4 Loading and Delivery Management

4.1 Freight Loading and Delivery Management

Multiple Locations

Description

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.

This chapter discusses best practices for managing freight delivery on multimodal urban streets that, like Market Street, lack off-street loading facilities. Considerations include strategies for ensuring that space at the curb is available for deliveries; ways to manage the time and place of freight loading (including both regulations and enforcement strategies); and ways of consolidating deliveries elsewhere in the city.

Design and Operational Considerations

1. Competition for scarce curb space

Where off-street loading facilities do not exist, delivery vehicles use curb space. In dense urban areas, double parking often occurs when freight carriers can't find curb legal curb parking adjacent or reasonably close to their delivery location. Double parking can reduce capacity and create conflicts for all modes of passenger transportation. This section describes a set of strategies for managing curb space specifically for freight delivery, with the goal of providing adequate space for goods movement at the curb.

Design Solution: Create and manage on-street loading bays

The simplest way to ensure space for freight delivery is reserve curb space for solely for delivery vehicles to load and unload. Dedicated loading bays allow trucks to stop without blocking travel for other modes. These spaces can be either open to all delivery vehicles at all times, or they can have restrictions on use. The current configuration of Market Street, which are a "best practice" themselves, has several loading bays on each block restricted to vehicles with six or more wheels. Time limits restrict loading to 30 minutes or less. Currently, there is more demand for deliveries than available loading bays, and delivery vehicles often park in travel lanes or pull onto the sidewalk. Other cities have addressed this problem either by adding more loading bays, or by using fees, time limits, enforcement, and other management approaches.

New York City

New York City has in the past reserved a number of parking spaces in midtown Manhattan for deliveries between 7 AM and 6 PM. As in San Francisco, limited loading space and vehicles using existing loading bays for long periods of time in Manhattan led to many delivery vehicles double parking, contributing to congestion. In response to this challenge, New York City's Commercial Vehicle Parking Plan, completed by NCDOT in 2004, added loading bays and implemented a graduated rate structure (using multispace meters dispensing prepaid tickets) in a pilot area of midtown (between 2nd and 9th Avenues and between 43rd and 59th streets). The pricing plan included a rate of $2 for one hour, $5 for two hours, and $9 for three hours. NYCDOT's evaluation found that curb occupancy has dropped from 140% to 95%. The typical time of occupancy has fallen from 160 minutes to 45. Just 25% of commercial vehicles stay for more than 60 minutes. [1]

[1] "Urban Freight Case Studies: New York," U.S. Department of Transportation, Federal Highway Administration Office of Freight Management and Operations, 2009. http://ops.fhwa.dot.gov/publications/fhwahop10019/fhwahop10019.pdf

Washington, DC

The Washington, DC Department of Transportation (DDOT) created a Downtown Curb-space Management Plan in an effort to improve delivery efficiency and reduce congestion. The plan includes several complimentary strategies. In cases where commercial vehicles were observed using loading zones for all day parking in violation of posted 15 minute loading limits, DDOT added metered loading zones along with new multi-space parking meters. On one major corridor, K Street NW, loading bays were increased from 40 feet to 100 feet. New signage was also installed on K and I Streets NW, between 12th and 21st Streets. The plan moved commercial loading zones to the approach side of an intersection where possible. Parking enforcement was also increased. Finally, the plan prohibits trucks with more than two axles from parking during peak hours. Once fully implemented, the plan aims to increase the number of on-street commercial loading spaces to one for every 100,000 sq/ft of commercial space. Implementation of this curb space management plan included extensive outreach, including communication between BIDs, DDOT, property managers on the facing buildings, and other stakeholders.

The most detailed evaluation of the program thus far has occurred on K Street, NW, between 12th and 21st Streets. There, travel time data was collected in May 2007. The study showed a statistically significant decrease in vehicle and bicycle travel times. The measured reduction in bus travel times was not statistically significant, however, the period of the study coincided with an 11 percent increase in ridership, which may have had an offsetting affect on vehicle dwell times. Enhanced enforcement on K street lead to a 50% increase in citations on the corridor between 2006 and 2007.[2]

Curb Management on 10th Street, NW, Washington DC

Source: DDOT, 10th Street, NW Curbside Management Plan

[2] "Urban Freight Case Studies: Washington, DC," U.S. Department of Transportation, Federal Highway Administration Office of Freight Management and Operations, 2009. http://ops.fhwa.dot.gov/publications/fhwahop10018/fhwahop10018.pdf

Design Solution: Accommodating delivery trucks in 'shared' or 'flex' spaces

In addition to dedicated loading bays, delivery vehicles can be accommodated in 'shared spaces' or 'flex lanes,' two approaches that provide an alternative to rigid separation between uses, and offer the opportunity to make more efficient use of limited right-of-way.

Shared spaces are public rights-of-way where multiple uses mix in the same physical area, and where transportation is only one among many activities. Space sharing already occurs informally on Market Street, as many freight carriers park illegally on the sidewalk when loading bays are occupied, using space that is normally reserved for pedestrians. An important consideration for a more formal implementation of a shared space concept is to ensure that access for individuals with limited vision and other disabilities is not restricted or compromised. Flex spaces are public rights-of-way where permitted uses change according to the time of day – for example, a street may permit through traffic during commute hours and delivery activity at other times of day. The following examples apply flex spaces to an urban environment.

Barcelona, Spain

Deliveries on two streets in Barcelona (Balmes Street and Muntaner Street) are managed using 'flex-lanes' or 'combined use lanes.' These lanes allow through-traffic, deliveries, or residents only, depending on the time of day. Variable message

signs are used to communicate the appropriate use. Deliveries are permitted in 700 loading zones between 8 AM and 2 PM. The City has found implementation of this concept to be expensive, at more than half a million Euros per street because of the investment in technology required for the variable message signs, as well as additional costs for enforcement. However, the program has been popular with residents, and has reduced travel time on affected blocks by 12 to 15%.[3]

Variable message sign for flex lanes in Barcelona

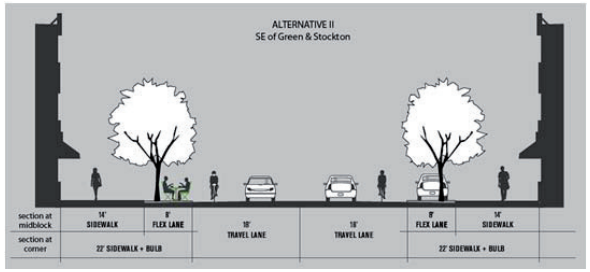
[3] "Innovative Approaches in City Logitics - Space Management for Urban Delivery," *NICHES Policy Notes* (a Coordination Action funded by the European Commission). http://www.niches-transport.org/fileadmin/archive/Deliverables/14277_transportconcept_1_BAT_low.pdf

Source: "Innovative Approaches in City Logistics - Space Management for Urban Delivery," NICHES Policy Notes (a Coordination Action funded by the European Commission).

San Francisco

The San Francisco County Transportation Authority has created a proposal for pedestrian space that can be shared with delivery vehicles on Columbus Avenue. This proposal, which has not yet been adopted, would widen the sidewalks on Columbus Avenue by eight feet, extending the sidewalk into what is now the parking lane. The outer eight fee of sidewalk would be designed as shared space, which would be available not only to pedestrians but also for loading and unloading delivery vehicles. The sidewalks would be between 20 and 22 feet wide, providing additional space for pedestrians while allowing all café seating and street trees to remain on the sidewalk. In order to maintain delivery access, the sidewalk would be divided into "inner" and "outer" zones defined by textured pavement. A beveled or "mountable" curb would enable delivery vehicles to park in the "outer" zone. This space would be available to both pedestrians and delivery vehicles at all times (unlike the Barcelona flex lanes described above, where different users have access to the flex space at different times of day). However, a majority of delivery activity on Columbus Avenue occurs during the day, while the period of peak pedestrian activity is in the evening, resulting in a natural time sharing arrangement for this portion of the sidewalk.[4]

Cross section for San Francisco Columbus Avenue proposal with flex lane



Source: "Final Report Columbus Avenue Neighborhood Transportation Study," San Francisco County Transportation Authority, 2010.

2. Congestion due to deliveries during peak passenger travel times

In an unregulated environment, many deliveries in an urban environment occur during peak periods for passenger transportation. High delivery truck volumes during peak travel times can lead to roadway congestion, and the impact of delivery vehicles stopping in the travel lane is also particularly disruptive during these times. This

[4] "Final Report Columbus Avenue Neighborhood Transportation Study," San Francisco County Transportation Authority, 2010. http://www.sfcta.org/images/stories/Planning/ColumbusAvenue/FinalReport/SFCTA%20Columbus%20Ave%20Final%20Report.pdf

section discusses policy approaches to reduce these impacts.

Design Solution: Time of day restrictions

Many cities respond to the challenge of peak-period conflicts by using restrictions on the time of deliveries to limit freight deliveries to off-peak periods for passenger transportation. This practice is common in both European and North America cities. Regulations can restrict either vehicle access, prohibiting delivery trucks from entering the area, or they can allow delivery vehicle through-travel but restrict stopping to load and unload.

Boston, MA

The City of Boston bans commercial vehicles from using some streets in its busy Downtown Crossing area between 11 AM and 6 PM. Commercial vehicle operators may seek a permit to enter Downtown Crossing for short period for special circumstances, such as an emergency or a one-day event. Utility companies may enter at any time to respond to emergencies, and exceptions are also made for several large companies (including Brinks, Wells Fargo, the US Postal Service, and local newspapers) after 2 PM. Other North American cities successfully employing time-of-day restrictions include Atlanta, GA; Cambridge, MA; and Toronto, Ontario.[5] San Francisco currently has time-of-day restrictions for deliveries on Maiden Lane.

Dublin, Ireland

Many European cities prohibit restrict delivery during peak periods. This practice is particularly common in older European cities with pedestrian zones. The city of Dublin, for example, created a 'pilot scheme for commercial vehicle traffic in the city centre' in 2004. The plan included time-of-day restrictions on commercial deliveries, and it designated "clearways", where on-street deliveries were prohibited between 7 AM and 10 AM, and between 12:30 PM and 7 PM. Deliveries are still permitted for indented loading bays and designated commercial vehicle parking areas. The impact of the restrictions was to push many deliveries to earlier in the morning. While the program was considered a success, Dublin recognized that the restrictions caused many stores to incur significant additional costs related opening earlier and coordinating deliveries during off-peak hours. It is estimated that about a quarter of food deliveries in Dublin's city center now occur during off-peak periods.[6]

Design Solution: Incentives for off-peak deliveries

An alternative to restrictions on delivery vehicles during peak times is a program to encourage deliveries during off-peak times. While this practice is not common, research suggests that it has the potential to shift a significant amount of delivery activity outside of the peak period for passenger travel, while generating improved travel times and reduced waiting for freight carriers.

New York, NY

The US Department of Transportation (US DOT) funded a study of a program to incentivize businesses in Manhattan to accept deliveries during off-peak periods. The project was funded with a $1.2 million US DOT grant and $640,000 from the project's coordinator Rensselaer Polytechnic Institute (RPI). The study piloted a combination of tax incentives and technology assistance to delivery companies in an effort to reduce peak-period deliveries by 20 percent, targeting 300 businesses (including many restaurants), and about 50 shippers.[7] The study found that travel speeds from truck depot to the first delivery stop improved by 75 percent, and carriers reduced wait times by 70%.[8]

[5] "Best Practices in Freight Movement," Seattle Urban Mobility Plan Briefing Book. City of Seattle, 2009. http://www.seattle.gov/transportation/docs/ump/10%20SEATTLE%20Best%20Practices%20in%20Freight%20Movement.pdf

[6] "Best Practice Handbook Theme 3: Control and Enforcement in Urban Freight Transport Theme 4: City Access Restriction Schemes," Best Urban Freight Solutions (BESTUFS), 2006. http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf

[7] "Freight Management in Manhattan: Tax Incentives and High-Tech Tools for Night Owls." Rensselaer Polytechnic Institute. http://news.rpi.edu/update.do

[8] "NYC DOT Pilot Program Finds Economic Savings, Efficiencies for Truck Deliveries Made During Off-Hours." New York City Department of Transportation Press Release,

Freight delivery in New York, NY

Source: "Urban Freight Case Studies: New York," U.S. Department of Transportation, Federal Highway Administration Office of Freight Management and Operations, 2009.

3. Enforcement of delivery regulations

Restrictions on the location, time of day, or duration of curbside freight deliveries must be enforced to be effective. In some cases, facilities can be designed to physically restrict non-permitted loading and unloading activity. Physical restrictions can include roadway design, as well as gates and either permanent or removable bollards.

In other cases, enforcement requires monitoring by city staff. While enforcement requires significant staff time, costs can be offset by fine revenue. In some cases, technology such as cameras and license plate recognition technology can be used to improve the efficiency of enforcement procedures.

Design Solution: Create an enhanced enforcement program for freight delivery restrictions

One way to improve compliance with curbside freight delivery restrictions is to enhance enforcement. When the city identifies areas where enforcement is particularly important to improve traffic operations and allow for efficient delivery, it can direct additional resources to these areas using a targeted enforcement program.

Los Angeles, CA

The Los Angeles Department of Transportation created an enhanced enforcement effort called 'Tiger Teams Curbside Management Program,' which monitors key travel corridors to enforce parking regulations. The program is intended to reduce traffic congestion and improve the efficiency of delivery activity. Prior to the introduction of the program, curb parking regulations were not strictly enforced and were often ignored. Though tickets were issued to violators, some repeat offenders received more than 100 tickets per year. The program monitors key corridors, and deploys 15 traffic control officers and 10 tow trucks during the peak travel period. Introduction of the program followed a series of interviews with many of these repeat offenders, which gathered information on the challenges faced by carriers. From this input, LADOT established designated loading zones in the highest-need areas. Once these loading zones were established, the LADOT conducted a marketing campaign to inform shippers and the general public about the program. The Tiger Teams have succeeded in changing attitudes toward parking regulations and substantially reduced parking violations.[9]

Design Solution: Physical barriers to restrict truck access

Physical barriers can also be used to enforce delivery restrictions. These can include width restrictions (as long as accommodations are made to ensure emergency and transit vehicle access), gates, and permanent or retractable bollards. These systems can be controlled using technology that allows access for permitted vehicles.

Barcelona

Barcelona has also implemented strategies to physically restrict delivery vehicle access to certain parts of the city. For example, it implemented "Zone Access Control" in its historic city center. The city installed 50 gates at the boundaries of the

July 1 2010.
www.nyc.gov/html/dot/html/pr2010/pr10_028.shtml

[9] "Urban Freight Case Studies: Los Angeles, " U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, 2009.
http://ops.fhwa.dot.gov/publications/fhwahop10020/fhwahop10020.pdf

controlled area, issued access cards to 8,000 residents, and installed digital video enforcement. The system only allows delivery vehicles to access the area during permitted times of day. Wider permitted time windows are available to clean air vehicles.[10]

Bollard for zone access control

Source: "BESTUFS Good Practice Guide on Urban Freight Transport," Best Urban Freight Solutions Consortium, 2007.

[10] "Urban Freight Distribution in Barcelona," Julio Garcia Ramon, Mobility Projects Director Barcelona Municipality. Best Urban Freight Solutions Conference, 2001. http://www.bestufs.net/download/conferences/Barcelona_March01/BESTUFS_Barcelona_March01_Ramon_Barcelona.pdf

4. Delivery consolidation

Urban areas have created a variety of facilities to help consolidate shipments and make delivery to congested urban areas more efficient. By combining multiple deliveries at the same location into a single shipment, these facilities can help to reduce the total number of deliveries that must travel through and stop on the busiest urban streets. Consolidation facilities have not always been successful, and their success depends on careful implementation and a location and set of protocols that does not substantially to carrier costs.

Loading and unloading can also occur at smaller, nearby facilities, where shipments can be broken up into small loads and delivered with electric or non-motorize vehicles, or on dollies. Paris has had success with parcel delivery by electric tricycle, and London has studied the possibility of cycle delivery in detail.[11]

Design Solution: Urban Consolidation Centers

Consolidating deliveries has the potential to reduce the total trips by delivery vehicles in to a crowded part of the city. An Urban Consolidation Center (UCC) is "a logistics facility that is situated relatively close to the area that it serves (be that a city centre, an entire town or a specific site) from which consolidated deliveries are carried out within that area."[12] UCC's allow carriers to deliver goods to a facility on the periphery of the city, potentially reducing shipment costs and improving reliability. This arrangement also reduces the number of truck trips into the busiest parts of the city. It can also allow for shipment using smaller, quieter, or lower-emissions vehicles if needed. Some UCC's depend on public funding, while others have been funded by freight carriers themselves. UCC's have been tested in numerous European cities, and have not always met with success. During the 1990's, a large number of UCC's were opened in European cities and the closed due to low delivery volumes and the need for continuing public financial support. More recent efforts at UCC's, particularly those focused on serving single large commercial operations, have had more success.[13]

Bristol, UK

A partnership in Bristol, UK, created the Bristol Freight Quality Partnership in 2003. Establish by the City and several freight carriers, the facility aimed to reduce truck trips to stores in Broadmead, the city's retail core. It was well-regarded by both freight carrier and store operators. Initial funding was provided by the European Community. The facility began operating in 2004, first with one

[11] "Cycle freight in London: A scoping study," Transport for London, 2009. http://www.tfl.gov.uk/assets/downloads/businessandpartners/cycle-as-freight-may-2009.pdf

[12] "BESTUFS Good Practice Guide on Urban Freight Transport," Best Urban Freight Solutions Consortium, 2007. http://www.bestufs.net/download/BESTUFS_II/good_practice/English_BESTUFS_Guide.pdf

[13] Ibid.

delivery truck, and then with two. It was located a 25 minute drive from the urban core, and was marketed toward “medium-sized, non perishable goods” deliveries.[14] To the 46 stores served, it reduced deliveries by 73% and mileage by 65%.[15]

Urban Consolidation in Bristol, UK

Source: "BESTUFS Good Practice Guide on Urban Freight Transport," Best Urban Freight Solutions Consortium, 2007.

Germany Cities

More than 80 German cities tested “City-Logistiks” centers during the 1990’s. Like Bristol’s facility, these projects consolidated shipments outside the urban core. In each city, a new enterprise was created to operate the facility, collect deliveries, and make final shipments into the city center. Many of these facilities have since closed. However, facilities remain open in Frankfurt, Bremen, Essen, Nuremburg, and Regensburg. Among the keys to success in these cities was early involvement and education of all stakeholders.

Design Solution: Alternative access areas

While some cities have created large-scale urban consolidation centers like the ones described above, other cities have relied upon smaller-scale areas reserved for loading, and unloading. In this approach, space is reserved inside the city center but outside the most crowded area. Shipments can be unloaded from delivery trucks, and loaded onto conveyances such as electric vehicles, carts, and bicycles for the last mile distribution. These facilities can be either staffed or unstaffed.

Bordeaux, France

Bordeaux created dedicated ‘nearby delivery areas’ in 2003, through collaboration between the Chamber of Commerce, freight carriers, and the metropolitan government. The goal was to ease delivery to the central city, and to reduce traffic, noise, and pollution. The facility consists only of a reserved area of the street about 30 meters in width that is used to unload shipments to nearby stores. It accommodates up to 5 delivery vehicles. It is open and has dedicated staff available to load and unload goods Monday through Saturday. Goods are unloaded from delivery trucks and loaded onto smaller trucks, carts, and dollies and moved the ‘last mile’ by business owners. The system has been regarded as a success by all of its major stakeholders, and additional delivery areas were establish in 2005 and 2006. Other French cities, including Rouen, have followed with their own versions of this concept.[16]

Nearby Delivery Areas in Bordeaux, France

Source: "BESTUFS Good Practice Guide on Urban Freight Transport," Best Urban Freight Solutions Consortium, 2007.

[14] Ibid.

[15] “Best Practices in Freight Movement,” Seattle Urban Mobility Plan Briefing Book. City of Seattle, 2009. http://www.seattle.gov/transportation/docs/ump/10%20SEATTLE%20Best%20Practices%20in%20Freight%20Movement.pdf

[16] "BESTUFS Good Practice Guide on Urban Freight Transport," Best Urban Freight Solutions Consortium, 2007. http://www.bestufs.net/download/BESTUFS_II/good_practice/English_BESTUFS_Guide.pdf

Brussels, Belgium

Brussels, Belgium has sought to reduce delivery trips to the central city, and to reduce traffic, noise, and pollution by creating 'delivery stations' or 'microwarehouses.' These small facilities are dispersed inside the central city. Like Bordeaux's 'nearby delivery areas,' these delivery stations allow large trucks to make a single stop to offload goods destined for several nearby businesses. The goods can later be carried the remaining distance using small trucks, carts, or dollies. Unlike the facilities in Bordeaux, the delivery stations are unstaffed, and they are accessible at all times of day. This arrangement allows deliveries to be made outside of restricted peak hour periods, while businesses can receive shipments during business hours. [17]

Design Solution: Non-motorized vehicles for last-mile delivery

Paris, France

Beginning in 2003, the City of Paris has experimented with freight deliveries using electric tricycles. Deliveries have been made by a private company called la Petite Reine. Financial support for the feasibility study and partial subsidy of the delivery vehicles themselves came from the city and the national government. The city provided a consolidation area near the center of Paris. La Petite Reine provides consolidation and last-mile delivery services, focusing on food products, flowers, and parcels. In addition to store and business deliveries, parcel deliveries are also made directly to customer's homes. Delivery vehicles are tricycles assisted by an electric motor. The maximum delivery weight is 100 kg. The project began as a trial, but was considered a success and was implemented permanently. It has also expanded from four designated central areas to all of Paris.

Potential Market Street Applications

- **Right-of-way allocation.** The current design of Market Street includes on-street loading bays. Future 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.** New approaches to management of loading bays could reduce conflicts between delivery vehicles and other users during peak travel periods. 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 on Market Street while still accommodating the needs of stores and freight carriers, the city could consider consolidating deliveries off of Market. While a large Urban Consolidation Center might be excessive for a delivery area the size of Market Street, establishing nearby delivery areas or delivery stations just off of Market Street could improve operations for a variety of users. Again, however, such a solution would impose an additional burden, as deliveries would have to be transferred at delivery stations to "last mile" conveyances of some sort. Moreover, it is not clear how such a program would be managed.
- **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

[17] "BESTUFS Best Practice Update: Road pricing and urban freight transport Urban freight platforms," Best Urban Freight Solutions Consortium, 2007. http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BPU-2007-I_Road-Pricing_Freight-Platforms.pdf

stakeholders. Such a comprehensive approach could be useful in the Market Street context.

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