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# A Roadmap for Integrating Complete Streets Infrastructure into Pavement Asset Management Systems

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# POLICY BRIEF

## Issue

Transportation agencies nationwide use pavement management systems (PMS) to maintain roads and highways. A PMS is an asset management system applied to a network of pavements. It is used to inventory the network, evaluate its current condition and predict its future condition under different maintenance and rehabilitation plans, and proactively maintain it to meet performance goals in a cost-effective manner.

Pavement management has typically been used for auto-oriented infrastructure. However, state and local agencies are increasingly adopting complete streets policies to promote roadway designs focused on the needs of all transportation users (Figure 1). Complete streets designs include new assets such as pedestrian and bicycling infrastructure that are not typically incorporated into mainstream pavement management systems and do not have asset management systems of their own. Including pedestrian and bicycling features into asset management systems (directly in PMS or via other approaches) would help ensure that sidewalks and bike lanes are properly maintained over time and continue to provide the safety, environmental, and public health benefits attributed to complete streets design.

Researchers at the Georgia Institute of Technology and the University of California,

Davis surveyed all 50 state departments of transportation and conducted in-depth interviews with agency experts to understand the implementation status of complete streets asset management, identify what state transportation agencies need to improve their asset management plans, and develop a road map for implementing complete streets asset management.

## Key Research Findings

**States that have enacted complete streets policies are often missing performance measures and targets to support these policies.** PMS need to include performance measures related to safety, functionality, usage, connectivity, and accessibility to help prioritize maintenance of complete streets features. Usage, connectivity, and accessibility data can also be used outside the PMS to analyze the active transportation network and help agencies build future assets in the right places.

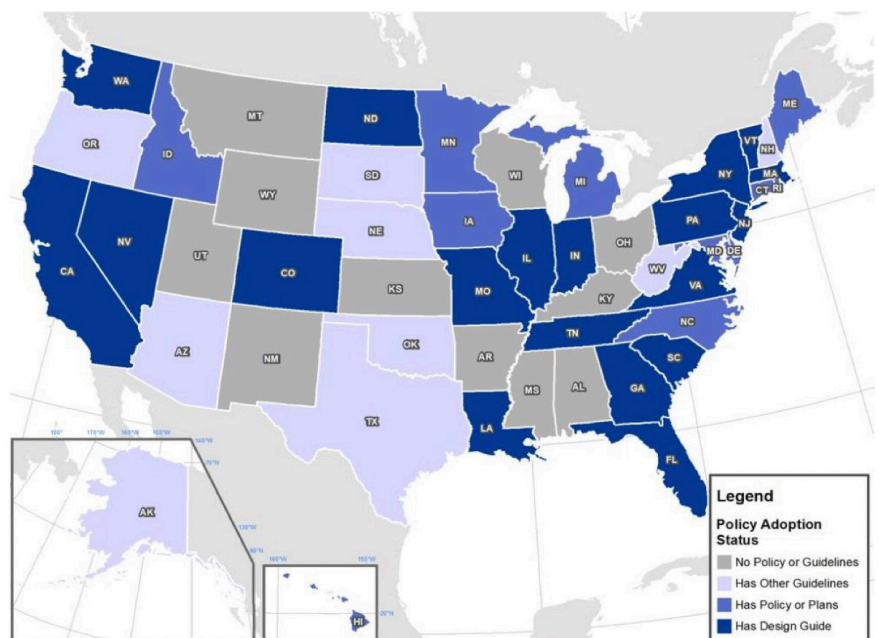


Figure 1. States that have adopted complete streets policies or guidelines

**Most agencies lack a condition rating system for their complete streets assets akin to their pavement condition rating system.** A condition rating system that identifies needed maintenance and appropriate treatment options can be used to communicate funding needs to decision makers. Condition surveys collect data that are used to calculate performance measures. For example, data on the unevenness of the surface could inform a safety performance measure. Survey respondents named four categories of performance to measure that can support efforts to identify and prioritize maintenance and rehabilitation: safety, comfort, deterioration rate, and utilization.

**Most agencies lack a prioritization approach for their complete streets assets akin to their pavement management prioritization methods.** Prioritization uses the condition ratings and costs of the appropriate maintenance to identify projects with the highest benefit/cost ratio within the available budget. Prioritization requires some knowledge of the deterioration rate for the assets (e.g., through use of performance models) and a conceptual identification of appropriate treatment(s) (e.g., through use of decision trees).

**Transportation agencies do not have cost-effective methods of collecting data on the presence, condition, usage, comfort, and safety of their pedestrian and bicycle network.** Without data on performance measures for pedestrian and bicycle features, treatments cannot be appropriately identified. Survey respondents indicated that current data collection methods are too costly and labor intensive to be used extensively. Measures for safety and usage were identified as the most difficult to collect due to data inaccuracy and limited data collection capacity at a network level, respectively. Existing cost-effective (automated or semi-automated) systems for pavement condition surveys are not all directly applicable to complete streets assets.

**Adoption of performance measures and dedicated organizational structures could alleviate some of the challenges to implementing complete streets projects.** Half of surveyed agencies responded that funding and lack of resources were their primary challenges to implementing complete streets, with right-of-way and construction costs

identified as the main costs. Interviewees suggested that complete streets programs are not given a high enough priority to motivate dedicated funding because they lack performance measures. The survey also indicated that lack of a dedicated organizational structure around complete streets contributes to the lack of funding. Furthermore, complete streets projects cover many jurisdictions, crossing from state- to city- or county-owned roads, and do not fit neatly into one existing office at most DOTs.

## Policy Implications

This research highlights the following needs for effective management and funding of complete streets assets: 1) An organizational structure to support complete streets planning, implementation, and asset management, including a dedicated coordinator or liaison within the transportation department; 2) Asset management systems to provide data and analysis to support planning, construction, and maintenance of the network; 3) Performance measures tied to the goals of the complete streets network; 4) Condition ratings systems to quantify performance; 5) Multi-criteria prioritization approaches; and 6) Cost-effective asset condition data collection technologies. Performance measures should support the goals of safety, comfort, managing deterioration, and utilization, and may also be tied to policy goals such as emissions reduction or active transportation usage levels.

## More Information

This policy brief is drawn from “Technology Review and Roadmap for Inventorying Complete Streets for Integration into Pavement Asset Management Systems,” a report from the National Center for Sustainable Transportation, authored by April Gadsby and Yichang (James) Tsai of the Georgia Institute of Technology and John Harvey of the University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/technology-review-and-roadmap-inventorying-complete-streets-integration-pavement-asset>.

For more information about the findings presented in this brief, contact James Tsai at [james.tsai@ce.gatech.edu](mailto:james.tsai@ce.gatech.edu).

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