NCHRP 17-113 COUNTERMEASURES

Install Transit Signal Priority (TSP) Technology (Transit-related Crashes)

INTERSECTIONS

Transit Signal Priority (TSP) reduces transit-related crashes by minimizing red-light delays for buses or trains, improving their movement predictability and reducing conflict with other road users.

Implementation Strategy

How and Where to Apply

- TSP should be applied on corridors with high-frequency transit service, frequent signalized intersections, and significant transit delays, especially in urban areas with mixed traffic.
- Implement TSP by integrating transit detection systems (GPS or sensors) with traffic signal controllers to adjust green and red phases.
- Avoid installing TSP where it may increase transit-related crashes, particularly at intersections lacking adequate pedestrian, cyclist, and signal safety measures.

Use in a Safe System Approach

TSP supports the Safe System Approach by improving signal coordination, reducing delays, and lowering the risk of crashes involving transit vehicles. It enhances safer roads and speeds by creating more predictable movements and minimizing conflicts with general traffic.

Key Stakeholders

State DOTs, MPOs, engineering consultants, construction contractors, freight/trucking associations, advocacy groups, transit agencies, community associations.

Proactive Implementation

Proactive implementation of TSP involves identifying transit corridors with frequent delays, high ridership, or crash patterns involving buses at intersections. Transportation agencies should coordinate with transit operators to assess signal infrastructure and readiness for TSP technology integration. By deploying TSP before issues escalate, agencies can enhance safety, improve service reliability, and support sustainable urban mobility.

Countermeasure Overview

Objective: Ensure that roadway design and traffic control elements support appropriate and safe speeds.
Strategy: Effect safe speed transitions through design elements and on approaches to lower speed areas.

Targeted Solution

CONTRIBUTING FACTORS	▪ Frequent stop-and-go movement of transit vehicles ▪ VRUs
TARGET CRASH TYPE	▪ Angle ▪ Rear-end ▪ Turning
ROAD FACILITY TYPE	▪ N/A
AREA TYPE	▪ Urban

Safety Linkage

NCHRP 500 Series	SAFE SYSTEM APPROACH
Signalized Intersection	Safe Roads
AASHTO'S TOWARD ZERO DEATHS	SAFE SYSTEM ROADWAY DESIGN (TIER 1, TIER 2, TIER 3, TIER 4)
Safer Drivers and Passengers	Tier 3

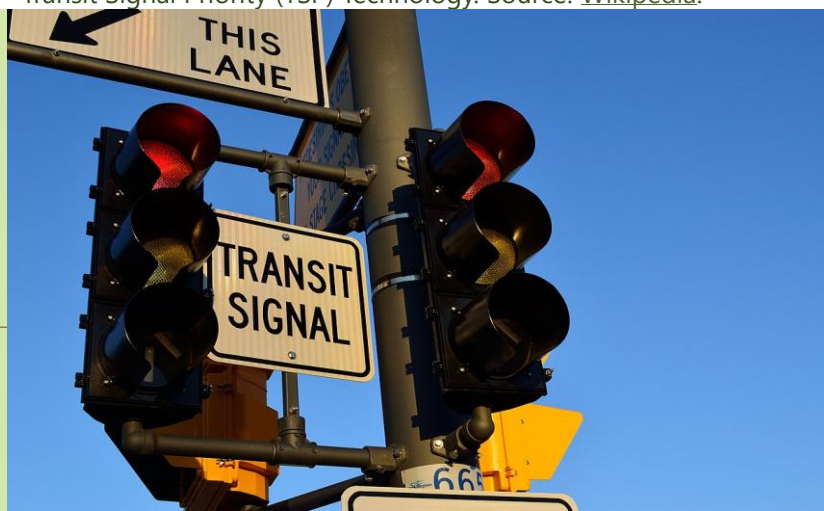
Selected Related Countermeasures

- CM1 Queue jump lanes
- CM2 Dedicated transit lanes
- CM3 Far-side bus stop placement

Cost: $$$$ (High)
Service Life: 10 years
Benefit-Cost Ratio: 3.6:1

Safety Benefits

- Installing TSP technology at signalized intersections increases the number of transit-related crashes. (CMF ID: 2079, CMF ID: 2078)
- To improve safety, TSP implementation should be combined with enhanced pedestrian and cyclist protections, clear signal phasing, and comprehensive intersection safety audits before and after installation.



Transit Signal Priority (TSP) Technology. Source: Wikipedia.

Resources

- FHWA proven-safety-countermeasures
- Transit Signal Priority