Freight movement is essential for a strong economy. Freight vehicles range from single unit box trucks to large tractor-trailer combinations. These large vehicles are wider, have larger turning radii, and more blind spots than typical passenger vehicles.

Freight vehicles have significant mass, creating the potential for serious or fatal injuries when involved in a bicycle or pedestrian collision. Data from the National Highway Traffic Safety Administration indicates that among crashes involving large trucks, 11 percent of people killed were non-occupants such as pedestrians or bicyclists (Traffic Safety Facts: Large Trucks, 2015, p. 2).

Conflicts between freight vehicles and bicyclists and pedestrians generally occur at intersections; however, midblock conflicts can also occur and are typically due to loading activities. Through roadway design, conflicts can be mitigated and the behavior of all users can be made more predictable. Education of all road users can improve the understanding of how each mode operates on roadways.

**FREIGHT INTERACTION SAFETY**
Through engineering, education, and enforcement, roadway designers and the freight industry should consider an approach to reduce the severity and likelihood of crashes.

**ACCOMMODATION AND COMFORT**
The design should provide a sense of comfort for vulnerable road users where freight vehicles are present and accommodate freight needs specific to each corridor.

**COHERENCE**
The path of travel for pedestrians and bicyclists should be clearly delineated for freight vehicles to recognize.

**PREDICTABILITY**
The design should maximize predictability and reduce conflicts between vulnerable road users and freight vehicles.

**CONTEXT-SENSITIVITY**
The design should support community health and livability goals while maintaining and growing the economy.

**EXPERIMENTATION**
Freight vehicles should consider innovative technologies that can alert drivers of potential conflicts with other roadway users.
COMMERCIAL LOADING AND UNLOADING

Truck loading operations typically involve pulling over to the side of the roadway. This may result in blocking a bike lane or crossing through a bike lane to access a loading zone. Dedicated commercial loading zones can save trucking companies time and money and improve air quality. Consider designating commercial loading zones where they will cause minimal conflict with bicycle facilities. This should be balanced with providing convenient dedicated loading zones.

CONSIDERATIONS

- Streets with heavy freight usage, high parking demand, and bike lanes benefit from dedicated commercial loading zones after an intersection. Loading zones may help reduce obstruction of the bike lane and make deliveries easier for businesses. These zones can be striped and signed, or managed for off-peak deliveries. (NACTO Urban Street Design Guide 2013, p. 15)

- Consider consolidating commercial loading zones to a single location on each block to reduce potential conflicts.

- Consider the length of typical loading vehicles that use the space when determining the length of the loading zone.

- The loading zone should be 8–10 feet wide.

- Where on-street parking and separated bike lanes are provided, consider a 5-foot minimum access aisle between the commercial loading zone and the bike lane. Vertical objects should be discontinued where an access aisle is provided.

- A curb ramp with a separated bike lane crosswalk can simplify loading and unloading activity.

- Green colored pavement can be used to notify freight operators of a potential conflict with a bicyclist.

- Consider locating a commercial loading zone on an adjacent block or alley where a loading zone is desired but on-street parking is not present. A lateral shift of the separated bike lane and the sidewalk should be considered as a last resort.

MIRRORS, SIDEGUARDS, AND WARNING SYSTEMS

Mirrors and blind spot warning systems prevent collisions by decreasing the driver’s blind spots and alerting them to bicyclists or pedestrians in the blind spot. A 2007 National Transportation Safety Board (NTSB) study found that large trucks lacking right fender mirrors were disproportionately involved in serious injury and fatal collisions (NTSB Safety Recommendations 2014, p. 4).

Sideguards mitigate collisions by keeping vulnerable road users from being struck by the truck’s rear wheels in a side-impact collision. The sideguards prevent a bicyclist or pedestrian from being swept under the truck and struck by the rear wheels.
INTERSECTION GEOMETRY

Designers should consider mountable truck aprons where turning movements by large vehicles are common. Mountable aprons discourage smaller vehicles from making turns at high speeds while still allowing trucks to turn without entering the pedestrian zone or adjacent vehicle lanes. They help reduce off-tracking risks to pedestrians with visual disabilities. Additional strategies for accommodating large vehicles at intersections include setting back stop lines and allowing large vehicles to encroach into adjacent lanes when turning. For more information, refer to the design topic on Intersection Geometry.

SIGNAL PHASING

Signal phases can be used to separate or give a head start to bicycle and pedestrian movements from conflicting freight movements. Separate signal phases can be used where a primary freight route turns and a bicycle route continues straight, at intersections with a high number of freight and bicycle or pedestrian crashes, and at intersections with separated bike lanes. When using separate signal phases, the intersection must be designed so that tractor-trailer combinations can safely make a turn without encroaching on the bike lane, preferably with curb separation between the bike lane and the travel lane. To give a head start, a leading pedestrian or bicycle interval can be used to increase visibility and reduce conflicts. For more information, refer to the design topic on Signalized Intersections.

SIGNS

Dynamic warning signs may be used to alert freight vehicles when bicyclists are present. Dynamic signs use a loop detector to detect a bicyclist. When a bicyclist is detected, the dynamic sign illuminates to alert any potential turning vehicles to yield to the bicyclist. Signs should comply with the 2009 MUTCD. For more information, refer to the design topic on Turning Vehicles.

EDUCATION

Education is an important component of reducing conflicts between freight and bicycles and pedestrians. Large vehicles need more room to make turning maneuvers than passenger vehicles and the rear wheels do not track along the same line as the front wheels. Educating bicyclists about truck movements and blind spots, as well as educating truck drivers about common bicycle and pedestrian movements, is a key component of sharing the road safely.

The United States Department of Transportation (U.S. DOT) and its Federal Motor Carrier Safety Administration held a pedestrian and bicycle safety assessment focusing on freight in Seattle, Washington on May 7, 2015. The purpose of the assessment was to identify issues and conflict points involving the movement of freight vehicles and bicyclists. Throughout the day, participants were able to ride in buses and trucks, learn about the operating characteristics of various roadways users, and share their experiences as bicyclists, bus drivers, and freight operators.

A key theme in the assessment was user education. While separated bike lanes along roadways with heavy freight traffic are ideal, participants acknowledged that a cohesive network of such infrastructure would take many years to construct. In the meantime, participants agreed that education of all road users on the operational characteristics and needs of each mode is a key tool in reducing crashes between bicyclists, pedestrians, and heavy vehicles.

Participants also recognized that a variety of other components play a part including improvements in both equipment and infrastructure. Turning movements often create conflicts between freight vehicles and bicyclists. Equipment enhancements such as sideguards and audible messaging systems were presented to address this situation. Infrastructure improvements may also decrease the number and severity of conflicts between buses, freight vehicles, and bicyclists by eliminating conflicts where feasible and minimizing speed differentials. The use of bike signals to time-separate the two modes was discussed as an example infrastructure improvement.
CASE STUDIES

OFF-HOUR DELIVERY PROGRAM
NEW YORK CITY, NY

In 2009–2010, the New York City (NYC) Department of Transportation implemented an Off-Hour Truck Delivery Pilot Program. Twenty participants shifted their delivery windows to between 7pm and 6am. Receivers had no major issues with the switch; some reported increased staff productivity because staff did not have to be available to receive deliveries while they were serving customers. Carriers reported more efficient operations, fewer parking tickets, and potential to reduce fleet size by balancing day and night operations. With the success, the program, now called NYC deliverEASE, has continued to grow where team members train participants on how to make quiet deliveries and use low noise technologies.

TRUCK SIDEGUARDS
BOSTON, MA

A literature review performed by the Volpe National Transportation Systems Center found a 61-percent drop in bicyclist fatalities and 20-percent drop in pedestrian fatalities from side-impact truck collisions in the United Kingdom after sideguards were mandated (Truck Side Guards Resource Page 2015). In 2014, the City of Boston mandated sideguards for all city-contracted vehicles. Vehicles over 10,000 pounds and tractor-trailers over 26,000 pounds combined must have sideguards, convex mirrors, cross-over mirrors (which eliminate the truck’s front blind spot), and blind-spot awareness decals. The improvements cost approximately $1,800 (2015) per vehicle.

FOR MORE INFORMATION


Federal Highway Administration. Separated Bike Lane Planning and Design Guide. 2015.


