Reducing Emissions and Noise at Truck Bottlenecks:
I-5 at the Port of Tacoma

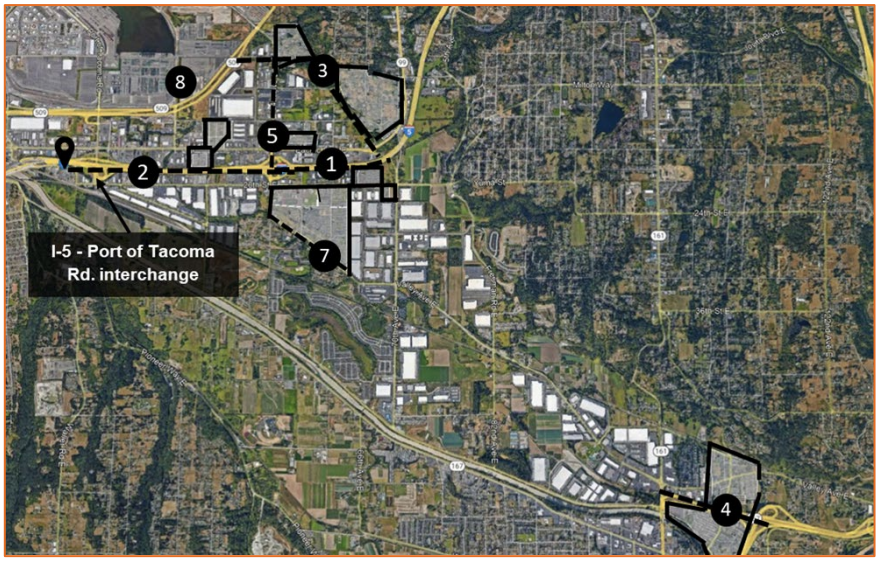
U.S. Department of Transportation
Federal Highway Administration

About the Research

The FHWA undertook research to provide information on strategies to address truck emissions and noise at truck freight bottlenecks, including major highway bottlenecks and intermodal connectors. The effects of hypothetical strategies including infrastructure, operations, vehicle technology, and noise-specific measures, were modeled at three case study locations.

Area Overview

Interstate 5 between Seattle and Tacoma ranks among the top 25 truck bottlenecks in the U.S. based on total truck delay per mile. Approximately 10 percent of the 18,000 daily combination trucks on I-5 serve the Port of Tacoma. Ranked as the fourth largest West Coast port in terms of volume handled, the Port has five major container terminals as well as serving breakbulk and bulk cargoes.



Numbers show modeled links.
Aerial image source: Google Earth.

Scattered pockets of residential development, as well as a high school, are located close to I-5 and the local streets providing access to the Port's terminals. Portions of this area are also owned by the Puyallup Tribe of Indians.

Overall Findings

Most trucks are through traffic on I-5. Strategies that only affect local, port-serving traffic will have modest overall benefits but more substantial benefits on local streets.

Eliminating congestion for trucks (truck-only lanes on I-5) has significant peak period emissions benefits.

Truck replacement and clean truck strategies can have substantial benefits if applied to all traffic.

Noise-specific measures, such as barriers, can provide larger truck noise reductions than other strategies on high-volume roads.

Hypothetical Strategies Tested in Tacoma

Eight strategies were tested for emissions impacts (CO, VOC, NO_X, $PM_{2.5}$, PM_{10}, CO_2e, MSATs) and nine strategies were tested for noise impacts in this case study. Note these are hypothetical strategies and results may vary by location and input assumptions.

Truck-only lane on I-5

Reduces emissions of some pollutants by up to 15–33% in the afternoon peak. Very modest noise reductions (<1 decibel).

New road (State Route 509/167 extension)

Small emissions decrease on existing roads; new emissions and noise source from new roads.

Improve interchange at Port of Tacoma Rd.

Reduces study area emissions 3–7% in the afternoon peak. Very modest noise reductions (<1 decibel).

Optimize traffic signals on 54th Ave.

Reduces emissions 4–10% along 54th Ave., 1–2% for the study area. Very modest noise reductions (<1 decibel).

Reroute trucks

Reduces noise near a local street by up to 6 decibels by rerouting truck traffic.

Retire and replace pre-2007 trucks

Reduces most emissions 6–23% from replacing trucks serving port (5% of study area; already implemented by the Port).

Reduce idle time at terminal

Reduces study area emissions up to 4% based on 10% reduction in idling time.

Optimize drayage trips

Reduces study area emissions up to 3%. No perceptible noise impact.

Construct noise barriers

Reduces noise by at least 10 decibels on average.

Methodology and Key Assumptions

- Emissions and noise from on-road vehicles (cars, trucks, buses) were modeled using the U.S. EPA MOVES3 model (7–8 a.m. and 4–5 p.m. weekday traffic) and FHWA Traffic Noise Model v3.0 (12–1 p.m. weekday traffic).
- Baseline traffic volume and speed data were taken from the FHWA Database for Analysis of Noise and Air Quality (DANA). Changes in vehicle activity are based on a variety of assumptions documented in the project report.
- The hypothetical strategies have not been evaluated for feasibility, costs, or other benefits or impacts. Nothing in this case study should be construed as a recommendation.