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Mobiliti—A New Tool to Guide Safer, More Equitable Traffic Management Strategies

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Issue

Regional studies examining transportation-related emissions and vehicle miles traveled (VMT) highlight the disproportionate safety and environmental impacts of passthrough traffic on vulnerable communities – traffic that travels through, but does not originate or end in these communities. Transportation practitioners and researchers have sought to address these inequities with locally tailored, context-sensitive traffic management strategies (e.g., lowered speed limits on residential streets). However, decision makers must carefully consider the network-wide tradeoffs these strategies may introduce, which can complicate their effectiveness.

This policy brief presents a network analysis method that is accessible to local and regional transportation agencies using Mobiliti, a high-performance traffic simulator currently available for research purposes. However, we demonstrate Mobiliti's practical applications for transportation agencies. Developed by research scientists at Lawrence Berkeley National Lab, Mobiliti offers traffic assignment solutions and regional simulation capabilities, allowing for high-resolution, iterative exploration of road treatments and routing strategies. Analysts can manipulate network characteristics and vehicle behavior by adjusting parameters such as lane count, speed limit, and the percentage of vehicles, to dynamically optimize travel times. These capabilities can support transportation equity evaluations by giving network managers deeper insights into the mutual relationships between local and regional traffic dynamics and the resulting social impacts.

Details about the simulator are contained in our full report, listed at the end of this brief.

A San Jose Case Study

We used Mobiliti to test strategies included in Move San José, a citywide access and mobility plan that proposes a Safer Streets strategy, designed to prioritize the needs of those with mobility impairments, adding bike lanes, building bus boarding areas, reducing speed limits, and creating café/retail space, among other things. Lowering speed limits using Mobiliti, we simulated putting a 20 mph speed limit cap on residential streets in the city's Equity Priority Communities (the study area) to explore whether that would reduce passthrough trips and improve local traffic safety. Our results show fewer passthroughs on local roads, collectors and arterials with the lower speed limits, but more traffic elsewhere in the vicinity of the study area (See Table 1). For example, one section of Ocala Avenue, a collector road in the study area, saw a 72% reduction in passthroughs per day due to the lower speed limit, down 279 from 385.

Road Class	Study Area Passthrough Traffic	Network Impacts in Citywide Equity Priority Communities (excluding study areas)
Local roads	-48%	+76%
Collectors	-39%	+34%
Arterials	-30%	+62%
Highway	N/A	+43%

Table 1. Percent Change of Passthrough Trips from Baseline to Experimental Scenarios with Lower Speed Limit.

Research Insights

Fewer pass-through trips might lead to safer conditions on residential streets. However, less congested streets may compel drivers to speed up and ignore speed regulations, counteracting the safety improvements.

The increased traffic load on surrounding highways and arterials has a mixed safety impact. An increase in traffic on arterials heightens the risk of conflicts between autos and non-motorists. However, higher traffic volumes on arterials prompt drivers to slow down, thereby broadening their field of vision and improving responses to roadway activity, reducing the risk and severity of such conflicts.

Equity Priority Communities contain a disproportionate share of the highways and arterials in the city, so diverting local traffic away from residential streets may concentrate safety hazards along these higher volume roadways. The slow streets strategy has an overall beneficial impact on residential streets in Equity Priority Communities and a mixed impact on the surrounding network. While the real-world impact of directing traffic away from residential streets in these communities remains to be seen, our research can inform intra- and interjurisdictional corridor management planning. While this study focused on safety, Mobiliti also supports emissions analyses.

Policy Considerations

City-level transportation decision support systems can leverage advancements in data science and technology to enable staff to diagnose issues, test options, and prioritize projects. For example, San Jose DOT's Decision Support System (DSS) includes a Projecting Outcomes module that can be supported by tools like Mobiliti that allow for quantitative analysis of how elements like traffic flow, routing, and trip type respond to traffic management strategies. Neighboring Bay Area jurisdictions could also adopt this approach which would promote increased intercity collaboration around addressing inequities in exposure to traffic externalities.

Metropolitan Planning Organizations (MPOs) can also include high-performance simulators like Mobiliti in their technical assistance programs. We foresee tools like Mobiliti supporting both local and regional agency staff in analyzing projected outcomes of traffic management strategies. For example, the Bay Area Metropolitan Transportation Commission (MTC) could include Mobiliti in the Bay Area Spatial Information System (BASIS) to support their Transportation and Infrastructure Technical Assistance programs.

More Information

This policy brief is drawn from the research report "Matching Technique with Authority: A Study of How Local DOTs Can Narrow the Gap between their Network Management Authority and their Analytical Capacity," prepared by Rowland Awadagin, Herbert-Faulkner, Ph.D., Jane Macfarlane, Ph.D., Karen Trapenberg Frick, Ph.D., and Joan Walker, Ph.D. of the Institute of Transportation Studies at UC Berkeley, which can be found at https://www.ucits.org/research-project/2023-21/. Please contact the lead author at dagin_faulkner@berkeley.edu for more information.

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