BEST PRACTICES IN IMPLEMENTING

TACTICAL TRANSIT LANES

A Guide produced by the UCLA Institute of Transportation Studies with funding from the California Department of Transportation (Caltrans) SB1 Research Fund

About ths Guide

This guide is intended for planners interested in implementing Tactical Transit Lanes, particularly first-time lanes. Its focus is on the implementation, i.e., the planning and outreach considerations of the project as opposed to design, for which other recent resources exist (see Other Resources section).

The content of this guide is drawn from interviews with 24 planners from twenty city departments and agencies conducted between August 2018 and January 2019. It is also informed by the results of a survey of 81 professionals conducted in January 2019, with 26 respondents, as well as by the researchers' review of relevant sources such as news articles, agency websites, industry blogs, and other reports.

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About the UCLA Institute of Transportation Studies

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BEST PRACTICES IN IMPLEMENTING

TACTICAL TRANSIT LANES

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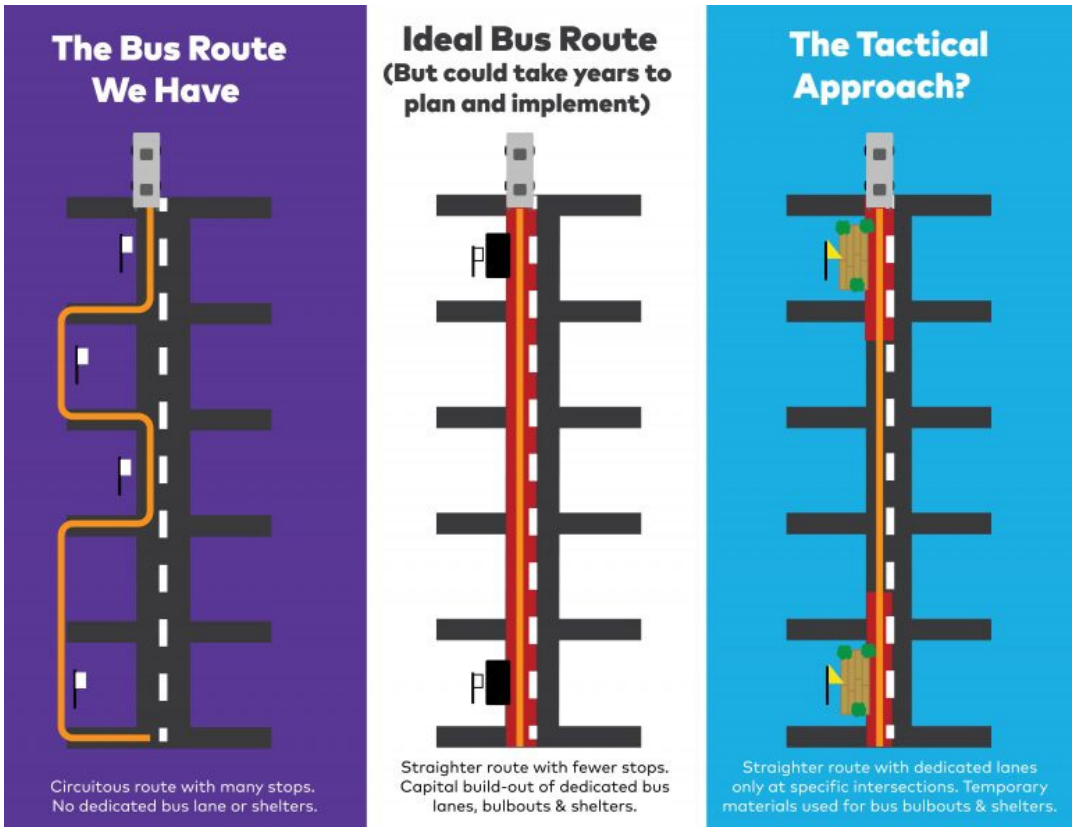
ABOUT TACTICAL TRANSIT LANES

What is a Tactical Transit Lane?

TransitCenter coined the term "tactical transit." Borrowing from the notion of tactical urbanism[1], tactical transit references "low cost, agile alternatives to jump start virtuous cycles of increasing bus ridership by speeding up travel times, improving [the] passenger experience and enhancing overall perceptions of riding the bus."[2]

A Tactical Transit Lane ("TTL") is a bus only lane tactically implemented in dense, congested areas to speed up transit without major capital improvements. Many projects described by other names, such as dedicated bus lanes, transit corridors, bus priority lanes, and business and transit access (BAT) lanes, are TTLs.



TransitCenter's tactical transit approach. Courtesy of TransitCenter

TTLs can be as short as a block or as long as several miles, but most recent TTLs are approximately one mile long.

Especially compared to other capacity-enhancing projects, TTLs are quick, low-cost, and reversible. Though some are planned as permanent projects, many recent TTLs have been pilot projects that give planners a low-stakes way to learn how a permanent improvement would work. Some have been quick pilots or "cone" pilot projects that are in place only a few weeks or in one case, a few days. Table 1 outlines these types of TTLs.

1 Lydon, M., Garcia, A., & Duany, A. (2015). Tactical urbanism: short-term action for long-term change. Washington, DC: Island Press.
2 TransitCenter. (2016, December 19). Why Tactical Transit is the Next Big Thing. Retrieved February 7, 2019, from http://transitcenter.org/2016/12/19/why-tactical-transit-is-the-next-big-thing/

Table 1: Categories of TTL

TTL Type	Installation	Planned lifespan	Public Process	Examples
Permanent	Permanent lanes, often red-painted	Indefinite	Traditional outreach	Baltimore Chicago Los Angeles San Francisco Santa Monica
Pilot	Semi-permanent lanes often striped or painted	6 months - 1 year; sometimes indefinite	Usually traditional outreach	Berkeley, CA Cambridge, MA Cincinnati Pittsburgh
Quick Pilot or "Cone Pilot"	Temporary and short-term; lanes demarcated with cones	3 days - 1 month	Abbreviated; sometimes none ("the pilot is the process")	Arlington, MA Boston, MA Everett, MA Minneapolis

Boston's "cone pilot" on Washington Avenue. Photo courtesy of LivableStreets.

TTL vs. BRT

Although TTLs and BRT both use bus only lanes for the purpose of giving transit priority, they are distinct in their characteristics and their typical contexts. Unlike TTLs, which are a road treatment, BRTs are also a program for transit planning and operations. Table 2 delineates TTL from BRT projects.

Table 2: TTL and BRT Compared

	TTL	BRT
Typical length	0.5 - 1 mile	1.9+ miles*
Typical context	Dense to very dense urban or urban core areas; high-traffic streets	Moderately dense areas outside urban core, sometimes suburban
Common "top 3" goals, ranked[3]	1. Increase transit speeds 2. **Reduce transit congestion at "pinch points"** 3. **Improve pedestrian/rider safety** 4. Increase ridership 5. Increase person throughput	1. Increase transit speeds 2. **Support transit-oriented development (TOD) or improved land use** 3. Increase ridership 4. **Improve transit's image/ brand** 5. Increase person throughput
Example	Market Street, San Francisco	Orange Line, Los Angeles
Routes served	Multiple, existing	Usually one, often new and/or branded (e.g., "Orange Line")
Bus only lane(s)	Yes	Yes*; can also be separate transitway
Lane treatment	Often red-painted	Usually white-striped and signed
Other vehicle access	Often bicycles, right-turning traffic; sometimes private buses/shuttles, taxis	Usually no other modes allowed
Branded service	No	Yes
Transit signal priority (TSP)	Sometimes	Usually
Enhanced stops/ stations	Sometimes	Yes
Enhanced ped/bike access	Sometimes	Usually
Streetscape improvements	Rarely	Usually
Reduced stops	Sometimes	Yes
Typical cost per mile	$100,000	$1M+
Pilotable	Yes	No

**The "BRT Standard" established by the Institute for Transportation and Development Policy (ITDP) defines BRTs as having a minimum of 3 kilometers (1.9 miles) of dedicated bus lanes.*

3 Informed by a January 2019 survey of 26 TTL and BRT planners. This question was answered by 12 TTL and 5 BRT planners; respondents chose their project's top 3 goals and ranked them; the results are weighted by rank.

Where TTLs make sense

TTLs are appropriate in dense, congested areas when and where transit speeds and/or headway reliability are a concern. In especially congested contexts, short TTLs of a few blocks (such as Berkeley, California's Bancroft Way) can significantly increase the reliability and appeal of transit service. Most TTLs have been installed on segments of about one mile, traveled on by 10,000 or more riders a day, on multiple routes. Table 3 includes information on the characteristics of recent TTLs.

Many TTLs are in "commuter corridors" where removing transit vehicles from peak-hour traffic yields the greatest benefits. Where congestion is not all day and not bi-directional, TTLs can operate in one direction in the morning peak and another in the evening.

Fairfax Avenue runs through Fairfax Village in Los Angeles, a dense, congested urban context appropriate for a TTL. Photo by Roberto Nickson on Unsplash

TTLS are appropriate in...

dense, congested areas ✓

where concerns include...

transit speeds ✓

headway reliability ✓

Arlington, MA cone pilot TTL. Cone pilots are a TTL planning method where the "pilot [is] the process" implementing a TTL in the real world and looking at actual resulting service benefits. Photo: Ann Ringwood, Wicked Local

Nicollet Mall, constructed in 1967 in Minneapolis offers an example of a legacy transitway. Photo: Matt Johnson via Flickr, CC BY-NC-SA 2.0

Geary St offers an example of a permenent bus lane in downtown San Francisco. Photo: SFMTA.

Who implements TTLs?

Most recent TTL projects have been collaborations between the area's transit agency and the city and/or county planning or public works department. Large and small cities have implemented TTLs; all are in metropolitan areas.

Recent trends

Bus lanes are not new. Many "legacy" bus only lanes date to the 1970s or earlier and were built alongside changes in downtown-specific general traffic patterns (often involving one-way streets) or in some cases as transitways. What has emerged as a recent trend is the use of bus lanes being installed outside downtowns, in targeted locations chosen for the improvements they make to bus operations on a specific route segment, and for the bicycle connectivity that they can also provide. As discussed above, the term "TTL" describes these newer tactical uses of bus lanes. A full list of recent TTLs is provided in Table 3.

Table 3: Recent TTLs of All Types

Location	Year Opened or Piloted	Length	Pilot	Hours	Riders/day
Arlington, MA	2018	0.25 miles	Yes	6-9 am in one direction	10,000+
Baltimore: BaltimoreLink	2016-2017	5+ mi. on 9 streets; each 0.25-1 mi. 7 mi. of TTL planned.	No	Most are 24/7	N/A
Berkeley, CA: Bancroft Way	2018	0.25 miles (3 blocks)	Yes	24/7	10,000
Boston/Roslindale: Washington Street	2017-2018	1.25 miles	Yes	5-9 am NB	19,000[4]
Cambridge/Watertown, MA	2018	0.9 miles	Yes	24/7	12,000
Chicago: Loop Link	2015	2 miles	No	24/7	
Cincinnati: Main Street	2018	0.5 miles	Yes	7-9 am, 4-6 pm	11,000[5]
Denver: Broadway/Lincoln Corridor	2017	3.5 miles converted; 0.25 miles new lane	Yes	24/7	N/A
Everett, MA	2016	1 mile	Yes		10,000
Los Angeles: Wilshire Boulevard	2013-2015	7.7 miles total (discontinuous)	No	7-9 am, 4-7 pm	45,000
Miami, FL: First Street	2017	0.5 miles	Yes	24/7	N/A
Minneapolis: Hennepin Avenue	2018	0.5 miles	Yes	6-10 am NB; 3-7:30p SB	400 buses; 3,300 brdngs in corridor
Pittsburgh: Liberty Avenue	2017	0.5 miles	Yes	6 am - 6 pm	6,000
San Francisco:Muni Rapid Network	2014-current	50+ TTLs planned systemwide	No	Varies	172,000 (Rapid Bus Network)
Santa Monica, CA: Lincoln Boulevard	2017	1 mile	No	7-9 am NB; 4-7 pm SB	N/A
Seattle: 3rd Avenue	2018	0.9 miles	No	6 am - 7 pm	100,000; 2,500 buses[6]
Washington, DC: Georgia Avenue	2016	0.3 miles	Yes	7 am - 10 pm, Mon-Sat	20,000

4 Boston Makes Its Bus Lane Experiment Permanent. (2018, June 8). Retrieved January 23, 2019, from https://usa.streetsblog.org/2018/06/08/boston-makes-its-bus-lane-experiment-permanent/

5 Cincinnati Bus Riders Finally Get A Lane of their Own. (2018, November 5). Retrieved January 23, 2019, from https://usa.streetsblog.org/2018/11/05/cincinnati-bus-riders-finally-get-a-lane-of-their-own/

Table 3: Recent TTLs of All Types (cont.)

Location (cont.)	Routes	Parking removed/ changed	Other features
Arlington, MA	3	Yes	Included signal phase changes, TSP, and queue jump
Baltimore: BaltimoreLink	6+	Yes; added in some places	System-wide overhaul with criteria for TTLs; 6 new full-time lanes; 2 enhanced full-time lanes; 2 peak-hour lanes
Berkeley, CA: Bancroft Way	9	Minor changes	One-way
Boston/Roslindale: Washington Street	6	Yes	
Cambridge/ Watertown, MA	2	No	"Quick Build" in two-weeks
Chicago: Loop Link	6	Yes	Project includes bike lanes, stations, and new bus hub
Cincinnati: Main Street	10+	Yes	Spurred by grassroots advocacy group (Better Bus Coalition)
Denver: Broadway/ Lincoln Corridor	10+	No	"Blocky" red paint being tested. Full-time lanes converted from part-time lanes; lane extension
Everett, MA	5	Yes	No prior outreach
Los Angeles: Wilshire Boulevard	2	Yes	Included street, signal, and signage improvements along 9.9-mile corridor
Miami, FL: First Street	4	No	Part of "Complete Streets" project
Minneapolis: Hennepin Avenue	4	Yes	Tuesday-Thursday only
Pittsburgh: Liberty Avenue	10+	No net decrease: restrictions lifted nearby	
San Francisco:Muni Rapid Network	4+	Yes	Bus bulbs, pedestrian bulbs and other safety features, stop consolidation/optimization, upgraded TSP
Santa Monica, CA: Lincoln Boulevard	2	Yes	Streetscape improvements
Seattle: 3rd Avenue	10+	No	All lanes are bus only
Washington, DC: Georgia Avenue	2	Yes	

6 Bus-only hours on Seattle's busy 3rd Avenue being extended. (2018, July 27). Retrieved January 23, 2019, from http://mynorthwest.com/1063535/bus-only-hours-on-seattles-busy-3rd-avenue-being-extended/

TACTICAL TRANSIT LANE BENEFITS

Increased transit vehicle speeds: Although they are short, TTLs can produce outsized travel time savings. Recent TTLs, such as Boston's and Everett's, have reduced peak congestion travel times by 20-28 percent.[7]

Decreased variability in travel times: TTLs can produce dramatic decreases in the variability of transit travel times particularly in peak-hour congestion, improving operating efficiency for the agency and quality of service for the rider. See Figure 2 for a summary of travel time improvements in the Town of Arlington's pilot.

The Town of Arlington found travel time variability was significantly lower after their TTL pilot was installed (red bars) than before (orange bars). Source: Town of Arlington.[8]

Relatively quick implementation: Cone pilots, such as Everett's, can be organized within weeks and installed within days; red-painted lane "quick builds", such as Cambridge's, can be installed in as few as two weeks.

Potential ridership gains: a summary of research suggests that bus lanes that reduce total transit door-to-door travel times by 5-15% will "by themselves increase urban peak ridership 2-9%."[9] The City of Denver found that ridership increased 2.8% in the first six months of their TTLs' operation, even though travel speed improvements were relatively modest (3-6%), likely due to the TTL being an expansion of existing lanes that had already been operational during peak hours when TTLs yield the greatest benefits.

Safer for cyclists: TTLs give cyclists a buffer between parked and moving cars.

7 Arlington's TTL produced savings of 5-6 minutes, a fifty percent reduction in travel time (for 50th percentile trips).

8 Amstutz, D. (2018). Massachusetts Avenue Bus Priority Pilot: Public Forum. Arlington, MA: Town of Arlington. Retrieved from https://www.arlingtonma.gov/home/showdocument?id=44642

9 Litman, T. (2016). When Are Bus Lanes Warranted?: Considering Economic Efficiency, Social Equity and Strategic Planning Goals. Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/blw.pdf

PLANNING A TACTICAL TRANSIT LANE

Strategic Considerations

Like most public works projects, TTLs typically attract interest from the community affected. Like many transit projects, the community affected is not necessarily the community that stands to benefit from the project's improvements, which can present a political challenge.

Political Support

The support of local elected officials is critical. Depending on your project's impacts and your community's experience with past projects, supporting the project could be politically risky for your elected officials. Many planners who have implemented TTLs new to their city say that having high-quality and specific data on the projected benefits for elected officials to see and use is helpful. Person throughput data is especially helpful.

Some TTL planners have found that their cities' decision-makers are not necessarily knowledgeable about transit and do not know how it works, how many people use it, or even how people use it. Worse, they sometimes had incorrect assumptions. In such cases, it can be helpful to organize field trips or site visits for officials to see the TTL context, where it will be installed, and what problems it will address.

While top-down political support is vital, it is also important to recognize when a bottom-up community process is essential to project implementation. In one example, a disconnect between the process that the city's planners pursued and the one their community nearly thwarted the project: Although the city council had approved the transit lane, an official's remark at a public meeting that "it doesn't matter because the council already approved this" galvanized opposition that delayed implementation by many years. When planners re-engaged the community several years later, they found that while the core group of opponents persisted, they were able to engage many more supporters by sharing a positive vision for the corridor.

Community Context

Knowing your community's preferences at the start is helpful. Does your community have expectations about what a project should look like or what input they will be able to give? Is your community open to experiments or pilot projects if it saves money or delivers results faster? The answers to these types of questions appropriately inform such decisions regarding what elements your project will include, what scale it should have, and whether a pilot project is suitable (and if so, what type of pilot).

Table 4 outlines some design and implementation choices driven by community context. Since each community context is different, suitable approaches to TTLs will vary widely. There is no one-size fits all approach to TTLs. Table 5 lists a few examples of cities with TTLs and the implementation choices that fit their contexts.

Table 4: Community context drives implementation choices

Community Context		Implementation Choices		
Community Preferences	**Project Goals**	**Project Scope**	**Pilot Type**	**Engagement**
▸ Results-oriented ▸ Process-oriented ▸ Comfort with innovation	▸ Reduce corridor person -delay ▸ Safer bike lanes ▸ Community investment ▸ Parking availability	▸ Transit Signal Priority (TSP) ▸ Streetscape ▸ Lane treatment type	▸ None ▸ Quick ▸ Full	▸ No outreach ▸ Abbreviated outreach ▸ Extensive outreach

Table 5: Examples of community contexts and implementation choices made

	Community Context	Implementation
Everett, MA	▸ Results-oriented ▸ Comfortable with innovation ▸ Wants faster transit	▸ Quick pilot (eventual permanence) ▸ No outreach before pilot
Santa Monica, CA	▸ Process-oriented ▸ Wants safer bike lanes and community investment	▸ Permanent (no pilot) ▸ Streetscape improvements ▸ Traditional outreach
Arlington, MA	▸ Results-oriented ▸ Wants faster transit ▸ Wants community investment	▸ Full pilot ▸ Streetscape improvements (permanent) ▸ Traditional outreach
Hypothetical	▸ Process-oriented ▸ Comfortable with innovation ▸ Wants faster transit	▸ Full pilot ▸ No outreach before pilot

As planners everywhere know, voices of opposition can have disproportionate effect proportion on the process. Identify early on where sensitive areas of the project are and "who will care". Liz Brisson, Major Corridor Managers at SFMTA advises: "Look at your land use map and you can figure out who you need to talk to."

Cyclists, both organized and not, have been major advocates of recent TTL projects, and in several cases, were the foremost advocates for TTLs, some of which started out as bike lanes. In Santa Monica, cyclists were important advocates for the bus only lane – identifying it as their top priority at public meetings – even though the city currently prohibits cyclists from using the TTL. Because buses are wide, TTLs stretch parking lanes from their typical 7-8 feet to a bus-accommodating 11-12 feet, opening 4-5 feet of new roadway space for cyclists to share with buses (if allowed) or to use when the TTL is not operational and is a parking lane. If your city has a community of cyclists, engage them early in your planning.

TTLs typically expand parking lanes, making room for bike lanes and giving cyclists a new buffer between parked cars and moving vehicles. Photo courtesy of City of Everett, MA.

Partnerships

TTLs are often installed by a city department while the buses that use them are operated by a separate city or county agency. A collaborative relationship is essential for a project's success, particularly if it is politically risky. Planners who have succeeded in collaborative TTL projects say that a shared understanding of a project combined with shared ownership ("our project") is important. Unified messaging from both organizations is also important to inspire public confidence in, and understanding of, the project. For projects that involve multiple jurisdictions, creating a "Project Development Team" with representatives from each city can promote understanding and collaboration.

> ***"If your city has a community of cyclists, engage them early in your planning"***

Costs and Funding

TTLs are relatively low-cost projects. Private foundations have supported many TTLs and are a potential funding source. Grants of $100,000 from the Barr Foundation, for example, funded TTL pilots in Arlington, Cambridge, and Boston, while a $150,000 grant from the R.K. Mellon Foundation funded one in Pittsburgh. Table 6 shows costs and funding sources, where known.

Table 6: TTL Costs and Funding Sources[10]

Location	Year Opened or Piloted	Approx. Length	Lane Demarcation
Arlington, MA: Massachusetts Avenue	2018	0.25 miles	Cones
Berkeley, CA: Bancroft Way	2018	0.25 miles (3 blocks)	Red-painted lanes
Boston/Roslindale: Washington Street	2017-2018	1.25 miles	Cones
Cambridge/Watertown, MA: Mt. Auburn Street	2018	0.9 miles	Red-painted lanes
Cincinnati: Main Street	2018	0.5 miles	Striping and signage
Everett, MA: Broadway	2016	1 mile	Cones; later red-painted lanes
Miami, FL: First Street	2017	0.5 miles	Red-painted lanes
Minneapolis: Hennepin Avenue	2018	1.1 miles (split-segments total)	Cones
Pittsburgh: Liberty Avenue	2017	0.5 miles	Red-painted lanes
Santa Monica: Lincoln Boulevard	2017	1 mile	Striping and signage

10 TTLs with no available cost or funding data are omitted.

Table 6: TTL Costs and Funding Sources (cont.)

Location (cont.)	Capital Cost	Funding Source
Arlington, MA: Massachusetts Avenue	$100,000, including TSP, signal changes and other enhancements	Private foundation grant
Berkeley, CA: Bancroft Way	$122,000	City funds; UC Berkeley a funding partner
Boston/ Roslindale: Washington Street	$100,000	Private foundation grant
Cambridge/ Watertown, MA: Mt. Auburn Street	$120,000 for water-based (temporary) red paint, markings, signs; $27,000 for signals and TSP; $25,000 for enforcement; $10,000 for consultant work; (Some signal equipment costs funded by adjacent jurisdiction).	Private foundation grant
Cincinnati: Main Street	$55,000	City capital improvements fund
Everett, MA: Broadway	$150,000 for permanent red-painted lanes; $250,000 for TSP; $100,000 for level boarding; $600,000 for ADA and stop improvements	City funds (CIP and general operating budget); state grant; private foundation grant for other corridor improvements
Miami, FL: First Street	$500,000, including Complete Streets elements	City and county funds; Private foundation support
Minneapolis: Hennepin Avenue	$5,000	N/A
Pittsburgh: Liberty Avenue	$150,000	Private foundation grant and private sources
Santa Monica: Lincoln Boulevard	$100,000	City CIP funds

Using Data

Good data can be critical for making the case for your project, especially to elected officials. Data that TTL planners identified as especially important include: parking utilization, person throughput, benefits to riders, and benefits to cyclists. Operational data, though often harder to obtain, are also helpful.

Parking utilization data: Local business owners often overestimate how much their customers use on-street parking. Parking utilization studies provide data to show when and how frequently (or seldom) customers are using those spaces. While the results of such studies do not always persuade business owners, they are useful as evidence to share with elected officials, who can cite the data. Parking utilization data can also inform any necessary workarounds. The City of Santa Monica, for example, used the results of their utilization study to re-configure permit parking in the neighborhood to remove a minimum net number of spaces as part of their TTL. Parking studies can also identify where there is not any issue, for example, where businesses are not open, and parking is not used during the TTL's proposed hours of operation.

Some cities have augmented their parking studies with license plate studies that provide more information about who is using the parking. City of Boston planners, for example, found that few parked vehicles belonged to area residents or shoppers; the permit-free area was being used as a de facto park and ride by drivers coming in from outside the city.[11] This finding helped to justify the removal of the parking lane for transit improvements.

Person throughput data: As mentioned previously, person throughput can provide a compelling case for the project. In addition, it is a valuable metric that properly frames what TTLs do, shifting the focus away from its impacts on single occupancy vehicle traffic (a default, in many areas) to a more inclusive measure of the project's effects on and benefits to all travelers. They are also useful for doing a "reality check": if person throughput is forecasted to be unaffected by a TTL during certain times of day or in certain areas, a TTL might not appropriate, in which case hours of operation can be adjusted. An important aspect of successful TTLs is their proof of "working". As Santa Monica Big Blue Bus' planning manager Tim McCormick advises, "[The public] needs to see something happen.... Don't waste the lane."

Rider benefits data: Improvements in transit travel times are important to capture in whatever way is available, particularly if the project's goal is to improve transit speeds. Capturing bus rider sentiment before and after a TTL is installed can be equally useful. Interestingly, riders' perceptions of travel time savings often exceed agencies' measurements. "It's about a feeling of moving" as Town of Arlington planning director Jennifer Raitt says. Although Arlington's TTL did produce substantial travel time savings (5-10 minutes)[12], nearly 18% of riders surveyed estimated their travel time savings as being even greater than 10 minutes.[13] SFMTA's survey of its Mission Street riders revealed that

11 Harmon, E. (2018, June 8). How Can We Fix This? How MAPC's Data Helped Boston Make A Bus Line Faster. Retrieved January 23, 2019, from https://www.mapc.org/planning101/how-can-we-fix-this-how-mapcs-data-helped-boston-make-a-bus-line-faster/

12 Matheson, A. (n.d.). Arlington's bus rapid transit pilot saved riders 5-10 minutes, initial data says. Retrieved from http://arlington.wickedlocal.com/news/20181105/arlingtons-bus-rapid-transit-pilot-saved-riders-5-10-minutes-initial-data-says

13 Amstutz, D. (2018). Massachusetts Avenue Bus Priority Pilot: Public Forum (p. 47). Arlington, MA: Town of Arlington. Retrieved from https://www.arlingtonma.gov/home/showdocument?id=44642

the TTL there improved bus speeds by an average of 2 minutes per trip, but riders' perceived travel savings exceeded 10 minutes.[14] Similarly, Boston's 1.25-mile Washington Street TTL produced peak-hour travel time improvements of 20-25%[15] but "commuters said they saved anywhere from 10 to 15 minutes on their commutes and some as much as a half hour".[16] Rider statements about their satisfaction with trip benefits are also good data.

(Left) Video: "A Street is a Terrible Thing to Waste: Boston's Newest Bus Lane" by Clarence Eckerson, StreetFilms (3:53, Vimeo) (Right). TTL as a benefit to bike riders. Photo: MBTA

Cyclist benefits data: TTLs improve cyclists' route options and safety. The City of Boston found that 89% of cyclists surveyed reported feeling safer in the Washington Avenue TTL[17], which made 4-5' of roadway space newly available to them both during the hours of operation and during its use as a parking lane. Consider using surveys to measure cyclists' before and after perceptions of safety.

Operational data: To the extent that capturing these data is possible, they are helpful, but some planners have reported difficulty capturing meaningful data from very short projects owing to the project not aligning with timepoints and stops (e.g., stops are outside the TTL).

Pilot Projects

The choice of whether a pilot is appropriate for your project depends on its scale and the community preferences. Most TTL pilots are relatively simple tests, though some (such as Arlington's) have involved additional elements such as TSP, signal and lane changes.

If your community preferences allow and your elected officials will support it, a "quick pilot" or "cone pilot" can provide real-world operational data and user feedback with a test of just a few days, with or without prior public outreach. Making the pilot *itself* the public process is an approach pioneered with success in Everett, Massachusetts. (See "The Quick Pilot: Everett" case study).

14 San Francisco Municipal Transportation Agency. (2016, August). Mission Rapid Project: 11th Street to Randall Street. Retrieved from https://www.sfmta.com/sites/default/files/agendaitems/2016/8-16-16%20Item%2014%20Mission%20Rapid%20Project%20-%20slide%20presentation.pdf

15 Permanent bus lane to be established on Washington Street in Roslindale. (2018, June 7). Retrieved from https://www.boston.gov/news/permanent-bus-lane-be-established-washington-street-roslindale

16 Bus-Only Lane Experiment in Roslindale Ends. (2018, June 3). Retrieved from https://www.wgbh.org/news/local-news/2018/06/03/bus-only-lane-experiment-in-roslindale-ends

17 Permanent bus lane to be established on Washington Street in Roslindale. (2018, June 7). Retrieved from https://www.boston.gov/news/permanent-bus-lane-be-established-washington-street-roslindale

Table 7: Pilot Project TTLs: By Year, By City

Location	Year Opened or Piloted	Length	Pilot Duration	Hours
TTL Pilots				
Washington, DC: Georgia Avenue	2016	0.3 miles	Indefinite	7 am - 10 pm, Mon-Sat
Miami, FL: First Street	2017	0.5 miles	1 year	24/7
Pittsburgh: Liberty Avenue	2017	0.5 miles	18 months	6 am - 6 pm
Denver: Broadway/ Lincoln Corridor	2017-2018	3.5 miles converted; 0.25 miles new lane	1 year	24/7
Berkeley, CA: Bancroft Way	2018	0.25 miles (3 blocks)	Indefinite	24/7
Cambridge/ Watertown, MA: Mt. Auburn Street	2018	0.9 miles	Indefinite	24/7
Cincinnati: Main Street	2018	0.5 miles	6 months	7-9 am, 4-6 pm
TTL Cone Pilots				
Everett, MA: Broadway	2016	1 mile	1 week	5-9 a.m.
Boston/Roslindale: Washington Street.	2017-2018	1.25 miles	4 weeks	5-9 am NB
Arlington, MA: Massachusetts Avenue	2018	0.25 miles	1 month	6-9 am in one direction
Minneapolis: Hennepin Avenue	2018	1.1 miles (split-segments total)	3 days	6-10 am NB; 3-7:30pm SB

Table 7: Pilot Project TTLs: By Year, By City (cont.)

Location (cont.)	Parking removed/ changed	Lane-marking method	Status (as of January 2019)
TTL Pilots			
Washington, DC: Georgia Avenue	Yes	Red-painted lanes	Indefinite pilot
Miami, FL: First Street	No	Red-painted lanes	Pilot underway
Pittsburgh: Liberty Avenue	No net decrease: restrictions lifted nearby	Red-painted lanes	Pilot underway
Denver: Broadway/ Lincoln Corridor	No	Experimental "blocky" red paint	Pilot underway
Berkeley, CA: Bancroft Way	Minor changes	Red-painted lanes	Indefinite pilot
Cambridge/ Watertown, MA: Mt. Auburn Street	No	Red-painted lanes	Indefinite pilot; Red paint temporary, expected to last 6 months
Cincinnati: Main Street	Yes	Stripes and signage	Pilot underway
TTL Cone Pilots			
Everett, MA: Broadway	Yes	Cones	Trial was extended 9 months; lane became permanent in September 2017; other permanent improvements added.
Boston/Roslindale: Washington Street.	Yes	Cones	Now permanent, with red-painted lanes as of August 2018
Arlington, MA: Massachusetts Avenue	Yes	Cones	Pilot concluded Nov. 2018; Recommendations under development. Lanes removed; TSP, queue jump, lane and signal changes, and bus stop relocations remain.
Minneapolis: Hennepin Avenue	Yes	Cones	Pilot ended; lanes "will be re-evaluated" in future street design decisions[18]

18 Hennepin Bus Lanes - Metro Transit. (n.d.). Retrieved January 23, 2019, from https://www.metrotransit.org/Hennepin-bus-lanes

Public Engagement and Outreach

Understanding your community's expectations for engagement is important for developing an appropriate outreach plan.

Abbreviated or no outreach

Although traditional outreach methods are a default for planners, they are not uniformly effective at engaging the community. Several TTL planners reported difficulty getting turnout at public meetings, making it difficult to capture community concerns or ideas – the point of outreach.

This difficulty might arise from TTLs being smaller projects whose aggregated benefits can be significant, but whose individual benefits are usually not dramatic. As one planner put it, "Two minutes of travel time savings is not enough to justify an evening away from their family." These limitations of traditional methods have prompted some planners to reconsider the approach to outreach.

Modeled on Everett, MA's example, the "pilot-as-process" at work in Arlington, MA. Photo: MBTA

Echoing Everett's pilot-as-process strategy mentioned earlier, Ryan Billings, senior city planner at the City and County of Denver, suggests "Instead of having a long conversation, turn the lights on... See if anybody really cares.... Put it in and let [the project] be the public engagement piece."

Where community interest is likely to be low, or where the people who will benefit from the project (bus riders and cyclists) are hard to reach and/or are unlikely to attend public meetings, a cone pilot project might provide more meaningful feedback and data than traditional public meetings.

Public meetings

If you do plan to have public open houses or meetings, consider getting on the agenda of local community stakeholder group meetings rather than organizing your own.

Several TTL planners who have held public meetings for their TTL projects (or for larger plans that involved TTLs) reported that interactive activities work well for identifying revealed preferences among tradeoffs. These include "build your own transit system" maps and drawings or asking participants to "budget" a certain number of tokens among project elements.

Door-to-door outreach

Because TTLs are smaller projects, door-to-door outreach is often a viable option. Several planners reported success at doing this early in the project's development phase. It is especially important to consider if your project involves the removal of on-street parking. Although the demand for on-street parking is often overestimated, some businesses have legitimate and critical needs for curb access and those needs are best identified early and in-person.

Meeting stakeholders individually provides the opportunity to find solutions that can be incorporated into your plans. The City of Santa Monica addressed some business owners' concerns about "losing" on-street parking to the LiNC TTL project by adjusting nearby neighborhood parking permit programs so that the net loss to parking in the block was kept to a minimum. (The City also had excellent parking utilization data to back up their plans.)

Online outreach

Planners report varying success with online methods; in some cities, however, transit-supportive communities have materialized through blogs and social media. A planner with the City of Seattle noted that "business follows public sentiment" closely, and that "we show them the support, especially from riders who go to those businesses." Even more helpful, he adds, is to "Have transit riders talk to businesses."

Videos

Brief videos about your project can be helpfulfor explaining your project and its benefits in greater depth than is possible on a brochure or poster. Working with Cambridge Community TC (CCTV), the City of Cambridge produced three videos: one three-minute project overview, a briefer one-minute version, and a one-minute "what you need to know" video. The City broadcast and posted these a few weeks before the lanes' opening and got good feedback.

The City of Cambridge's "Mt. Auburn St. Pilot: What You Need To Know" video (0:58, YouTube).

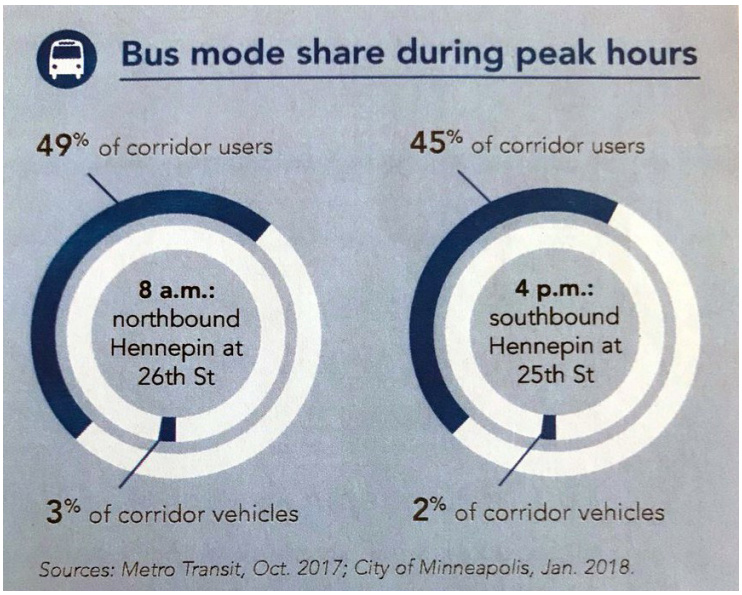
Surveys

Several TTL projects involved surveys handed out at bus stops or on buses; these have the benefit of informing riders and community members of the project while also gathering potentially valuable feedback on preferences and perceptions of project need and benefit.

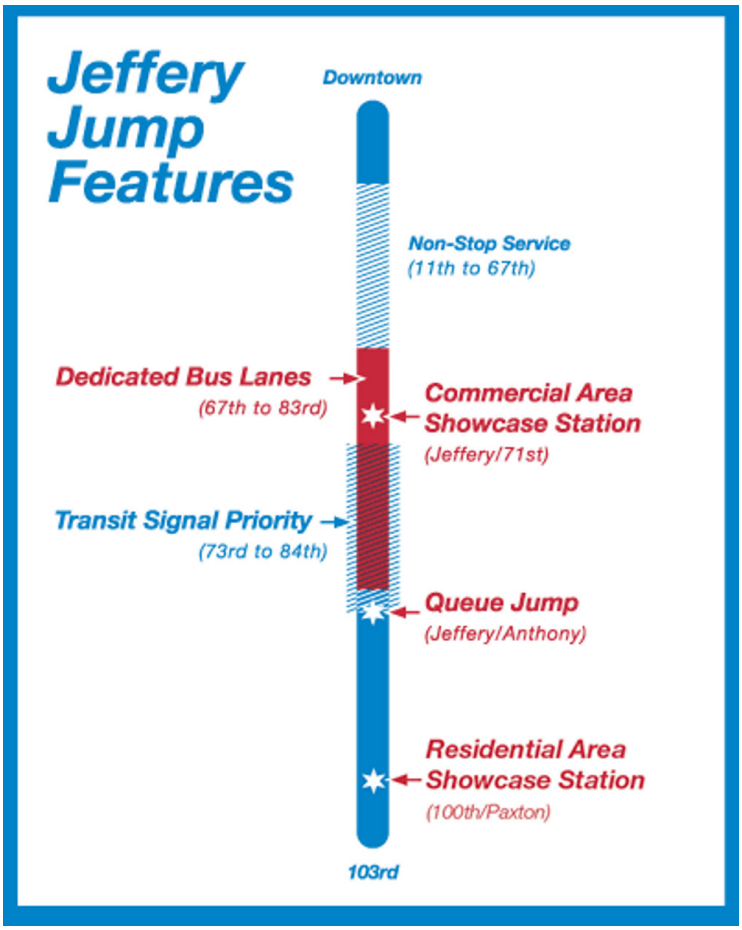
Community Design

Engaging the community in creative design decisions can promote collaborative interactions. SFMTA's Geary Boulevard TTL planners invited neighborhood communities interested in public realm enhancements to create the designs for decorative, no-maintenance steel landscaping panels for their neighborhoods.

SFMTA engaged several community members in several neighborhoods by inviting them to design project-adjacent landscape panels. Renderings courtesy of SFMTA



A bus mode share chart used in Metro Transit's brochure on the Hennepin Avenue pilot. Via: Streets.mn (CC-BY-NC-ND 3.0)



The route pamphlet for Chicago CTA's "Jeffery Jump" J14 route highlights dedicated bus lanes (and TSP) as a service feature. Source: CTA

Messaging

Cite transit-first policies (or consider testing them)

Many (though not all) cities with TTLs in place have transit-first policies that explicitly prioritize transit over cars; Seattle and San Francisco are notable examples. Seattle's policy even describes car traffic as problematic. Where these policies are in place, they are helpful for supporting such projects as TTLs. Where they are not in place, TTL pilots represent a relatively low-stakes way to test transit-priority projects and gauge public support for them. Messaging may need to include stressing the importance of transit generally, with an emphasis on its potential to increase person throughput and, in drawing more riders, decrease congestion. Specifically pointing out the percentage of corridor users who travel by transit versus the number of vehicles, as Minneapolis' planners did in their messaging, can be especially effective.

Put the benefits on the map

TTLs prominently mark the street and make clear where transit has the benefit of preferential access; this important benefit can and should be similarly denoted on transit maps. CTA's J14 route (also named "Jeffery Jump") project provides an example of a non-BRT route that highlights a TTL segment ("Dedicated Bus Lanes" in CTA's description) as a service feature.

Describe benefits in riders' (and cyclists') terms

Put cost savings or service efficiencies in terms of results that riders or cyclists will experience. For example, a project that saves money or reduces operating costs is better communicated as a project that can provide more service for the same money. As VTA transportation planner Adam Burger puts it: "Connect the speed of transit with service quality." Faster buses mean more buses.

Describing benefits in terms of improvements for riders and cyclists also keeps the focus on users whose benefits might otherwise be marginalized. As Town of Arlington planning director Jennifer Raitt says, "There's a tendency to talk about cars and parking. Streets are for everybody."

Communicate user benefits in terms of people, not vehicles. Avoid terms and statistics that discuss *vehicles;* focus instead on *person* throughput and other indicators that illustrate how individual riders will benefit.

Quote benefits from similar projects

TTLs have now been piloted or installed in a variety of operating environments and urban contexts, from large cities like Seattle and San Francisco to smaller metropolitan towns like Arlington, MA. Find a project similar to the one you're planning, taking into account city size, the number of routes and/or number of riders served by the TTL, the lane configuration used (parking or travel lane), and hours of operation. Then consider citing that project's demonstrated user benefits (e.g., travel time saved, improved reliability, increased cyclist safety, etc.) in your own case for the project. These benefits can be found in presentations or reports that many cities have posted on their websites: Arlington's project site is an excellent example of one such repository.[9] News reports may also include some of the data: Cincinnati's Enquirer, for example, published their reporters' own analysis of travel time improvements observed over one week.[20]

Since users' *perceptions* of their benefits are also important, consider including riders' observations that are quoted in cities' rider survey results and media coverage. Cyclists' perceptions of improved safety are especially notable given the importance of cyclists in many projects' public processes.

Design Considerations

Strategic design considerations include what type of lane demarcation to use, what hours of operation to have, and what other vehicles to allow access. Several white papers and studies listed in "Other Resources" contain more technical design considerations.

Lane demarcation

What type of TTL is planned determines to some extent what lane demarcation is suitable. Quick pilot TTLs of a few days or weeks, for example, call for cones, not red-painted lanes.

19 See: https://www.arlingtonma.gov/Home/Components/News/News/8603/225
20 Sparling, H. (2018, November 18). Cincinnati's bus-only lane: We rode it and timed it. Here's how fast it is. Cincinnati Enquirer. Retrieved from https://www.cincinnati.com/story/news/2018/11/18/cincinnati-metro-heres-how-fast-new-bus-lane/1846393002/

Table 8: Advantages and disadvantages of lane demarcation types

	Advantages	Disadvantages
Cones	▸ High visual profile ▸ Low cost ▸ Quick, easy to install ▸ Suitable for short pilots ▸ May be a more effective driver deterrent than red-painted lanes	▸ Suitable for pilots only ▸ Ongoing labor costs of daily placement, removal if peak-hour ▸ Violations (parked cars) can "trap" buses in the lane ▸ Cones visually narrow the lane and can cause bus drivers to hesitate, drive slower
Signage and striping	▸ Less expensive than red-painted lanes ▸ MUTCD listed ▸ Suitable for part-time lanes	▸ Low visual profile ▸ Not as effective as other methods at deterring violations
Red-painted lanes	▸ High visual profile ▸ Effective at reducing violations and collisions in full-time lanes	▸ Higher cost ▸ Arguably not suitable for part-time lanes ("effect dilution") ▸ Long-lasting application can be tricky in some environments ▸ Still experimental in MUTCD

Cones

Cones make quick pilots cheap and easy to do, but they have limitations. Everett city planner Jay Monty, who pioneered the cone pilot, says that in their experience, cone-marking the lane resulted in *fewer* violations than the red-paint treatment that they later installed, but cones have the disadvantage of "trapping" buses when a vehicle is parked in the lane. Planners in Minneapolis also discovered that the use of cones in narrow (10 foot) lanes caused bus drivers to drive more slowly than expected. In addition, cones require ongoing crew labor to install and remove each day of the pilot if a lane is peak-hour only.

Signage and striping

White striping and "bus only" markings are standard treatments listed in the MUTCD. This treatment is less expensive than red-painted lanes but has a lower visual profile and is not as effective at keeping cars out of lanes. Abundant signage, especially in a project's first few weeks or months, can supplement the street markings effectively.

Red-painted lanes

Many recent TTLs have used red-painted lanes (See Table 3 and Table 5). SFMTA's test of three red transit lanes installed in 2014 revealed that red-painted transit lanes resulted in fewer transit delays (despite increases in car traffic), a 25% improvement in transit reliability[21], a 16% decrease in collisions, and a 24% drop in injury collisions, compared to citywide rates which did not substantially change over the test period.[22] Most significantly, the SFMTA found that on its red-painted Third Street corridor, the number of drivers violating transit lanes fell 48 to 55 percent (depending on the time of day), even as traffic increased.[23]

Denver's "blocky" red paint treatment is an ongoing experiment. Photos courtesy of the City and County of Denver.

A separate study of 100,000 trips in SFMTA's red-painted Mission Corridor conducted by the technology company Zendrive found that the bus service improvements (red transit-only lanes in addition to left turn restrictions and forced right turns for private vehicles) resulted in safer driving overall (in the TTL-adjacent travel lanes). Notably, the smartphone sensor-collected data show a 36% reduction in speeding, a 30% drop in fast acceleration, and a 21% reduction in hard braking.[24]

Currently, red painted lanes (or red-tinted asphalt) have no approved uses in the MUTCD but are allowed with FHWA's "experimentation approval."[25]

Cities that have used red-painted lanes in either their permanent or pilot TTLs include: San Francisco, Denver, Pittsburgh, Cambridge, MA, and Everett, MA (after its cone pilot).

21 San Francisco Municipal Transportation Agency. (2016, August). Mission Rapid Project: 11th Street to Randall Street. Retrieved from https://www.sfmta.com/sites/default/files/agendaitems/2016/8-16-16%20Item%2014%20Mission%20Rapid%20Project%20-%20slide%20presentation.pdf

22 Bialick, A. (2017, April 7). Red Transit-Only Lanes Work: Two New Studies Show Their Benefits. Retrieved January 23, 2019, from https://www.sfmta.com/blog/red-transit-only-lanes-work-two-new-studies-show-their-benefits

23 Ibid.

24 Zendrive. (2017, March 10). The Numbers are in From the Mission: The Bus is Faster and the Street is Safer. Retrieved January 23, 2019, from http://blog.zendrive.com/mission-st-study/

25 Frequently Asked Questions - Part 3 Markings - FHWA MUTCD. (n.d.). Retrieved January 23, 2019, from https://mutcd.fhwa.dot.gov/knowledge/faqs/faq_part3.htm#cpq1

While red-painted lanes can be used for part-time lanes as well, many planners interviewed for this study believed that red lanes should be reserved for full-time lanes, so as not to "dilute" the effect that red paint signals. No paint scheme or design currently exists specifically for part-time lanes.

Current red-paint coating technologies include pre-formed thermoplastic or methyl methacrylate or painted with epoxy-based paint.[26] Trials with latex paint have not been successful, even for temporary installations.[27] Some resources on coatings are listed in Other References.

While most red-painted lanes "cover" the entire lane, giving lanes in San Francisco the "red carpet" moniker, planners at the City and County of Denver are, with the permission of FHWA, testing the effectiveness of "blocky" red paint, in which lanes are intermittently painted with red blocks or stripes.

Hours of operation

TTL hours of operation should generally match the times during which transit rider throughput is high and/or congestion-related transit delays are a problem. In some contexts, peak hour operation avoids parking conflicts as parking is already prohibited during those times or adjacent businesses are not yet open.

Some recent TTLs are full-time but most are peak-hour, or morning peak-hour, and/or in one direction.

Other vehicle access

Bikes are the most commonly allowed non-transit vehicle in TTLs, and TTLs are popular with cyclists: In Seattle, King County Metro planners were surprised to find that some cyclists prefer to use the TTL on a major street rather than a cycle track on a less-busy street only a block away. Although some transit agencies are wary of sharing heavily used transit lanes with slower-moving cyclists, most planners reported few if any problems with the arrangement. As Maryland MTA senior planner Patrick McMahon notes, shared TTLs have an important benefit for transit: "bikes keep out cars." Other vehicles sometimes allowed in existing TTLs include right-turning vehicles, school buses, and taxis. Note that state law might specify what other vehicles may or may not access the lane.

26 Pavement Markings & Color. (n.d.). Retrieved January 23, 2019, from https://nacto.org/publication/transit-street-design-guide/transit-lanes-transitways/lane-elements/pavement-markings-color/

27 San Francisco Municipal Transportation Agency. (2017). Red Transit Lanes Final Evaluation Report (p. 25). Retrieved from https://www.sfmta.com/sites/default/files/reports/2017/Red%20Transit%20Lanes%20Final%20Evaluation%20Report%202-10-2017.pdf

COMMON CHALLENGES

Pre-Implementation

Parking

Parking is universally a top community concern, and projects that involve the removal of on-street parking require more extensive community engagement and creative problem-solving. At the same time, parking's importance is often overestimated, even by planners. Minneapolis Metro Transit planners noted after their trial that there were "very few comments about parking. We expected more." Parking might not even be an issue in some areas, if, for example, businesses are not open during the peak-hour TTL's operation.

On some TTL projects, planners have found ways to *increase* available parking by shortening commercial loading hours (in San Francisco)[28] or by fine-tuning adjacent parking restrictions and permit parking nearby (in Denver, Baltimore, and Santa Monica).

Parked vehicles disrupt TTL operation, as such planning for pre- and post-implementation strategies is important. Image courtesy of Streetsblog LA (5/15/2015).

In some cases, "carveouts" (interruptions in your TTL) might be necessary. While not ideal, they present a way to proceed with your whole project while avoiding significant impacts and opposition. The Town of Arlington used this approach when residents rallied to defend a popular bakery whose business they perceived to be threatened by the removal of "their" on-street parking spaces. Similarly, LA Metro policymakers also opted to make Wilshire Boulevard's 7.7 mile-long TTL discontinuous in some areas of intense opposition in order to advance the project.

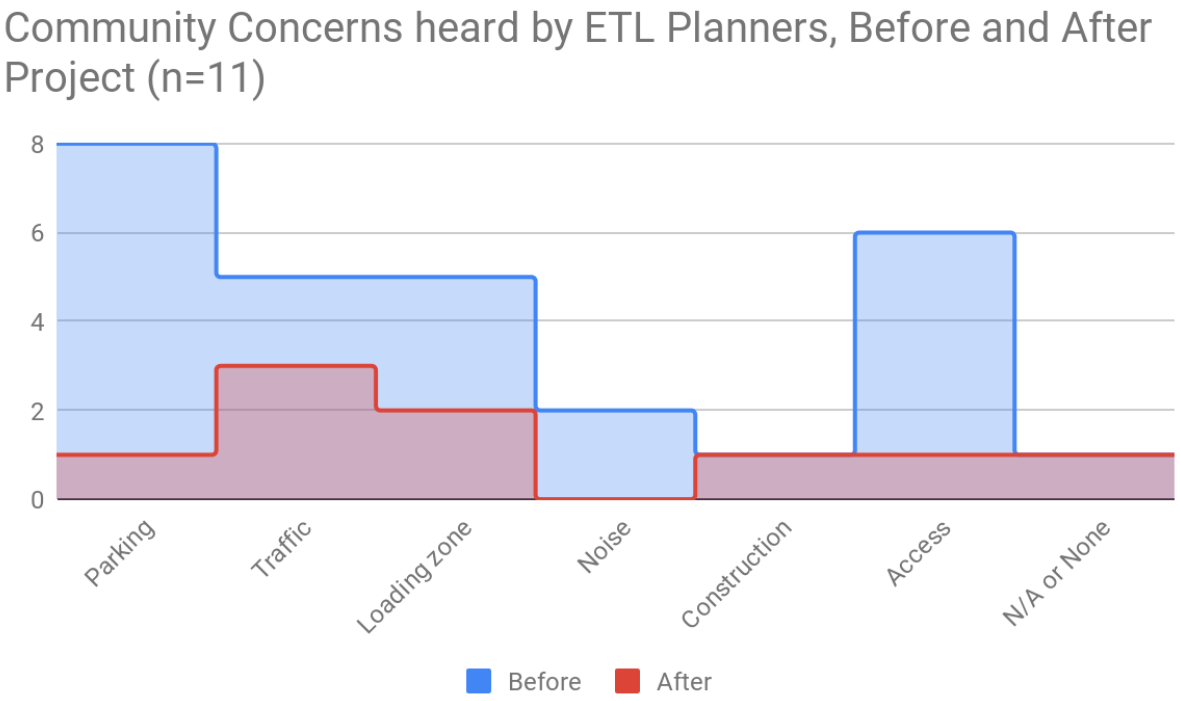
Access/loading zones

As with parking, the utilization of access or loading zones, both official and de facto, is important to investigate where TTL plans conflict with them. As with parking, commercial loading areas might not be used as much as is assumed or during as many hours as are allocated. In other cases, as in Baltimore, where some of the TTLs course through dense downtown blocks where busy commercial loading zones serve the many hotels located there, more comprehensive plans are likely needed, such finding as alternative loading zones or hours or establishing a limited-hours delivery vehicle access permit program (as Seattle did on its multi-lane Third Street TTL).

28 Alameda-Contra Costa Transit District. (2018, January 25). AC Transit Announces the Roll-out of the East Bay's First Ever Dedicated Red Transit-only Lane. Retrieved January 23, 2019, from http://www.actransit.org/2018/01/25/ac-transit-announces-the-roll-out-of-the-east-bay%E2%80%99s-first-ever-dedicated-red-transit-only-lane/

Community concerns

Besides parking and access, other common pre-implementation community concerns include worsening traffic, noise, and construction impacts. As Figure 8 shows, planners heard far fewer concerns of all types after projects were completed.



Planners of recent TTLs report hearing more concerns before the project started than after.

Post-Implementation

Enforcement

Without enforcement, TTLs break down. Because it takes only a single parked car or delivery vehicle to interfere with TTLs' efficacy, enforcement of a TTL is vital for providing the reliability and time savings for which a TTL is designed. When lanes are not kept clear for transit, buses must maneuver around parked vehicles and where violations occur regularly, bus drivers may start avoiding using the TTL altogether to avoid such maneuvers, which defeats the purpose of the lane. Recent pilot projects have used a number of enforcement approaches, sometimes in tandem:

> The City of Santa Monica used a combination of enforcement techniques over the project's first few months, adjusting as drivers got more accustomed: passive enforcement only (signage) for the first four weeks, soft enforcement (warnings) for six months, and finally targeted enforcement of hotspots (as measured by transit vehicle delays) and areas where "flagrant disregard" of the TTL's rules occurred.

Conventional enforcement involves the issuance of citations to drivers of non-permitted vehicles stopped in or using the lane. In jurisdictions where they exist, traffic wardens or parking control officers can ticket illegally parked cars or trucks, but only police officers can enforce moving vehicles (i.e., cars in the lane). Police resources are limited and expensive, however, and traffic enforcement is low priority for most police departments. Some planners describe challenges in relying on conventional enforcement as a solitary option for these reasons.

One city budgeted $25,000 for officers' overtime to police the lanes. Some agencies, such as the Maryland MTA, have their own police force; an MOU with the Baltimore Police Department enables joint enforcement.[29]

Soft enforcement prioritizes driver education over fines and citations; police must still be involved to stop vehicles, however. In several cities, TTL planners opted to use soft enforcement for an initial period (4 weeks in Santa Monica) to "ease in" to the project and give drivers an opportunity to adjust to new TTLs. A period of soft enforcement might palliate politically sensitive projects.

"Because it takes only a single parked car or delivery vehicle to interfere with TTLs' efficacy, enforcement of a TTL is vital for providing the reliability and time savings for which a TTL is designed"

Targeted enforcement seeks to allocate police resources to problem areas. Santa Monica used this approach later, linking enforcement efforts to areas of repeated delay. One "hotspot" was near a popular taco stand, where customers in cars queued on the street and in the TTL. The city police resolved the issue by appealing to the stand owner and asking him to tell his customers not to block the lanes.

Photo enforcement, where permitted by law, involves officers issuing citations for TTL violations from their review of video footage captured by cameras on-board transit vehicles. SFMTA transit planner Michael Rhodes notes that this process is time-consuming and slow and has little deterrent effect since the program is not widely known or advertised. Maryland MTA staff also considered photo enforcement but determined that the volume of data and issues of quality made its value questionable. No city included in this research has used fixed location photo enforcement.

Passive enforcement includes simple signage, clear policies, and well-marked or painted lanes. Aided by those things, community enforcement can take hold. In Pittsburgh's Liberty Avenue TTL, for example, the director of the project noted "You could see bus drivers yelling at delivery trucks in the lane six hours after the paint was dried."[30] Peter James, principal planner of Santa Monica notes that effective passive enforcement can require so much signage as to be "not aesthetically ideal"; the City planned its "cacophony of signage" to remain in place only as long as needed, i.e., until drivers had adjusted and their behavior had changed.

29 Sweeney, D. (2018, August 29). Tired of scofflaws, bus riders call on city and MTA for better bus lane enforcement. Retrieved January 23, 2019, from https://baltimorefishbowl.com/stories/tired-of-scofflaws-bus-riders-call-on-city-and-mta-for-better-bus-lane-enforcement/

30 Santoni, M. (2017, September 21). Downtown Pittsburgh experiments with Liberty Avenue bus lane, sidewalk extension | TribLIVE. Retrieved January 23, 2019, from https://triblive.com/local/allegheny/12759704-74/downtown-pittsburgh-experiments-with-liberty-avenue-bus-lane-sidewalk-extension

CASE STUDIES

The Cone Pilot: Everett, MA and Minneapolis

The "Quick Build" Pilot: Cambridge, MA

The Comprehensive Project: Santa Monica

The Network Project: Baltimore and San Francisco

The "Long TTL"

The Cone Pilot: Everett, MA and Minneapolis

Where transit demand is robust and political support strong, a quick pilot can prove a project's value to transit riders and the public with minimal resources and effort. Everett, Massachusetts is the primary example (and pioneer) of this method. With the mayor's support, Everett city planner Jay Monty planned a one-week trial of a one-mile bus lane down Broadway, the city's busiest arterial, using simple cones to demarcate the bus lane that displaced parking. A part-time operation (5 - 9 a.m.) meant that the lanes were in place only a few hours a day, which meant "everything [went] back to normal and then everyone [could] take a deep breath," as Monty says. Notably, the pilot was opened with no prior public outreach or public meetings. Instead, as Monty says, "the pilot *was* the process."

Monty acknowledges that not conducting traditional public outreach (which "you're trained to do") was unconventional; however, he adds that they received far more input and data from the pilot's first five days than they would have from holding evening meetings that "would have drawn out critics, not beneficiaries...Pilots are a great way to get feedback from everybody," Monty says.

The initial media coverage of the pilot, published three days before it started, was "not positive," and predicted "disaster," but coverage after the lanes opened – with operations to see – turned generally positive. The benefit of "saving folks 10 minutes on their commute" was there for the media to verify and quote.

Minneapolis' Hennepin Avenue TTL "cone pilot" from a rider's point-of-view.
Photo: Aaron Isaacs, Streets.MN (CC BY-NC-ND 3.0 US).

The one-week pilot was extended to nine months and became permanent in September 2017. The City has since added TSP, bus bulb-outs, level boarding, and bus stop access improvements.

Monty notes that the politics of a quick pilot should not be underestimated; it took political courage from the mayor to support the pilot. However, it has paid off: "It's nice to be a leader sometimes... that goes a long way with residents," Monty says.

> ***"the pilot was the process"***

Planners in Minneapolis also used the quick pilot approach on a 1.1-mile stretch of Hennepin Avenue during morning and afternoon peak hours, over three days. The pilot proved the effectiveness of the lanes and garnered positive press and public reception. The city had four main goals: get good data, get feedback, get operational information, and note other changes. The city had expected comments about parking but received "very few comments. We expected more." Only two cars were towed. With the trial over, the city is now considering future roadway designs in the reconstruction of Hennepin Avenue in 2023, while Metro Transit is planning future rapid bus improvements ("E Line") along the corridor.

Boston and Arlington, Massachusetts conducted four-week cone pilots, modeled after Everett's.

Scenes from Boston-area city "cone pilots". (Upper left) City of Everett, MA cone pilot. Photo: City of Everett. (Upper right) City of Arlington, MA cone pilot. Photo MBTA. (Left) City of Boston cone pilot. Photo: Josh Reynolds, Boston Globe.

The “Quick Build” Pilot: Cambridge, MA

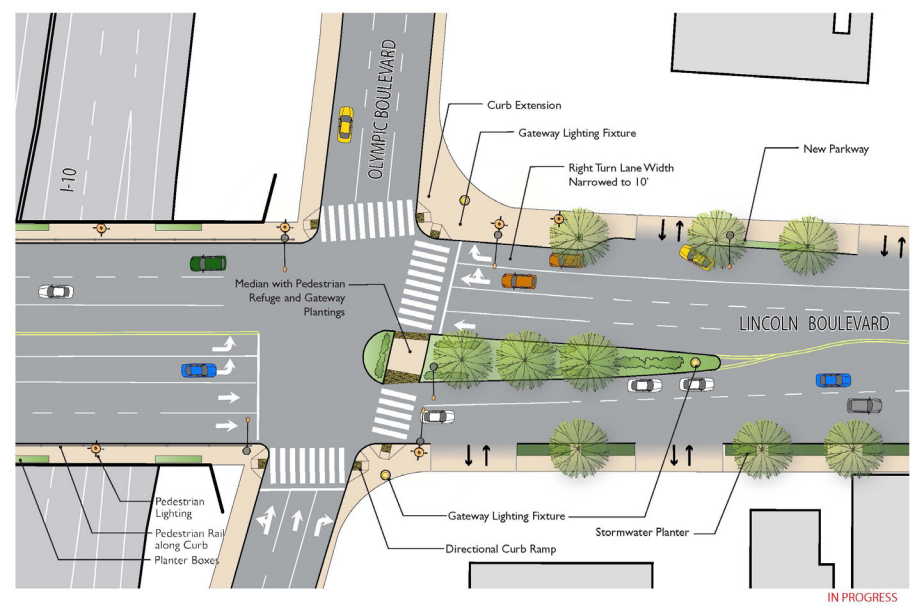
Only miles from Everett, planners at the City of Cambridge and neighboring Watertown, MA also pursued a pilot to address delays and reliability problems on transit routes in the city, which are the second busiest outside of Boston, after Everett. Cambridge planners took into account their community’s expectations for extensive engagement in projects and preferences for process-driven “bigger” projects and decided to build a full-time, red-painted lane demonstration project. With thorough coordination with Watertown, the city managed to complete the build out in two weeks. The coat of water-based red paint is expected to fade away within 6 months (over winter).

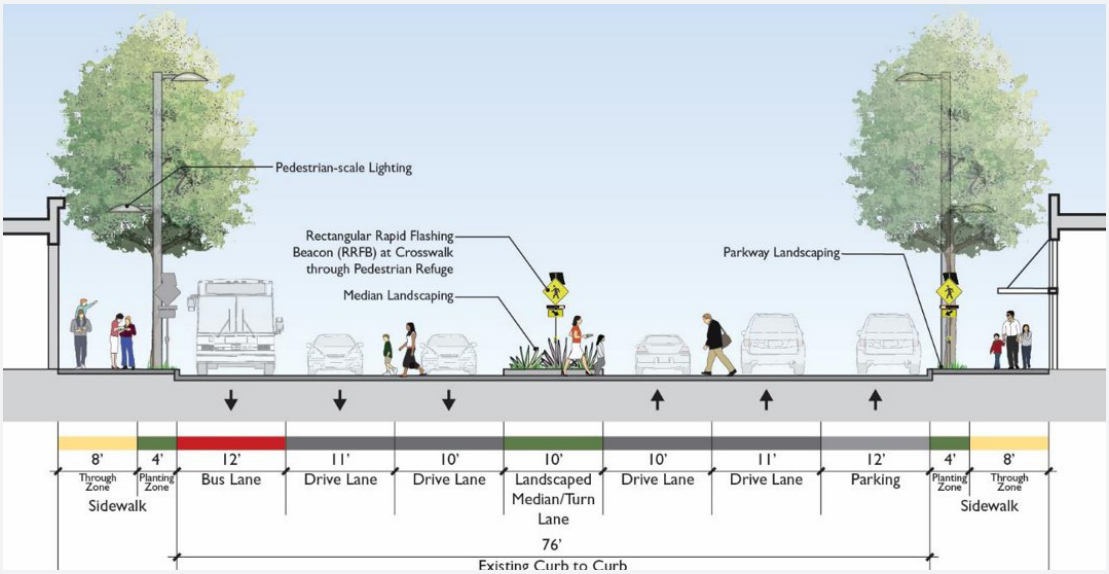
Cambridge/Watertown’s Mt. Auburn Street pilot TTL made their painted lane application temporary; the red paint is expected to disappear within months. Photo: Jesse Costa/WBUR

The Comprehensive Project: Santa Monica

Santa Monica's one-mile TTL traverses the city's major north-south arterial (Lincoln Boulevard) during peak hours. Although city council first approved it in 2005, it became ensnared in politics after grassroots opposition grew over the initial process. The city resurrected the TTL years later, marrying it to LiNC, a comprehensive streetscape improvement project that aims to redesign the land use and transportation functionality of an underperforming corridor. Principal planner Peter James described the approach as "businesses lose two hours [of parking] but gain two crosswalks" and an improved street setting.

The City of Miami also incorporated a TTL into its First Street Complete Street project.



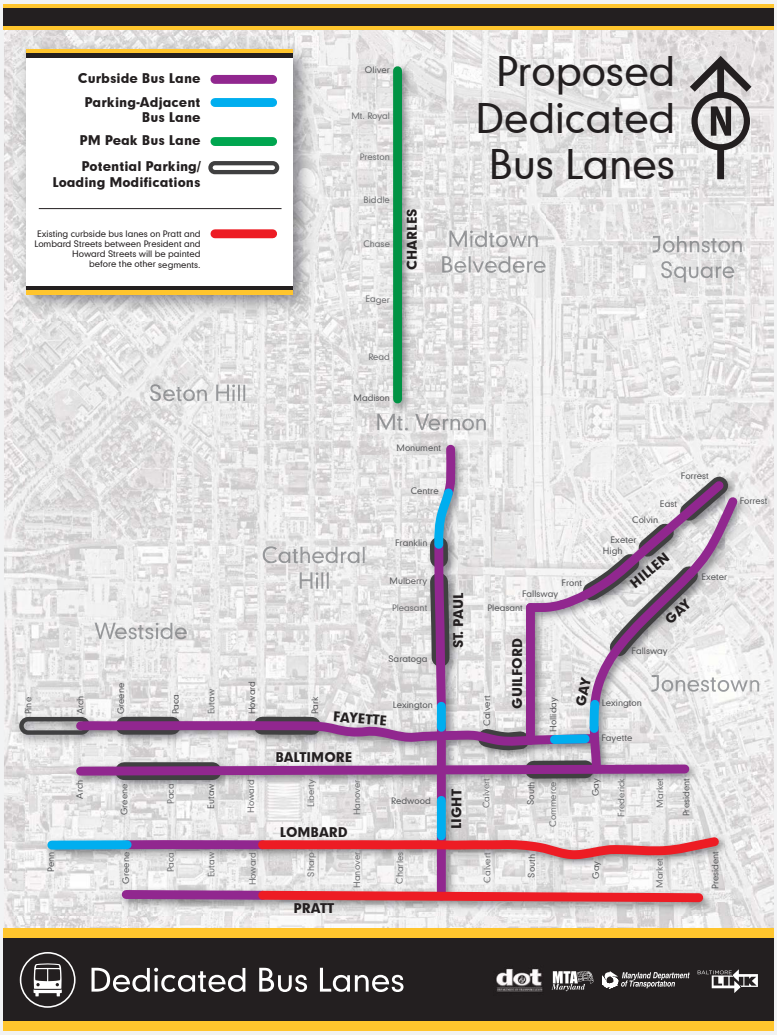


LINC project design. Courtesy of the City of Santa Monica

The Network Project: Baltimore and San Francisco

First suggested by a bike planner, Baltimore's recent TTLs came into being as part of the Maryland Transit Administration's (MTA) system overhaul, branded BaltimoreLink, which redesigned the entire city's network to simplify routes, increase system-wide transit speeds, and boost ridership.

MTA planners developed a multi-step process for considering what routes and segments would benefit most from a bus only lane: they first evaluated transit vehicle hourly volumes and established a threshold of 18 buses per hour as a criterion; segments that had three or more routes were also identified. Finally, MTA planners compared the transit and single-occupancy vehicle person throughput in each corridor. Planners calculated person throughput on the transit vehicle by multiplying average peak load by buses per hour and used the MPO average of 1.3 persons per SOV. As a criterion for a TTL, person throughput on transit needed to be at least equal to person throughput in the adjacent lanes. Senior planner Patrick McMahon noted that future bus lane projects will also consider area rates of vehicle ownership as a criterion.



Proposed dedicated bus lanes for BaltimoreLink. Courtesy MTA Maryland

BaltimoreLink opened in 2017 with 6 new full-time lanes; 2 improved full-time lanes, and 2 peak-hour lanes. Most are approximately 1 mile and curb-adjacent, though in some segments, the bus lanes are parking-adjacent to discourage double-parking, a major concern.

San Francisco is in the process of converting up to 50 corridors into TTLs as part of their Muni Forward program, which seeks to provide a "rapid and transit priority network" serving nearly 70% of all riders.[31] While some of their projects, such as Geary Boulevard, have elements of BRT, and previously were named BRT, the agency is now referring to them as "Rapids."

31 San Francisco Municipal Transportation Agency. (2015). Muni Forward: Implementation Workbook. Retrieved from https://www.sfmta.com/sites/default/files/reports-and-documents/2018/04/muni_forward_implementation_workbook_v16.3_web.pdf

The "Long TTL": Los Angeles and Santa Clara Valley

Long TTLs and especially those that span multiple jurisdictions are challenging to implement and difficult to enforce.

Los Angeles' Wilshire Boulevard was the busiest bus corridor in the country when, in 2009, planners envisioned a traditional, continuous bus-only lane to span its 9.9 miles and four jurisdictions. Initially described as a BRT, but tactical in the sense that it was planned where bus speed and reliability improvements were needed, the project faced intense public opposition in several areas. To move the project forward, planners opted to interrupt the lane in those areas and planned instead 7.7 miles of discontinuous, peak-hour bus only lanes along the corridor. The $31.5 million project, which included significant street improvements, was constructed in phases over two years (2013-2015). At its opening, tow truck-involved enforcement of the peak-hour operations was robust and visible, but the project's ongoing effectiveness has suffered from lax enforcement. The project's length and its multiple jurisdictions make effective enforcement difficult.

Metro Los Angeles' Wilshire Boulevard "Long TTL" project. Photo Metro LA

The Santa Clara Valley Transit Authority (VTA's) El Camino Real project was an effort to install a 17.6-mile bus-only lane connecting six cities along a state-owned route, one of the area's busiest arterials. Initially described as a BRT project, the project was poorly understood; planners found that their descriptions of the project – a "high-capacity" and "high-speed" system similar to what "other countries" have – was alienating to many stakeholders. Although cost savings from improved operations were projected to be significant ($9 million per year), stakeholders did not understand that what cost savings meant was better service. Although the project had important goals for regional transit, it did not explicitly connect with cities' individual goals in a way that might have catalyzed more support. The BRT plan morphed into proposal for an HOV-type bus-only lane, but critical political support faltered after an organized group of car dealers worried about losing passing car customers threatened to move out of one of the cities. Without the full accordance needed among all seven jurisdictions, the project was cancelled in 2014, four years after its inception. The agency now plans to focus on incremental improvements to bus speeds, such as Transit Signal Priority (TSP). In 2017, VTA opened a seven-mile BRT line (Alum Rock-Santa Clara) similar to the one proposed for El Camino Real in another part of the county where only two jurisdictions were involved.

Decision-making & Collaborating

"Who are your decision makers, and what are they going to need to be able to make decisions?"

—Jody Litvak, LA Metro

"Get parties in the room and don't make demands"

—Ted Meyer, SORTA

"It's very important to have a champion, and important to show you're working together"

—King County Metro

Data & Messaging

"How the pilot is received depends on how parking utilization is done"

—Tim McCormick, Santa Monica BBB

"Quantify the Project"

—Eric Carlson, OCTA

"Connect the speed of transit with service quality."

—Adam Burger, Santa Clara VTA

"Quantify your benefits to build your support"

—Michael Rhodes, SFMTA

TAKEAWAYS

Planning

"Only go for the bus lanes in the areas where you need them"

—David Mieger, LA Metro

"Know your constituents"

"Make transit riders feel bought into"

—Liz Brisson, SFMTA

"A project has to show a big benefit"

—Tegin Teich, City of Cambridge

"Go for it!"

—Peter James, City of Santa Monica

OTHER RESOURCES

Agrawal, A. W., Goldman, T., & Hannaford, N. (2012). ***Shared-Use Bus Priority Lanes on City Streets: Case Studies in Design and Management*** (p. 232). San Jose: Mineta Transportation Institute. Retrieved from https://nacto.org/docs/usdg/shared_use_bus_priority_lanes_on_city_streets_agrawal.pdf

This comprehensive report focuses on the policies and strategies behind the design and operations of existing bus lanes in congested urban centers. It describes in detail how cities transportation agencies grapple with the challenge of bus lane enforcement.

Carry, William et al. (2012, March). ***Red Bus Lane Treatment Evaluation***. Presented at the 2012 ITE Technical Conference and Exhibit. Retrieved from https://nacto.org/docs/usdg/red_bus_lane_evaluation_nycdot.pdf

An overview presentation of NYCDOT's extensive evaluation of red lane treatment types, also discussed in greater detail in the authors' 2014 TRB paper (http://docs.trb.org/prp/14-4649.pdf).

Cesme, B. (2017, October). ***Bus Lane Best Practices for Rapid and Effective Implementation in the Washington, DC Region***. Presented at the Ohio Transportation Engineering Conference. Retrieved from http://www.dot.state.oh.us/engineering/OTEC/2017Presentations/59/Cesme_59%20-%20v2.pdf

A presentation with suggested strategies and implementation plans for bus lanes, with an emphasis on enforcement tactics. A benefit-cost analysis of design and enforcement techniques is also presented.

Danaher, Alan R. (2010). ***Transit Cooperative Research Program, Synthesis 83: Bus and Rail Transit Preferential Treatments in Mixed Traffic***. Washington, D.C.: Transportation Research Board. https://doi.org/10.17226/13614

This report provides a synthesis of practice concerning transit preferential transit treatments including Tactical Transit Lanes as well as TSP and queue jumps. It includes a survey of the treatments, programs, interagency agreements, and methods of public input in place in over 50 urban areas. The report also provides detailed case studies of four cities (San Francisco, Denver, Portland, and Seattle) and their programs and projects.

Litman, T. (2016). ***When Are Bus Lanes Warranted?: Considering Economic Efficiency, Social Equity and Strategic Planning Goals*** (p. 23). Victoria Transport Policy Institute. Retrieved from http://www.vtpi.org/blw.pdf

A summary of research on bus lanes, with evaluations of their benefits and costs.

National Association of City Transportation Officials. (2016). ***Transit Street Design Guide***. Washington, DC: Island Press.

An illustrated compendium of transit lane types, design treatments, and project elements. See also NACTO's Transit Street Design website: https://nacto.org/publication/transit-street-design-guide/transit-lanes-transitways/

National Capital Region Transportation Planning Board. (2017). ***Bus Lane Enforcement Study.*** Washington DC: Metropolitan Washington Council of Governments. Retrieved from https://www.mwcog.org/documents/2017/06/30/bus-lane-enforcement-study/

This comprehensive report describes research-based strategies for improving the effectiveness and enforcement of bus lanes. Strategies include physical improvements, law enforcement, information campaigns, and legislative actions.

Ray, R. (2018). ***The Path to Partnership: How Cities and Transit Systems Can Stop Worrying and Join Forces.*** TransitCenter. Retrieved from http://transitcenter.org/wp-content/uploads/2018/05/Collaboration.pdf

A best practices guide on transit agency and city department collaboration that discusses several cities cited in this report.

San Francisco Municipal Transportation Agency. (2017). ***Red Transit Lanes Final Evaluation Report*** (p. 25). Retrieved from https://www.sfmta.com/sites/default/files/reports/2017/Red%20Transit%20Lanes%20Final%20Evaluation%20Report%202-10-2017.pdf

This report describes the SFMTA's early (2013-2014) experiments with red painted lanes and documents their effects on motorist compliance (including an analysis of compliance across varying volume/capacity ratios), traffic speeds, and transit travel times.

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Errors are the authors' own.

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