Brief on Curbside Safety Considerations

TTI researchers developed this summary brief document on curbside management and safety factors based on the research findings from Safe-D project 05-096: *Curb Management Practices and Effectiveness in Improving Safety*. The information for this summary brief is based on takeaways from interview discussions with staff members from cities, stakeholder organizations, and private industry companies concerned with curbside management or transportation in general. The brief highlights ideas for best practices and recommendations the stakeholders can use to guide them in developing curbside interventions which improve safety outcomes for drivers and active travelers.

Safety Goals

This section discusses the uses of safety considerations and goals with respect to the curbside area, how any set goals are measured, and prioritization for improvements or implementations.

Safety Considerations

Cities typically include priorities and policies for transportation planning as part of their comprehensive planning process; these including complete streets, safety planning (such as Vision Zero initiatives), and design specifications.

- Multimodal travel is increasingly important in transportation planning with the emergence of micromobility and on-demand travel; still basic pedestrian and accessibility needs should always be present in these planning efforts.
- Any safety issues that arise from the parking of vehicles around an available parking meter may necessitate moving the meter to a different location.
- E-scooter operations in cities can create safety issues with vehicles blocking sidewalk pathways and creating potential safety issues, particularly for people with disabilities.

Small Cities

Smaller cities and rural areas can struggle with having the infrastructure needed for safe road crossings, as curbs and sidewalks may be missing in some places or nonexistent along roadways.

- Access to local businesses and residences from the roadway is often done in piecemeal, creating successions of driveways that cut of the continuity of any existing sideways and create additional turning opportunities for vehicles.
- Lacking infrastructure can create dangerous situations for potential conflicts between pedestrians and vehicles, with vehicles traveling at too-high of speeds and pedestrians needing to cross to get to their destinations.
- Presence of pedestrian infrastructure along with other traffic calming measures helps signal to vehicles the need to slow down and watch out for pedestrians.

Service Providers and Technology Companies

Curbside management can provide benefit for some service providers in having designated zones drivers are directed to go, thereby reducing vehicle circling and benefiting cities in the process (through improved safety and lowered traffic). Delivery drivers can particularly benefit from designated loading zones that are available only for their use, sometimes with technology integrations to reserve loading times for certain vehicles.

Other Entities

Reducing driving speed to improve safety for vehicles and pedestrians is an overall safety goal that factors into curbside management and can adjusted with local contexts in specific communities.

Prioritization of vehicles versus pedestrians is a central question in curbside management; meaning, if vehicle access to designations is the priority, then parking spaces at the curb are in turn prioritized. However, if access for people at the curb is prioritized, then additional modes and uses at the curbside can be implemented.

Integrating Safety into Service

Improving the conditions, uniformity, and connectivity of sidewalks and curbsides is a good first step in improving safety.

- Identifying locations of pedestrian crossings and subsequently implementing street crossings (through signals, crosswalks, islands, signage, etc.) helps prioritize non-vehicle travel and slow down vehicle speeds on the road. Creating a shorter distance for crosswalks through certain curb cut designs and pedestrian bulbs can also improve safety for pedestrians.
- Complete streets principles can help improve safety by moving streets more towards working better for pedestrian and micromobility travel. These principles can include automobile lane reductions, adding bike lanes, retiming traffic lights, widening sidewalks, creating landscape buffers, and many others.
- Often complete street principles can be implemented without impacts to traffic flow. However, implementing bike lanes will impact the curb area (often taking away parking spaces and changing to floating parking availability), potentially changing the design and character of adjacent streets as well.
- Signage is a base layer necessary to have along with any technology integrations and enforcement practices that are in place; signage at curbside areas should be understandable to all vehicle users, communicating allowable uses of the space.
- Minimum lengths for curbside and loading areas need to be specified as part of the design guidelines implemented by the city or program.
    - Temporary pickup and dropoff zones should be big enough for a standard private automobile while discouraging multiple vehicles from packing into the space (and creating a safety hazard).
    - Spaces intended specifically for persons with disabilities need to have enough space around the vehicle and to the curb ramp for persons to get to and from their vehicle safely.
    - Loading areas from freight delivery need to have a minimum length long enough for larger vehicles (60 feet or more), including the ramp for the vehicle.

Using Safety Goals

Safety goals used by a city may inform the types of travelers and right-of-way uses that are prioritized, thereby affecting curbside uses. For example, prioritizing bicycle and pedestrian uses could reduce available places for curbside access for vehicles. Area needs in certain neighborhoods can also prioritize certain curbside while improving pedestrian safety.

Government Staff and Regulators

Many state and municipal government entities have implemented Vision Zero as a long-term goal in improving transportation safety, aiming to eliminate fatalities on roadways and pedestrian pathways. Cities and DOTs may also identify corridors that should be designated in the high injury network (places with higher occurrences of pedestrian, bicycle, and traffic-related fatalities); this identified network can be used to reduce conflicts seen in those corridors.

Measurement of Goals

Tracking data on fatalities and incidents is a common practice by cities and states, though typically this tracking is reactive in nature. Cities can also look at instances of double parking, crosswalk parking, and other vehicle violations to look for unsafe situations that could call for changes in design and policy. However, parking tickets can sometimes be issued in focused areas of the city (meaning they are not an absolute standard for measuring effectiveness of policies).

Large City Example

San Francisco's Rapid Response Program looks at the speeds and behaviors of travelers involved in an incident soon after it occurs; this quick response at the spot level helps determine whether immediate changes need to be considered.

Liability at the Curb

Cities will determine liability for collisions or injuries at the curbside area during each specific incident. For example, in cold weather areas snow on sidewalks can cause potential safety issues for pedestrians. Often cities adopt policies to make keeping sidewalks clear the responsibility of the property owner, but this still creates a need for cities to properly communicate such policies.

Prioritizing Access

Variable parking and access terms may be possible at some locations based on the parking usage and conditions of the area.

- Examples of variable parking include: parking at a hospital zone during certain hours of the day when visitors are expected, delivery zone areas converting to parking in the evening in an arts/downtown district, etc.
- Cities can utilize signage and curb paint to help communicate these variable uses.
- Smartphone applications for parking can also be helpful in communicating to drivers where spaces are currently available and allow them to make better parking decisions.

Government Staff and Regulators

Working with area businesses and business organizations (such as downtown organizations) can help determine areas were designated curbside zones or delivery loading areas are needed. This communication and feedback can also assist cities in determining needs in policy-making and areas that should have higher pedestrian access.

Prioritizing Improvements

Sidewalk and curb access improvements can be difficult to manage due to the sheer need of improvements needed across a given city. Most cities rightfully prioritize locations where collisions or incidents have occurred as places to address identified safety issues and implement improvements.

- Handling sidewalk improvement requests on a first come-first serve basis is not the most equitable approach and may not have the biggest impact to safety.
- Prioritizes can be made based on places with the most need, areas of higher travel, or opportunities to improve connectivity of the sidewalk network.
- Identify hot spot areas for pedestrian travel can help prioritize safety improvements at places with high levels of pedestrian crossing; inputs for identification can include community feedback, traffic data, crossing push button activity and more.
- Sidewalk inventories are useful prioritization tool if they are updated on a regular basis.

Some cities are shifting to more technology for monitoring curbside areas and removing physical assets (e.g., parking meters) due to cost and convenience.

- Common examples include technology for drivers to pay by their parking plate number through a smartphone app, texting, or pay station/kiosk for the overall parking zone.
- Some demographic groups may be more likely than others to use parking meters newer technologies; cities should study the use of meters and determine any detrimental effects on removal in order to maintain access to curbside parking.
- Newer technologies can be phased-in incrementally or used concurrently with existing meters (e.g., pay stations on one side of the street and meters on the other side) to help avoid adverse effects.

Government Staff and Regulators

City departments of transportation (DOTs) can play a role in prioritizing improvements for pedestrian pathways by the curbside area. DOTs can require new developments to build sidewalks on the property; this in effect results in improvements at new developments being prioritized.

Capital Projects

In many cities, large capital projects for roadway improvements can take a significant amount of time for approval before the construction phases can begin. However, safety improvements in curbside management may be doable in smaller projects that do not require all the traditional approvals and public input. These quick build projects can be a strategy to address pedestrian infrastructure problems without altering the entire street corridor.

Decision-Making and Planning

This section discusses insights on planning and decision-making around the curbside area, including how safety challenges are addressed and considerations for historically-vulnerable populations.

Assessing the Curb

Assessments of safety for pedestrians at the curbside area can include looking for tripping hazards of various sizes. Small tripping hazards may include metal sticking out of the pavement or other walking obstacles, while larger issues include big cracks in the sidewalk or incomplete pedestrian pathways.

Other Entities

Stakeholder engagement is a tool that can help identify safety challenges at the curbside.

- Types stakeholder engagement include workshops or walk audits with members in the community to look at the needs for public space and get ideas for what types of mobility needs should have access to the curbside at various locations.
- Stakeholder engagement can also help cities determine how to rebalance parking between streets or to off-street garages based on received feedback.
- Community advocacy groups can be a helpful mechanism for cities to hear about challenges in safety at the curbside.

Strategies to Address Safety

Curbside management strategies adopted by cities can include designated access locations for certain vehicle types and adaptive uses by time of day.

- Cities may choose to address access by establishing hierarchy of uses for curbside areas and street blocks based on types of corridor designations or neighborhood uses.
- Designations for curbside access and hierarchy determine the proper areas for curbside zones, parking, transit access, and any adaptive uses based on safety needs.

Accessibility Challenges

Federal and state requirements for accessibility often dictate what cities can/will do in terms of curbside accessibility for pedestrians; these requirements include basics like curb cuts and tactile pads to be compliant with ADA standards.

- Cities can also use street painting for accessible spaces and loading zones, including larger buffers (than standard spaces) around the vehicle in the accessible zone.
- Designations for ADA spaces may come from different departments between cities (ex. a parking division handling while an economic division designate spaces.

- Sidewalks can have challenges for accessible pedestrian pathways in terms of width and free from obstacles. One method for reducing obstacles is to measure the ratio of meters to parking spaces, finding opportunities to increase the number of spaces per meter.
- Installations like cycle tracks, bike parking, and placement of parking meters can create challenges for clear pedestrian pathways. Cities can look to whether allowing bike or scooter parking attached to meters is contributing to issues of sidewalk clutter.
- Accessibility challenges for people with cognitive or hearing disabilities are often not addressed in curbside management techniques, as there is a need to be more wholistic in thinking about accessibility in curb access.

Affordability Challenges

Some cities may make metered spaces free for persons with disabilities and people with low incomes to help address affordability access issues in parking and curbside spaces. Cities can also charge reduced rates at meters for different types of employment, such as people working in the hospitality or service industries, as well as reduced rates for local residents to help make curbside access more equitable.

Safety for People Experiencing Homelessness

Some high traffic areas in major cities experience challenges in pedestrian circulation and safety with respect to the presence of people experiencing homelessness in terms of pathway obstruction. For example, pedestrian underpasses may be good locations for encampments that will not allow pedestrians to the use the sidewalk, or people living in their cars may be parked in high demand areas.

- Some cities implement policies to not allow sleeping on city sidewalks; an extreme response to these pedestrian safety issues would be to install physical barriers attempting to dissuade encampments.
- Other cities have invested in programs to provide housing and resources to people experiencing homelessness in order to improve safety for all parties.
- Conversely, opportunities to widen sidewalks in corridors frequented by people experiencing homelessness may be an opportunity to improve safety for pedestrians and provide additional access points for curbside zones.

Opportunities for Improvement

Streets uses are not always consistent throughout the year, and special events or area construction can change the availability of or prioritizes for curbside zones.

- Understanding construction schedules and their affected areas is important for cities implement any temporary changes needed to avoid adverse impacts for users.

- Holiday and special event schedules that may disrupt normal street uses should also be considered and planned for in advance.

Defining infrastructure both within and away from downtown areas is important for improving the presence of sidewalks and curbsides on major roadways.

Land uses that generate curbside parking are sometimes in overlooked areas that have big impacts in attracting traffic.

- For example, locker locations that allow pickup of packages ordered online may be located in areas without permitted parking at the curb but in effect encouraging temporary parking and pickup by private automobiles.
- Cities need to reconsider newer business types in both their comprehensive planning and curbside management processes to avoid the development of additional potential safety conflicts.

Education, Outreach, and Enforcement

This section discusses practices on stakeholder education and outreach as well as information on enforcing policies about the curbside area.

Pricing Curbside Areas

Parking spaces at curbside areas may be charged flat rates per hour or minute-increments depending on the parking authority, with time limits for parking imposed in high-demand areas.

- Demand-based pricing is possible but implemented in few places; in this system, pricing is updated every few months based on historical demand for parking and any data on loading and unloading activity.
- Higher pricing of metered parking spaces can help encourage vehicle turnover in the area; this may be a motivating factor for some cities in certain districts.
- Cities may also price high-demand areas while offering free parking or loading/unloading in other areas (such as off-street parking garages) further away from the destination to help improve congestion and safety.
- Pricing curbside areas for freight loading and unloading is an emerging strategy that some cities have used to help manage demand for deliveries in highly congested areas.
- Technology companies exist that take reservations and payment for loading areas, monitoring of those areas, and data dashboards to cities on utilization.

Determining Curbside Locations

Businesses and property owners are often a key driver in the ultimate determination of where curbside zones will be located, based on both their willingness to have these zones nearby but also due to their experience in observing travel demand in the area and needs for deliveries.

- Cities can also work with private transportation companies and technology providers to determine curbside location areas and dropoff points that would work best for all parties.
- Having data on curbside utilization is a best practice to understanding the types of vehicles that park in certain locations and peak times of day when locations are used.

Government Staff and Regulators

Different city departments may have in hand in the determination versus the monitoring and enforcement of policies at curbside areas. For example, city public works departments could approve certain right-of-way for loading locations, micromobility parking, and bike lanes; then the parking authority will determine locations for meters based on the roadway and access locations (e.g., driveways, intersections, curb-cuts).

Education for Different Audiences

Some cities rely mostly on installing signage and painting on the street to indicate the rules for loading and parking at the curbside. However, information about changes to curbside policies can be spread through a variety of mechanisms.

- Traditional media (e.g., news stations and newspapers) as well as social media can help to make announcements to the general public.
- Online or intercept surveys on proposed curbside-related projects, as well as technical assistance webinars and townhalls might be more dynamic ways to inform the community or work collaborative to provide feedback.
- Video PSAs and brief pamphlets on curbside policies to help improve understanding to the general public.
- Going door-to-door with business owners and residents in specific areas affects by changes in policies can help directly inform people in the immediate area, answer their questions, and receive feedback on those changes.
- Messaging to resident and business audiences can also focus beyond what is happening directly in front of their properties and look at the big picture; these conversations can be aided with transparency of data to show the need and impact, including pricing and occupancy data of curbside areas.

E-scooters have encouraged recent opportunities in general public education about how to use and leave scooters properly parked.

- Some cities require micromobility companies to provide local policies to users before they can ride the vehicle, though the effectiveness of passing through that responsibility towards improving safety can be low.
- Cities and companies can work collaboratively in public education campaigns about property riding location and vehicle uses to help keep sidewalks and curbside areas clear.

Small Cities

In smaller cities and rural areas, businesses and property owners may have different priorities for automobile and pedestrian access depending on local conditions; some businesses may want to attract pedestrians in addition to automobiles, while others will not consider pedestrian travel.

Feedback on Curbside Safety

Cities often receive feedback from travelers and property owners through email and call centers. In particular, 311 programs can help inform the city of complaints received about dangerous travel conditions for bicyclists and pedestrians in decision-making on any needed changes.

- Changes in access to the curbside, particularly limiting access to parking that was previously more available, can irritate both business owners and vehicle drivers alike. This can be particularly true

in communities that are more auto-centric and used to parking vehicles as close as they can to their destination.

- Property owners can sometimes have avenues to request parking from the city; in these cases, the departments involved in parking will study the after to make a determination of traffic conditions throughout the day, determine whether a parking or loading space is needed, and determine whether to implement pricing for any new parking spaces.

Enforcement of Policies

Enforcement of curbside policies may be a combination of local codes of ordinances and state statutes along with any applicable federal regulations.

- City parking management authorities will use on-foot enforcement from parking officers to check vehicles hourly and chalk tires of vehicles who are approaching the time limits.
- Sometimes license plate recognition (LPR) technology with cameras is implemented to help monitor parking times and determine needs for turnover in parking spaces, loading zones, and delivery areas.
- Cameras can also help study the occupancy and usefulness of curbside spaces to see whether existing locations are adequate for the intended purposes.
- Loading zones which have a stated policy for parking time but are not enforced will tend to be abused, as drivers realize they can park their vehicle in the space longer without consequence.

Technology Companies

Some cities have worked with technology companies to help with monitoring of curbside spaces, including utilization time, vehicle payment, and ticketing. This can be particularly true for cities with dynamic freight loading areas, in which technology monitoring the area provides data to city enforcement and allows them to decide on ticketing a violation.

Effects of Policies and Interventions

This section discusses effects of curb policies and interventions on users and local travelers, including discussion of tactical urbanism implementations affecting curbside access.

Effects on Active Mobility Travelers

Curbside management policies and interventions can provide perceived safety benefits to pedestrians and cyclists/scooter-riders, as typically automobile access is more restricted as a result of these interventions.

- Street design templates can help create travel pathways that are safer for active mobility travelers like pedestrians and cyclists, though the space allocations called for in templates may not be realistic for all situations depending on the street.
- Bike stations, scooter corals, and designated markings on sidewalks have helped cities direct micromobility users to park vehicles safely after use (i.e., in the furniture zone of the sidewalk and out of the way of immediate pedestrian pathways).

Effects on Motor Vehicle Drivers

Ridehailing companies (TNCs and taxicabs) have worked with some cities on designated pickup spots in high demand areas to help improve safety for passenger loading; however, TNCs may be resistant to designated pickup spots as they could be perceived as limiting to the service potential. Ridehailing dropoffs are also more difficult for cities to imposed restrictions on, as vehicles may choose to dropoff the passenger in the most convenient area for them (at the expense of safety).

Transit riders can sometimes benefit from curbside management interventions, depending on the type of implementation.

- Transit agencies need a set amount of curbspace available at bus stops in order to meet ADA requirements and have riders using wheelchairs be able to board and alight the bus safely from the curb.
- These requirements can result in limitations of taking designating curb space away from bus stops or being able to move bus stops to a new location.
- If the transit need for access to the curb is large enough, cities should move parking spaces at the curb side to improve access.

Loading zones for **delivery drivers** should be located strategically by cities to be nearby delivery destinations but away from other through traffic from pedestrians or vehicles.

- Cities may locate loading zones on strategic blocks or work with delivery companies to schedule more deliveries during off-peak hours.

- Cities can have greater challenges with compliance from freight and parcel delivery drivers in using curbside areas appropriately, since these drivers may not be using their personal vehicles and are harder to ticket.

Tactical Urbanism and Coordination

Parklets and quick builds can be a tool to pilot and test a mobility use out in a parking space along the curbside.

Large City Example

The Shared Spaces program in San Francisco is an ongoing effort to identify areas for parklets and other tactical efforts through policy coordination, local legislation, analysis of city codes, and input from the community.

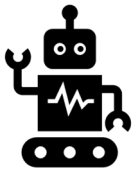
- Sometimes these installments can be easier in smaller cities because of simpler processes for approval, though larger cities open to adaptive uses of curb areas have also seen successes.
- Pop-up outdoor dining areas in parking spaces has been utilized in more and more cities as a way to expanded seating for restaurants and increase safety for diners and pedestrians; this was particularly the case during the COVID-19 pandemic when cities and restaurants were looking for ways to have diners patronize businesses safely.
- Pop-up areas can be a way to encourage buy-in for reducing parking with a benefit to local businesses that are willing to participate. Sometimes these pop-up areas lead to permanent installments should the use prove popular in improving access and safety.
- Locations of these adaptive curbside uses are also important in ensuring safety for all travelers.
    - Parklets and outdoor dining uses in parking spaces need to be prohibited from a certain proximity from street intersections and crossings.
    - Including delineators, wheelstops, and reflectors on parklets also helps focus visibility for passing motorists.

Considerations of Future Mobility

Mobility hubs or micro hubs can be a solution for several mobility options to converge together in one location and provide travelers with options for mobility aside from a private automobile. These hubs should incorporate the local transit agencies, ridehailing operators, micromobility vehicles, and other shared-use modes for travelers to transfer between.

Parking for **autonomous vehicles (AVs)** is another looming question for cities to consider, but currently the timing and needs from cities to provide for AVs is difficult to understand. Further developments need to happen before this is a major challenge for cities.

- Potential infrastructure and policy changes could include modifications to parking space designs, parking locations, and dropoff needs of AV delivery vehicles.



- AVs with connected technologies may also require communication with traffic signals (through dedicated short-range communications [DSRC] or similar technologies) for optimal traffic flow.
- For passenger transportation on AVs, working with AV companies to determine proper pickup and dropoff locations (either along planned routes or in demand responsive service) will be helpful to ensure that curbside areas are designated in needed locations and vehicles are not interacting with pedestrians in unsafe areas (e.g., crosswalks, bike paths, etc.), and whether areas are too heavily trafficked for safe operations.

Opportunities for Additional Learning

This section provides a few examples of opportunities for additional study, understanding, and implementation on safely-conscious curb management practices as discussed during the project stakeholder interviews.

1. Cities should have a good repository of information for curbside locations (and when they are available) for the city's benefit to do good planning. Curbside inventories are needed in order to properly create management for the space. Often cities are not aware of the curbside resources they have because each of them were built in piecemeal/over-time, making it difficult to improve the space comprehensively.

2. Peer examples of curbside management implementations can help with providing information and education about what is possible to communities looking for safe curbside management solutions. Communicating and storytelling about the ways that curbside areas and adaptive uses deliver outcomes beyond disrupting parking (such as equitable access, improved quality of life, or neighborhood resiliency) is also something that cities and partner organizations can consider utilizing.

3. Another opportunity for peer learning is the development of a database of curb case studies to help cities and partners learn from others. This database could help point out the current research gaps in what technology and payment options are available, what connections exists between technology and curbside usage, and what efforts at the curbside are successful.

4. Updates to the Manual on Uniform Traffic Control Devices (MUTCD) that incorporate new techniques and strategies in curbside management would also be beneficial for government staff and regulators to have improved guidelines for traffic safety. MUTCD can particularly cause problems for tactical urbanism at parking locations due to adaptive uses not cleanly falling with the manual's guidelines. Additionally, aligning existing guidance and common terms on curbside management between resources from industry organizations (such as the Institute of Transportation Engineers [ITE], the International Parking and Mobility Institute [IPMI], and Transportation for America [T4A]) would be helpful for clarity as well.

5. Data on crashes and incidents is not always useful to help cities make interventions and change in infrastructure, as the accuracy of data can widely vary and be challenged by other local factors. Additional knowledge on using enforcement cameras effectively for monitoring curbside zones as well as measuring instances of near-misses and other safety incidents in these areas would be useful for determining effectiveness of these curbside strategies.