Transit Priority Treatments

What is it?

Transit priority treatments (e.g. transit signal priority (TSP) and queue jump lanes) allow buses or trains to bypass traffic. These treatments can reduce the transit travel time delay caused by traffic congestion and improve the reliability of transit schedules. Transit priority treatments are a fundamental component for making transit service time-competitive with competing modes. To the extent that they can encourage mode shift, transit priority treatments can also reduce vehicle miles traveled (VMT) and improve environmental quality by reducing greenhouse gas emissions.

TSP facilitates the movement of transit vehicles through traffic-signal-controlled intersections by retrofitting traffic signals with detection systems and installing priority request generators on transit vehicles. Queue jump lanes involve the addition of a travel lane (usually a right-turn lane or bus-only lane) on the approach to signalized intersections, which allows transit vehicles to jump to the front of a queue.

What are the benefits?

- **Mobility**: Reduces in-vehicle transit travel time for users and improves transit schedule reliability. Can also reduce congestion and VMT by making transit more competitive with single occupancy vehicle travel.
- **Environmental**: Reduces the emission of criteria air pollutants and greenhouse gases that are harmful to the environment and human health by reducing transit vehicle idling and also encouraging mode shift to transit.
- **Funding the System**: May reduce operating costs by reducing fuel consumption from idling.

Where is it being used?

Transit priority treatments are used by transit agencies across North America and the world. Examples in the Pacific Northwest include:

- **EmX Bus Rapid Transit**, Eugene-Springfield, Oregon
- **Swift Bus Rapid Transit**, Snohomish County, Washington
- **RapidRide Express Bus**, King County, Washington
- **TriMet**, Portland, Oregon

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1 In this summary, the best available data on program effectiveness is used. Whenever possible, information is provided for the referenced examples; however, this information was not always available.
How effective is it?

Transit Signal Priority

TSP applications are rapidly becoming more popular in the U.S. Typically, transit travel times are reduced by 8% to 12%, depending on the length of corridor, particular traffic conditions, bus operations, and TSP strategy deployed. TSP has also been shown to improve schedule adherence and transit travel time reliability. Increases in general traffic delay associated with TSP have been shown to be negligible, ranging in most cases from 0.3% to 2.5%. These are a few examples of measured benefits:

- In Portland, Oregon, TriMet avoided adding one more bus to a corridor by using TSP, achieving a 10% improvement in travel time and up to a 19% reduction in travel time variability.
- In Tacoma, Washington, TSP with signal optimization reduced transit signal delay approximately 40% in two corridors.
- Los Angeles County Metropolitan Transportation Authority achieve up to a 25% reduction in bus travel times with TSP.
- In Seattle, along the Rainier Avenue corridor, King County Metro bus travel time variability was reduced by 35%.

Transit Queue Jumps

Transit queue jumps have been shown to produce a 5% to 15% reduction in travel times for buses through intersections. These are some examples of travel time savings associated with queue jumps/bypass lanes:

- In Seattle, along NE 45th Street, a 27-second reduction in bus travel time was achieved during the morning peak, with a 12-second reduction during the afternoon peak, and a 6-second reduction, on average, across an entire day.
- In Denver, on Lincoln Street and 13th Avenue, transit queue jumps/bypass lanes reduced delays at bus intersections by 7 to 10 seconds.

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2 https://www.communitytransit.org/
3 Photo courtesy of CH2M HILL.
4 https://www.transit.dot.gov/
8 TCRP Report 118. 2007. p. 4-32.
How much does it cost to implement?

Costs associated with TSP are highly dependent on whether the TSP system is localized to a corridor or centralized and integrated with a transit or regional traffic management center. In general, if existing software and controller equipment can be used, costs may be less than $5,000 per intersection, but costs can increase to $20,000 to $30,000 per intersection if equipment needs to be replaced. Costs for transit detection vary significantly based on the ultimate technology chosen. Additional information on the range of capital and operating costs for different TSP detection systems can be found in TCRP Report 118: Bus Rapid Transit Practitioner's Guide, Exhibit 4-38.

The cost of a queue jump or bypass lane depends on whether there is an existing right of way. If roadway lanes or shoulders are available, the costs are primarily for signing and striping modifications ($500 to $2,000) and the provision of a separate signal for the queue jump treatment ($5,000 to $15,000), depending on the type of detection deployed (loop vs. video). Costs for new lane construction, if required, vary based on the extent of roadway reconstruction, utility modification, and right-of-way acquisition required.

By reducing bus travel times and variability, however, transit agencies have realized both capital cost savings (by saving one or more buses during the length of the day to provide service on a route) and operating costs savings (due to more efficient bus operation) from the implementation of transit priority treatments. For example, due to an annual operating cost savings of approximately $3.3 million in Los Angeles, the relative benefit-cost ratio for TSP associated with two bus rapid transit corridors was estimated to be more than 11:1 over 10 years.

Implementation resources

To implement transit priority treatments, agencies should follow a typical transportation project planning, design, and construction process. The following resources may be helpful for jurisdictions wishing to implement transit priority treatments:

- Transit Signal Priority Handbook, United States Department of Transportation

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13 TCRP Report 118. 2007. p. 4-32.