities' goals for the management of those shared spaces.

### Fixing the curb: turning on-street parking into flex use zones

Moving to a more flexible use of curb space is not a trivial thing. It will imply design changes, engineering and construction costs (including knock-on congestion costs), revisiting the regulatory treatment of different transport modes and their access to public space (including anti-competition oversight), modifying or designing new revenue-collecting mechanisms, accounting for changes in peoples' travel behaviors and integrating a wide range of sometimes conflicting stakeholder concerns. One thing that seems clear is that the impacts of curb space reallocation on the location and availability of parking will likely be contentious and this must be carefully considered.



**Public transport curb access conflicts**  
 Unauthorised use of public transport space contributes to delays and unreliability

**Ride service double-parking**  
 In busy areas and at peak times ride-service and taxi double-parking triggers congestion and places passengers in danger.

**Poorly-managed loading/unloading**  
 Abusive occupation of parking or other reserved space leads to more cruising for parking.



**Public transport:**  
 early start and priority at junctions

**On-demand micro-transit**  
 accomodated with public transport

**Semi-automated people movers** provide first and last kilometre links alongside cycling walking

**Metered parking**  
 15 vehicles/day

**Food truck**  
 150 meals/day, €650-€1500 income/day

**Separated bike track**  
 and safe junction treatment for cycling. Entices a broad segment of the population to cycle conveniently and safely

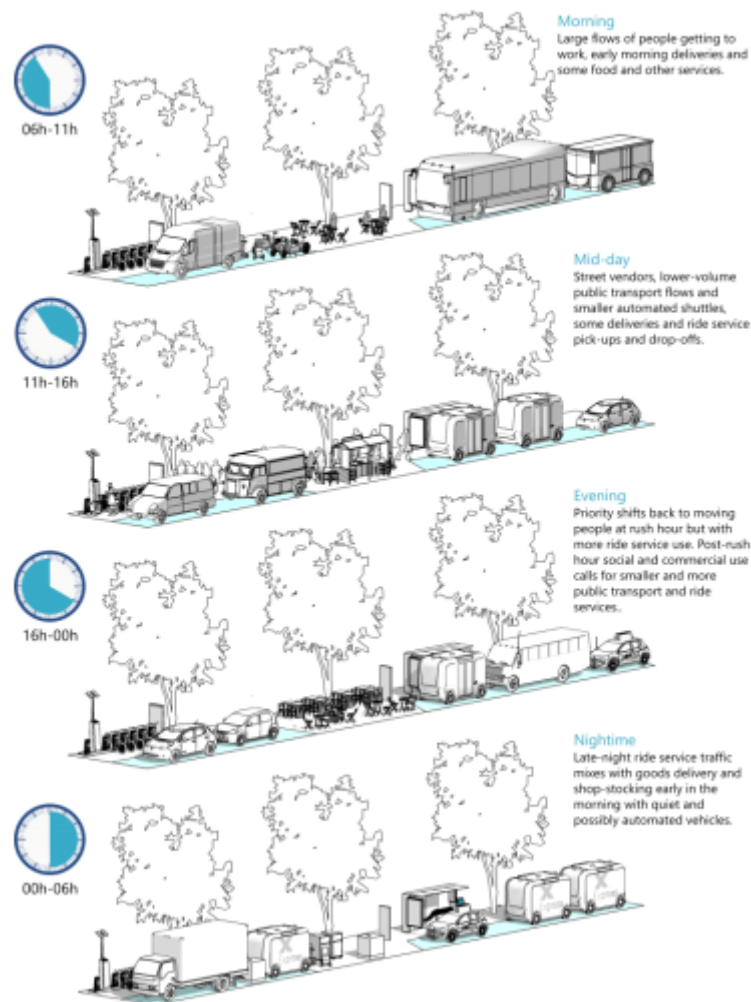
**Parklets and "streeteries"**  
 activate public life in the street and spur commerce  
 Parklet: 100 visitors/day, 10-20% additional revenue to nearby businesses

 Cycling



Source: [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)

Figure 17: **Dynamic use of curb space over the day**



Source: [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)

### Municipal Actions to Improve the Efficiency of Goods and Movements **[Urban Environmental Programs: Transport Canada]**

The movement of goods is an important part of the transportation landscape in Canada. With an export driven economy and domestic demand for consumer and industrial goods over an expansive geography, the need for efficient and sustainable transport strategies is crucial both for the health of urban environments and for supporting local, provincial and national economies. The need for efficient goods transport is especially sensitive in cities - where 80% of Canadians live. Municipalities have a key role to play in managing how these impacts are felt in urban areas. This includes coordination between the different jurisdictions and agencies involved in inter-city shipping, as well as management of local area transportation systems through such measures as land-use planning, route allocation, noise and emission controls, etc.

<https://www.cargo-montreal.ca/wp-content/uploads/2017/07/Municipal-actions.pdf>

**Shift modes:**

Trucking has greater per unit energy requirements than either rail or marine transportation (up to ten times more in some cases). Shifting away from trucking can help reduce congestion on inter-city roads, reduced the number of roads needed, and consolidate environmental impacts (potentially making impacts easier to manage and mitigate). Shifting to human-powered transportation should also be considered where possible. An example of this is Pedal Express - a human-powered cargo delivery service in the San Francisco Bay. It operates a fleet of cargo bicycles capable of carrying up to 700 pounds each.

**Work with industry:**

Some successes have been achieved in the US with voluntary agreements. Through the SmartWay voluntary partnership, the Environmental Protection Agency is working with various freight industry sectors to create incentives for fuel efficiency and GHG emission reductions. The program has three main target components: fleet management, idling and rail/ intermodal shipping.

**Inter-governmental coordination:**

Coordinated strategies, incorporating all levels of government, are needed to address the trans-boundary nature of the transport industry. The Ontario-Quebec Trade and Cooperation Agreement signed in November 2007 set out an agenda for establishing shipping efficiencies between the two provinces to, among other goals, reduce shipping related GHGs. Inter-governmental coordination can include agreements on approaches to improve the accessibility and efficiency of airports, rail and other methods of inter-city transport. Coordinated strategies also need to be formalized into infrastructure development, land use, economic development and other relevant plans.

**Improve load management:**

Trucks travelling empty consume 80% as much fuel and those travelling fully loaded, meaning large gains are to be made in optimizing load factors. Reverse logistics (the management of used materials, including used and reusable packaging, returns, and waste) can be facilitated to increase efficiencies. HBC is a company that has taken a leadership role on this, by pledging to eliminate the movement of empty trailers through backhauling with partners in need of complementary shipping. Several studies found that load factors are best managed from within companies rather than through government policy or programming.

**Consolidate deliveries:**

Consolidation of deliveries is emerging as an important tool for solving problems, but little attention is Urban Environmental Programs 9 being paid to accommodating or facilitating this through policy measures. This approach relies on infrastructure such as freight campuses, logistics centres and reload centres acting as hubs and linking with streamlined inner city delivery services. Fukuoka City in Japan provides an example of successful delivery consolidation. Here over 30 freight operators have formed a co-operative to manage logistics in the high traffic congestion region. As a result, the number of freight vehicles has been reduced by 67% and freight vehicle kilometers travelled has been reduced by 87%.

**City logistics:**

Building on consolidation activities, city logistics links with consolidation centres outside the city and

manages logistics for local delivery. Local governments, chambers of commerce and large haulers partner to create facilities to provide coordinated delivery services within the city. Consolidation at the city level can facilitate standardization of shipping within urban centres and streamline efforts to employ technologies such as noise emission reduction features. To be competitive, the quality of service needs to be better than average. This type of service benefits municipalities (less spending on roads), citizens (less noise and pollution), railways (new inter-city traffic), and shippers (reduced costs). Manhattan, where the last leg of deliveries is sub-contracted to local carries, also provides a valuable example of this approach.

**Use new technologies for more efficient goods movement:**

Federal government initiatives in both the US and Canada are already in place to stimulate advanced technology adoption. These include increased aerodynamics, weight reductions, reduced engine friction, improved engine and transmission designs, more efficient tires, and more efficient accessories. In addition, Intelligent Transportation System (ITS) technologies aim to increase transportation system integration, improve efficiency, safety, productivity and general mobility, while reducing threats to travel safety and security.

**Supporting road infrastructure:**

Adequate logistic facilities need to be provided including adequate on- and off-street loading areas to promote trans-shipment facilities and to facilitate e-commerce. Along with the delivery consolidation cooperative established in Fukuoka City, Japan, freight only parking meters were also installed at designated loading areas.

### SECTION THREE: ACADEMIC RESOURCES

The Final 50 Feet: Urban Goods Delivery System Toolkit

***The Urban Freight Lab***

***Supply Chain Transportation and Logistics Center, The University of Washington***

The Urban Freight Lab (UFL), housed at the Supply Chain Transportation and Logistics Center at the University of Washington, is an innovative partnership bringing together private industry, academic researchers, and public transportation agencies to solve urban freight management problems that overlay private and public spaces and control and have benefits for both.

The Urban Freight Lab at the University of Washington coined the term "Final 50 Feet" and defined it as the supply chain segment that begins when a delivery vehicle pull into a parking space and stop moving—in public load/unload spaces at the curb or in an alley, or in a building's loading dock or internal freight bay. It tracks the delivery process inside buildings, and ends where the customer takes receipt of their goods.

This Toolkit is designed to help transportation professionals and researchers gather key data needed to make the Final 50 Feet segment function as efficiently as possible, reducing both the time trucks park in load/unload spaces and the number of failed first delivery attempts. In addition, the toolkit can help transportation planners, traffic engineers, freight system managers, parking and operations strategists, and researchers build a fundamental knowledge base for planning; managing parking operations; managing emergency management and response; updating traffic, land use and building codes; and modeling future scenarios and needs. In short, the toolkit can be used to help cities meet the ever-increasing demand for truck and other load/unload activities.

All tools are open access and are permanently free for everyone to read, download, copy, and distribute.

<https://depts.washington.edu/toolkit/>





Source: <https://depts.washington.edu/toolkit/>



Figure XX: Hand truck Delivery