

THE INNOVATIVE DOT

**Focus Area 5:
Improving Options for
Mobility and Access**

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State transportation departments are tasked with improving travel options and experiences for everyone, not just drivers. Sometimes walking, cycling, or public transportation can provide access to destinations more efficiently and cost-effectively than automobiles. These modes are critical to providing access to jobs, school, and other destinations for those who cannot or prefer not to drive.

In this section:

- Make Urban and Metropolitan Transit a Key Partner
- Support Statewide Transit for Job Access and Economic Growth
- Enact Policies That Support Complete Streets
- Provide Leadership in Promoting Bicycle and Pedestrian Travel
- Update Design Policies and Standards



FOCUS AREA 5: IMPROVING OPTIONS FOR MOBILITY AND ACCESS

Make Urban and Metropolitan Transit a Key Partner

The Opportunity

In most American cities and metropolitan areas with transit service, stand-alone transit agencies are responsible for funding their own capital projects and operating service, whether through funds generated from their own revenue sources or through assistance from their state legislature, the federal government, or local governments. With very few exceptions, state departments of transportation (DOTs) have not taken on a role of providing transit service.

However, current trends in state DOT budgets are making it clear that states can no longer meet mobility needs predominantly through expanding road and highway capacity, nor does the public want this from DOTs. In a poll led by Transportation for America, over 59 percent of respondents said that increasing transit was the best way to address traffic congestion, instead of continuing to build and expand roads.¹ Americans are even willing to pay for this investment, as evidenced by the ballot measures that have passed in cities and metropolitan areas such as Charlotte, Denver, Dallas, and Los Angeles.² By working more closely with their partners in the transit world, DOTs may be able to achieve better system performance with smaller investments and meet their constituents' desire for more choices.

This is not necessarily about state DOTs providing funding for transit—though many do, and it is sometimes the least costly way to solve a transportation problem. Funding aside, basic changes to project development policies and adoption of design standards that better enable state roads to accommodate transit can greatly assist transportation agencies in meeting their service mandates.

What Is It?

Investing in and planning for transit represent relatively new undertakings for many state DOTs. By and large, they focus on roadway infrastructure, both for passenger and freight service, and providing metropolitan and urban transit is not typically one of their core responsibilities. In many states, highway and transit responsibilities are in separate divisions within the DOT. In some cases, similar to restrictions on the use of motor fuel taxes, laws prohibit direct DOT sponsorship of or an act of assistance to a transit agency, other than as a distributor of federal transit funding assistance. In the past, DOTs and transit agencies—especially larger transit agencies—pursued projects somewhat independently of one another, sometimes leading to inefficiencies and a lack of coordination that raised project costs or thwarted desired outcomes.

However, most states do provide some state level of funding to transit agencies, in addition to acting as a pass-through for federal funding.³ Improved partnerships between state DOTs and metropolitan transit can result in both better transit service and a reduced need to provide additional vehicle capacity.

1 Transportation for America. (2010, March). *Future of Transportation National Survey*. Retrieved 1/12/14 from <http://t4america.org/maps-tools/polling/2010survey/>.

2 Conley, L. (June 2012). "Paying for Infrastructure." *American City and County*. Retrieved 8/15/12 from <http://americancityandcounty.com/finance/paying-infrastructure>.

3 National Conference of State Legislatures. (2011, May). "A 50-State Review of State Legislatures and Departments of Transportation." Retrieved 8/1/12 from <http://www.ncsl.org/documents/transportation/FULL-REPORT.pdf>.

The key is for the state DOT to better understand and identify where transit offers strategic benefits and mobility potential. As discussed in further detail later in this section, this is possible through a variety of approaches. In some cases, travel demand is concentrated between particular origins and destinations, such as between college towns and larger metropolitan areas, or to and from major employment centers or corridors. The state DOT can focus investment in transit service in these areas—even if it is through assisting a non-DOT agency with operations—to forestall the need for expensive roadway capacity projects to serve a relatively confined travel demand.

DOTs can also focus efforts on strategic highway and street corridors under their purview where transit agencies are already providing service. Many routes that are highly useful for transit service—because of their direct connections between major centers of employment, commerce, and activity throughout cities and metropolitan regions—are controlled by state DOTs, and better design and operation to make transit a convenient and desirable travel option can greatly increase these routes' effectiveness.

Implementation

At its heart, this initiative involves partnerships between transit authorities and state DOTs. Even in the rare cases where state DOTs are also responsible for urban transit operations, such as in Maryland and Delaware, planning for road projects and for transit does not always occur in the same room. Planning and designing road projects with transit in mind involves a paradigm shift away from movement of vehicles and toward movement of people.

Nearly all state transportation agencies were formed from multiple predecessor agencies focused on individual elements of an overall transportation system, such as highways, ports, and aviation. The dominance of automobiles and trucks in American personal and commercial travel patterns has kept highways and roads in the top position in many integrated transportation agencies. Support for transit does not need to mean directly providing transit service, but rather can mean bringing transit to the table in discussing approaches for meeting urban and metropolitan area mobility needs.

Detailed Steps

With this in mind, state transportation agencies can take the following actions:

- 1. Align project selection criteria and design principles and standards to include transit as a potential roadway user.** In many cases, the addition of transit service can increase the number of people a transportation facility serves, especially on corridors nearing the limits of their vehicle-carrying capacity and facing the need for capacity expansion.

Maximizing impact means not only advancing projects that will serve potentially successful transit lines, but also including transit-facilitating features in the project design and ensuring that these features are consistent with the transit agency's operational policies. State roads that will accommodate transit service should be designed and constructed so that transit can use them efficiently; this includes attention to the following elements:

- Enhanced sidewalks and crosswalks that allow pedestrians appropriate access to transit
- Bicycle lanes or parallel facilities so that transit's reach to non-motorized travelers can be expanded
- Auxiliary lanes or other features, such as turn lane storage or enhanced roadway shoulders, that allow buses and other transit vehicles priority at traffic signals and ways to move past long queues of traffic (commonly referred to as "queue jumps")
- Lanes for exclusive bus use along the full length of a corridor

- Appropriate locations and right-of-way for enhanced stops and stations, recognizing in particular the needs of passengers waiting for service and for transit vehicles to re-enter roadway traffic once they have completed a stop
- Designing and timing traffic signals to prioritize bus movement at intersections. In its most basic form, this may entail the use of queue jump lanes to allow a bus or other transit vehicle to reach the front of a traffic queue, although more advanced systems of signal priority feature two-way communication between signal equipment and transit vehicles.

2. Identify the gaps in the cost of transit-enhanced DOT projects and available funding.

This is the key to avoiding a ‘go-it-alone’ strategy that forces state DOTs and transit agencies to spend different amounts of money on separate projects serving separate travel purposes when pooling resources would actually provide a greater benefit. Adding transit facilities to a state infrastructure project may increase that project’s cost, but it is likely that the incremental increased cost would be less than what a transit agency would spend on new capital construction for premium transit routes. Working with the transit agency to determine funding gaps, state DOTs can provide the additional necessary funding to transit agencies as a cost-sharing opportunity and a relatively low-cost way to advance a transit project.

3. Provide technical assistance to transit agencies to determine appropriate facilities.

In the case of smaller transit agencies, a state DOT already has an oversight role in how some operational funding is used (specifically funding provided by the federal government). The DOT can provide helpful technical services to allow the transit agency to make better decisions on where to focus its resources for corridor improvements and service enhancements. These technical services include transit demand modeling and forecasting, traffic simulation, and traffic signal timing support. Modeling and forecasting services in particular can be useful to a transit agency determining the potential for transit use and where the most effective projects may be advanced.

4. Provide direct highway access to transit facilities. Providing this access allows a DOT to utilize the capacity already offered by a transit system and conserve resources by shifting auto travel to transit within a corridor. It also offers the potential for increased transit ridership, which allows transit agencies to recover a greater share of their costs for a given level of service provided. Interchange and ramp projects from regional expressways to transit stations with parking facilities are one way to provide this access. The Atlanta region, for example, provides direct freeway ramp access from the Georgia 400 expressway to the MARTA North Springs station’s park-and-ride facility, and the Washington, DC, region has a comparable example, with its direct ramp access to the Greenbelt Metro rail station.

Case Study

Greater Washington, DC Region

The Washington Metropolitan Area Transit Authority (WMATA) has developed a plan for a network of enhanced bus routes (the Priority Corridors Network, or PCN) that, because of the multi-state nature of the Washington region, uses state arterial roads to carry transit service.⁴

⁴ Washington Area Metropolitan Transit Authority. (2011). *Priority Corridor Network Plan*. Retrieved 9/19/13 from http://www.wmata.com/pdfs/planning/110926_PCN_Report_Final.pdf.

Priority bus service was a topic of discussion in the Washington region for several years prior to the formal development of the PCN, but insufficient funding from WMATA and a lack of targeted focus from state agencies kept the idea largely confined to a conceptual understanding. Perhaps the most significant move toward implementation of the idea was WMATA's receipt of a Transportation Investment Generating Economic Recovery (TIGER) grant in 2009 for a variety of projects that will make priority bus operations along surface arterial roads competitive with vehicle travel. Implementing these TIGER grant-funded improvements has required partnership with the various state DOTs that control the roads in the PCN.⁵

The TIGER grant covered a range of proposed improvements, including:⁶

- **Wisconsin Avenue Bus Priority Improvements (street controlled by the DC Department of Transportation).** Capital improvements include transit signal priority at multiple intersections and real-time bus arrival display technology at select express service stop locations. The amount awarded from the TIGER grant was approximately \$700,000.
- **Addison Road Improvements (road controlled by Maryland State Highway Administration (SHA)).** This includes upgrades to bus shelters along the existing WMATA P12 bus route with real-time arrival prediction displays at bus stops. The amount awarded from the TIGER grant was approximately \$200,000.
- **University Boulevard Bus Priority Improvements (road controlled by Maryland SHA).** Improvements include four queue jump lanes, transit signal priority at nearly 20 intersections, and a number of bus stop enhancements, such as real-time arrival prediction displays. The amount awarded from the TIGER grant was approximately \$1.3 million.
- **U.S. Route 1 Bus Priority Improvements (road controlled by Maryland SHA).** Capital improvements include queue jump lanes and transit signal priority at multiple intersections. The TIGER grant amount was just under \$1 million.
- **Viers Mill Bus Priority Improvements (road controlled by Maryland SHA).** Capital improvements include a queue jump lane and real-time bus arrival displays at several stations along the route. The amount awarded from the TIGER grant was approximately \$300,000.
- **Potomac Yard Transitway (road controlled by the Virginia DOT).** One of the largest individual corridor enhancements in the TIGER package, this includes the design and addition of a bus transit-way in the median of U.S. 1 within Alexandria's city limits, providing exclusive right of way for buses. While additional funding is needed to fully construct the proposed passenger amenities, the bulk of this TIGER grant amount (approximately \$8.5 million) has been dedicated to the transit-way.
- **VA 7 (Leesburg Pike) Bus Priority Improvements.** Improvements include real-time arrival displays at several express service bus stops and transit signal priority at a number of intersections along the corridor. The TIGER grant amount was approximately \$1.3 million.

5 Metropolitan Washington Council of Governments. "59 million TIGER Grant Awarded to the National Capital Region." Retrieved 9/19/13 from <http://www.mwcog.org/uploads/committee-documents/IV1eW15d20120207152335.pdf>.

6 *Ibid.*

The Maryland SHA has voiced its support for this collaboration,⁷ with specific roadway enhancements to include timing traffic signals to prioritize buses using the PCN and constructing queue-jumper lanes and facilities so buses may continue to achieve timely operations. Coordination between SHA and WMATA to design and implement these improvements is ongoing at the time of this publication, with completion expected in 2013.

Resources

Cambridge, Massachusetts: Cambridge Systematics, Inc. Requested by the American Association of Highway and Transportation Officials. (2006, April). The Role of State DOTs in Support of Transit-Oriented Development. http://www.fta.dot.gov/documents/Project_25-25_Task_20_final_report.pdf.

The research described in this report addresses the role that state DOTs can play in supporting transit-oriented development.

Chrisholm-Smith, G. (2011, September). Research Results Digest 361: State DOT Public Transportation Performance Measures: State of the Practice and Future Needs. National Cooperative Highway Research Program. Transportation Research Board: Washington, DC. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rrd_361.pdf.

This report provides a survey of state DOTs using transit performance measures to inform investments and decision-making. It also provides a summary of best practices and case studies.

Ehl, L. (2011, November 28). “Innovations—State DOT and Transit Agency Partner to Ease Congestion, Increase Transit Use.” Transportation Issues Daily. <http://www.transportationissuesdaily.com/innovations-state-dot-and-transit-agency-partne/>.

This article describes the Interstate 55 Bus-on-Shoulder Demonstration Program, a pilot program in the Chicago area that would convert shoulders on the interstate to express bus lanes during heavily congested times of day to improve transit service. The program involves a partnership between the Illinois DOT, the Regional Transportation Authority, and Pace Suburban Bus.

Wisconsin DOT Programs for Local Governments—Public Transportation. Retrieved 8/7/12 from <http://www.dot.wisconsin.gov/localgov/transit/index.htm>.

This website describes a number of funding assistance programs the Wisconsin DOT offers to local governments to support the provision of transit.

⁷ Maryland Department of Transportation, State Highway Administration. (2010, February 5). Letter from Maryland State Highway Administrator Neil Pedersen to Diana Zinkl, Chair of the Riders’ Advisory Council. Retrieved 9/19/13 from <http://odd.greatergreaterwashington.org/files/2010/shapcnresponse.pdf>. This letter of support for the corridor from Maryland State Highway Administrator Pedersen mentions signal priority and congestion management projects on PCN arterials as key strategic approaches to modifying state highways to better serve transit operations.

FOCUS AREA 5: IMPROVING OPTIONS FOR MOBILITY AND ACCESS

Support Statewide Transit for Job Access and Economic Growth

The Opportunity

States have a great deal to gain from seamless public transportation between cities, in rural areas, and between rural areas and cities. While state transportation agencies have traditionally focused on roadway projects, public transportation investments can often be the most efficient and cost-effective way to improve intercity and rural travel for both riders and drivers. Intercity and rural transit provides job access for those who do not drive — currently 30 percent of Americans⁸ — as well as access to hospitals, schools, shopping, and social services for those who cannot or choose not to drive, or cannot afford to drive.

By operating separately from transit providers, most state DOTs miss opportunities to integrate different transportation modes that support intercity and rural transit. Partnering with regional transit authorities, intercity bus providers, and Amtrak to provide better-integrated transit service between cities and along corridors will encourage local and long-distance transit travel with more frequent and reliable service, relieving pressure on highways and improving travel options for residents in rural areas.

What Is It?

States can support intercity and rural transit by directly funding rail and bus systems, by providing technical assistance to small city and rural transit agencies, and by coordinating service providers. Strategies will vary by state according to structural, legislative, and funding contexts. States that already hold some control over the funding or operations of transit systems will have more autonomy and flexibility to work with transit agencies, whereas other states will need to build solid partnerships between roadway and transit authorities. In most cases, state DOTs will first need to modify their practices to integrate transit into the decision-making process. Specific policies that can support intercity transit development include the following:

Partnering with regional transit authorities, intercity bus providers, and Amtrak to better integrate transit service. State DOTs can coordinate activity between public transportation service providers across the state. In many cases, it is helpful for the state to act as a central database for statewide transit information and contacts. States can also provide a central source of information about public transportation to help riders who use multiple systems and lead efforts to coordinate fare payment with a universal pass program. In addition, through direct contracts with private transportation providers, states can help bridge gaps in a statewide network.

Supporting development around intercity passenger rail and bus stops. To maximize the economic potential of public transportation investments, states and local municipalities should actively encourage development around rail and bus stations and create incentives to attract job creation and housing within walking distance. For example, it is often necessary to provide parking for rail and bus stops, and most states have found it helpful to construct structured parking to preserve land area for private development. States can partner with local public and private organizations to directly fund parking construction. They can also work with local agencies to identify ways to improve roadway and non-roadway access in the station area.

8 Federal Highway Administration. (2010, January). "2009 National Household Travel Survey." Retrieved 8/21/12 from <http://nhts.ornl.gov/publications.shtml>.

Using conventional DOT funds for roadway projects that support transit. State DOTs that are not directly involved in transit operations can still provide and enhance highway connections to intermodal hubs and use highway and automobile capacity-based funds to provide parking.

Directing funding or in-kind assistance to transit providers. States can support intercity transit by committing operating funds, purchasing existing rail tracks and right-of-way, or purchasing new right-of-way for dedicated transit alignments.

Implementation

For some state DOTs, direct involvement in transit may be perceived as an expansion of their scope of work, and may therefore require high-level policy reform. If reform only requires DOT action, the transportation executive can allow the DOT to collaborate on transit activities or authorize a particular reform. If state legislative action is required, the transportation executive should work together with key political actors, including the governor and members of the state's transportation legislative committee.

Once the framework is established and the state's role in transit is recognized, states can support intercity transit projects by taking the following steps:

- **Modify policy to officially recognize the role transit plays in the greater transportation system.** This should identify areas near transit stations and along transit corridors where critical access to existing transit infrastructure is currently lacking, and adopt evaluation and decision-making metrics that favor projects in those areas that improve transit access (such as infrastructure to support walking and biking).
- **Identify and implement a funding mechanism for transit projects.** It is important to anticipate the costs of intercity transit and to secure funding for activities such as improving station areas, building intermodal facilities, assisting with direct operating costs for improved service, and coordinating activities between state partners.
- **Convene public and private transit providers and develop a statewide framework for interagency operations.** It may be necessary to create an independent, statewide transit authority to oversee this work.

Case Studies

Maine: Intercity Transit Spurs Economic Development

The Northern New England Passenger Rail Authority (NNEPRA)⁹ was created by state legislative action in Maine in 1995, at the request of former Governor Angus King, Transportation Commissioner John Melrose, the state Chamber of Commerce, the Maine DOT, and local business leaders, to establish and operate modern passenger rail in the state. This action was in response to a citizens' initiative known as TrainRiders/Northeast, which collected 90,000 signatures calling for passenger rail service between Portland and Boston.¹⁰

Intercity passenger rail was viewed as an important symbolic and logistic connection with Boston, the economic center of New England. Even those who did not use the rail themselves viewed it as a key

⁹ Amtrak. "About NNEPRA." Retrieved 8/22/12 from <http://www.amtrakdowneaster.com/about>.

¹⁰ Pence, H. A. "The People's Train: Amtrak's Downeaster." Community Transportation Association. Retrieved 8/21/12 from http://web1.ctaa.org/webmodules/webarticles/articlefiles/Amtrak_Downeaster.pdf.

link to southern New England, which attracted investment in Portland and throughout the southern Maine coast.

Today, NNEPRA is responsible for marketing, food service, and station-area activities, and negotiates with Amtrak to operate the trains. Funding for NNEPRA comes through ticket revenue and state and federal support. Though the service runs through New Hampshire and Massachusetts, only Maine contributes direct funding. Local municipalities are responsible for maintaining and operating transit stations.

The Amtrak service, known as the Downeaster, has spurred development since service began in December 2001. The following stations have experienced significant growth and economic activity¹¹:

- Old Orchard Beach, Maine. Traditionally only a seasonal destination, it is now home to a new \$22 million residential and retail complex with over 800 new housing units for year-round residents and shoppers.
- Biddeford-Saco, Maine. Downtown Biddeford-Saco is being renovated with \$300 million in development projects underway within walking distance of the Downeaster train station. New retail, office, residential, and restaurant facilities are built or are under construction, including a \$2.2 million “green” transportation center that is home to the Biddeford-Saco Chamber of Commerce.
- Dover, New Hampshire. Transit-oriented development is occurring around the station and the state moved the Children’s Museum from Portsmouth to Dover to be walking distance of the station.
- Durham, New Hampshire. The University of New Hampshire spent over \$900,000 to renovate the historic train station to better serve passengers and students, and promotes the service as an asset to prospective students.

NNEPRA is planning to expand the service north of Portland to Freeport and Brunswick, two communities that have requested intercity transit service to encourage economic development, and is currently spending \$44 million on capital improvements to the transportation system for this expansion.¹² In anticipation of the new service, Brunswick developers are investing more than \$30 million in the Maine Street Station Complex, which includes a train station, restaurants, retail shops, office space, medical center, and a 52-room inn. In Freeport, a passenger platform will be constructed within walking distance of the popular shopping strip centered on the L.L Bean flagship store. A \$2.5 million theater is being planned adjacent to the station site.¹³

Finally, the Downeaster service has reduced regional traffic congestion, and highway maintenance needs by shifting trips from the highway to the regional transit service.

The NNEPRA model is a realistic option in most states, though the time requirements should be acknowledged at the outset. In Maine, it took six years from the legislative action to the point where service was operational, and the investment described here occurred primarily over the next ten years.

11 Northern New England Passenger Rail Authority. (2011). *Building a Stronger Future*. Retrieved 8/20/12 from <http://www.nnepra.com/sites/default/files/3.11BuildingStrongerFuture.pdf>.

12 Atlantic Northeast. (2000). *Rails & Ports*. Retrieved 9/19/13 from http://atlanticnortheast.com/onl/iss/i020103_175053.pdf.

13 Northern New England Passenger Rail Authority (2011). *Building a Stronger Future*. Retrieved 9/19/13 from <http://www.nnepra.com/sites/default/files/3.11BuildingStrongerFuture.pdf>.

Wisconsin: The DOT Role in Supporting Intercity Transit

Along with the federal government, WisDOT has begun subsidizing intercity bus routes to cover shortfalls between revenue projections and operating costs. This is intended to provide mobility options between smaller population centers, such as Wausau and Green Bay, Wisconsin, and Dubuque, Iowa.

WisDOT is funding this bus service expansion through its Intercity Bus Assistance Program, established in recent legislation (Wisconsin Statutes 85.26) and inaugurated in early 2011. The legislation enabled WisDOT to provide direct subsidy assistance to private operators to maintain mobility options across the state, especially to smaller population centers and rural areas.

WisDOT understood that private intercity providers manage established route networks and retain knowledgeable operations staff, and that service quality declines when these routes are not profitable. Assisting these organizations helps maintain options for intercity travel, especially for people without access to private automobiles, and in the long term reduces demand for vehicle trips.¹⁴

Resources

Lewis, C. A., Higgins, L., Perkins, J. Zhan, F. B., & Chen, X. (2009, January) Regional Transit Coordination Guidebook. Texas Transportation Institute: College State, Texas, and the Center for Transportation Training and Research, Texas Southern University: Houston, Texas. Available at <http://tti.tamu.edu/documents/0-5345-P1.pdf>.

This guidebook provides tools, strategies and organizational structures for improving coordination between transit providers, based on success stories from regions across the country.

Kapper, J. (2010, December). "Wisconsin Intercity Bus Assistance Program." *Grassroutes: A Wisconsin Rural and Specialized Transportation Newsletter*, Volume 22, Number 4. http://www4.uwm.edu/sce/resources/cted/grassroutes/Grassroutes_December_2010.pdf.

This program supports intercity bus service in the state and allows WisDOT to work with providers of intercity bus service and/or give grants to "political subdivisions" in support of intercity routes, instead of providing assistance only to local governments.

U.S. DOT. (2011, September). *Transit at the Table III: Washington Case Study*. http://www.planning.dot.gov/documents/TransPlanning/TAT_III_CaseStudy_WA.pdf.

This paper provides a case study of how rural transit agencies throughout Washington work with the Washington State DOT to plan rural transit. Because of the DOT's innovative funding strategy, the intercity bus service provides the "backbone" of transportation service in the state.

¹⁴ Kapper, J. (2010, December). "Wisconsin Intercity Bus Assistance Program." *Grassroutes: A Wisconsin Rural and Specialized Transportation Newsletter*, Volume 22, Number 4. Retrieved 7/20/12 from http://www4.uwm.edu/sce/resources/cted/grassroutes/Grassroutes_December_2010.pdf.

FOCUS AREA 5: IMPROVING OPTIONS FOR MOBILITY AND ACCESS

Enact Policies That Support Complete Streets

The Opportunity

Complete Streets policy initiatives offer a clear and popular route for state DOTs to begin systematically considering the needs of diverse road users in their own projects and in their work with other jurisdictions. Examining and modifying standard practices to ensure that projects include safe accommodation for users of all ages and abilities nets clear safety gains. Complete Streets policies also help a state DOT meet citizen demand for non-motorized and public transportation access under its existing budget. Integrating the needs of all road users across all departmental activities provides opportunities to make small changes in routine operations that will result in significant improvements at minimal or no cost.

Thoughtful Complete Streets policy initiatives are generally strongly supported by citizens and political leaders, who then become allies and resources throughout the implementation process. A 2013 report by the New York City Department of Transportation provided evidence that improved accessibility and a welcoming street environment created by Complete Streets projects generate increases in retail sales in project areas.¹⁵ Many smaller communities are also supportive of Complete Streets policies because they support main street revitalization plans. In Washington State, careful implementation of a main street focused policy was found to reduce project delays, saving an average of \$9 million per project.¹⁶

National, state, and local polls show strong, consistent support for ensuring that transportation projects include all modes; in fact, respondents generally support allocations for non-motorized and transit access at far greater than current levels.¹⁷ Such support can translate into financial support when funding measures come up for either a popular vote or for consideration in the legislature. This support applies not only to special measures for specific projects, but also to support for core programs. Including all users in transportation projects broadens the range of constituents who will take action to support increased transportation funding, and it can also make such projects more competitive for funding from some sources.

What Is It?

State DOTs traditionally focus on improving the movement of motor vehicles over long distances, and historically have set and used standards and procedures that preclude consideration of other road users. Yet many, if not most, state roads are also used by people walking, riding bicycles, and using public transportation vehicles or school buses. This is particularly true in urban areas and along small town main streets. State DOT practices that are not responsive to these road users cause safety problems, project delays, and citizen opposition.

Over half of the states have adopted Complete Streets policies through legislative action or internal departmental directives.¹⁸ At its core, a Complete Streets policy is a simple declaration that all future

15 New York City Department of Transportation (December 2013). "The Economic Benefits of Sustainable Streets." Retrieved 11/7/14 from <http://www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf>.

16 Washington Department of Transportation. (October 2009). "State highways as main streets: a study of community design and visioning." Retrieved 9/19/13 from <http://www.wsdot.wa.gov/research/reports/fullreports/733.1.pdf>.

17 National Complete Streets Coalition. (2011). "Transportation costs." Retrieved from <http://www.completestreets.org/complete-streets-fundamentals/factsheets/transportation-costs/>.

18 National Complete Streets Coalition. (2011). "Complete Streets Policy Atlas." Retrieved 9/19/13 from <http://www.smartgrowthamerica.org/complete-streets/changing-policy/complete-streets-atlas>.

projects undertaken by an agency will seek to accommodate all users of the roadway; it doesn't necessarily have to use the term Complete Streets. Often the policy lists the users, including people of all ages and abilities who are walking, riding bicycles, driving, and catching public transportation, and notes the specific modal needs of public transportation and freight vehicles. Policies should aim to change the mindset of everyday decision-making, so that all users are assumed to be present and expected to be safely accommodated along the corridor, with limited and explicit exceptions.

Beyond that core commitment to serve all users, successful policies include a compelling vision; language that directs best practices in issues such as design, network connectivity, and performance measures, and provides some structure for implementation. The development of the policy itself should be inclusive of both the public and the practitioners who will be implementing it. Often a very general policy passed by a state legislature is followed by a more detailed policy document from the DOT, such as a new design manual or new project development processes.

Implementation

The clarity and simplicity of a Complete Streets policy gives strength and direction to an implementation process that involves changing everyday procedures and practices inside a transportation agency. The innovation of Complete Streets is not in new designs, but in new ways of doing business and making decisions. Agencies with successful Complete Streets policies have reexamined their day-to-day procedures and changed them to ensure the needs of all users are taken into account as a matter of course. They have offered educational opportunities to personnel in how to achieve a balance for the mix of users on a particular street. They have usually made changes to design manuals, and they are coming up with new ways to measure the success of their transportation projects.

Implementation can be roughly categorized into five areas of action. These categories overlap; agencies may pursue activities in several concurrently, or they may focus more heavily on one aspect at a time. Undertaking activities in each of these categories will ensure routine, on-the-ground changes and institutionalization of the Complete Streets approach.

Structuring Implementation: Undertaking activities to assess current procedures and activities, and to plan for the full implementation of Complete Streets.

Once a Complete Streets policy is adopted, an agency can focus on the changes required inside a transportation agency to routinely account for the needs of all users. Many policies include a strong role for an advisory committee and/or designation of an internal champion. Some policies include reporting requirements and deadlines; this step may also include a benchmarking audit of current policies and processes, to determine if anything needs to be updated to reflect the Complete Streets directive. Some agencies have written detailed implementation plans, setting timelines and responsibilities across the department. Though this step is listed first, it can happen concurrently with other activities and over time.

Changing Processes and Procedures: Restructuring or revising related procedures, plans, regulations, and other processes to accommodate all users on every project. This includes incorporating Complete Streets into plans as they are updated, changing internal processes to support Complete Streets activities and related initiatives, modifying state aid standards and rules, shifting the cost burden for sidewalk construction from municipalities and/or modifying procedural documents such as checklists and decision trees.

Thorough implementation requires a review of current project development procedures, and may

include the creation of new procedures, project-level checklists, and exceptions processes. For example, procedural changes may revise maintenance and operations procedures to help identify low-cost projects that can be completed within the existing scope of work. In many cases, agencies also initiate outreach beyond the departments immediately responsible for a project; this includes cross-departmental collaboration or team creation to ensure all projects address the needs of all users, more collaboration with local and regional transportation agencies that may also be implementing local Complete Streets policies, and more sophisticated and on-going public involvement.

Reviewing and Updating Design Guidance: Updating or adopting new design guidance and standards that reflect current best practices in providing multimodal mobility.

A key activity under this step is to identify and address any design specifications that currently act as a barrier to creating multimodal projects. While some agencies, such as the Massachusetts DOT, have undertaken extensive re-writes of design manuals, much can also be achieved by using existing national resources, such as the latest guidance from AASHTO, or by encouraging a more flexible use of existing guidance. A number of innovative model design manuals are now available, including those issued by the Institute of Transportation Engineers and the National Association of City Transportation Officials.

Providing Training and Educational Opportunities: Offering workshops and other educational opportunities to transportation staff, community leaders, and the general public so that everyone understands the importance of the Complete Streets vision and the part they play in its implementation.

For state DOTs, instilling this knowledge across a large agency is a challenge that may require a formal training system reaching employees working across the state. Also, training is about far more than just helping engineers learn how to incorporate bicycle and pedestrian facilities into road projects. Planners, engineers, consultants, and other agencies need a thorough understanding of new procedures and an understanding that a multimodal approach has become core to their agency's mission. Often the best messengers during the training process are those within the same profession: engineers need to hear directly from other engineers, planners from other planners.

The education process should also include elected officials and the general public, who need ongoing engagement to understand how the general policy goal will be translated into projects on the ground. The public may support the concept of Complete Streets, but residents will have questions once the project is on their street or in their neighborhood.

Measuring Performance: Developing and instituting ways to measure progress and performance and collecting and disseminating data on how the streets are serving all users.

Measuring the impact of a Complete Streets policy is essential to its ultimate success, yet the development of new performance measures often lags behind other activities. Agencies may discover they have few existing tools to measure whether their network is becoming more multimodal. Some agencies stick to relatively simple measures, such as the number of facilities built; others create new questions in customer satisfaction surveys. Agencies can also measure safety improvements and mode splits. They can cooperate with local officials to document economic gains on newly redesigned main street highways. An important motivator for developing new performance measures should be their use in communicating with the public about the purpose and efficacy of the Complete Streets policy and showing the multiple benefits received from investing in projects that follow that policy.

Case Studies

Over half the states have adopted some form of a Complete Streets policy.¹⁹ High-quality state Complete Streets policies are noted in the annual Complete Streets Policy Analysis report, and news about state Complete Streets activities can be found in the National Complete Streets Coalition's publications.

Michigan

The Michigan Department of Transportation (MDOT) has embraced the concept of “walkability reviews” and has been funding them in communities across the state for the past 10 years.²⁰ Walkability reviews are usually organized by an MDOT-contracted consultant who coordinates a walking tour of the community to study areas where bicycling and walking infrastructure, streetscapes, and traffic calming can be improved. A Walkability Checklist was developed out of a partnership among the U.S. DOT, EPA, Safe Routes to School, and Pedestrian and Bicycle Information Center.²¹ While open to anyone, walkability reviews are typically geared to government administrators, engineers, municipal planners, business owners, and residents. By working with communities to understand challenges to walkability, MDOT can design projects that will bolster local economies, improve safety, and implement complete streets policies. Walkability reviews are a way to work with stakeholders to build support for a common vision of street networks that support a diversity of transportation modes.

MDOT has also supported a program called Training Wheels that provides courses around the state to educate communities interested in providing on-road bicycle facilities.²² Designed for city, township, and county managers; council members; engineers; and related design and planning staff, Training Wheels gives stakeholders an opportunity to experience their community by bicycle to understand the importance of planning for multiple modes of transportation. MDOT's commitment to supporting complete streets offers a good model of how to support vibrant, healthy communities.

Massachusetts

Massachusetts was among the first states to require its state DOT to build every transportation project with all users in mind, through a simple two-sentence law passed in 1996.²³ The state initially struggled with the meaning of the law, issuing a too-prescriptive directive the following year that laid out very specific methods of accommodation, with little regard to context or need. Though several later documents provided further guidance, there was still a strong desire for more flexible design that responded better to community needs.

In April 2003, Governor Mitt Romney formed the Highway Design Manual Task Force as one part of a larger initiative to provide communities with more flexibility and input into transportation projects. Comprising representatives from municipalities, MPOs, advocacy groups, professional organizations, and state agencies, the Task Force sought to develop a new design guide. Though Governor Romney had requested a final version by October 1, 2003, the magnitude of the project forced a delay in its release until January 2006.

Three guiding principles emerged in the process: multimodal consideration, context sensitive design

19 National Complete Streets Coalition. “State-Level Complete Streets Policies.” Retrieved 8/4/12 from <http://www.completestreets.org/webdocs/policy/cs-state-policies.pdf>.

20 Michigan Department of Transportation. (2014). “MDOT promotes Walkability Reviews”. Retrieved 11/23/14 from <http://www.michigan.gov/mdot/0,4616,7-151-9620-324545--,00.html>.

21 U.S. Department of Transportation, U.S. Environmental Protection Agency, Safe Routes, Pedestrian and Bicycle Information Center. *Walkability Checklist*. Retrieved 11/23/14 from http://www.pedbikeinfo.org/pdf/community_walkability_checklist.pdf.

22 Michigan Department of Transportation. (2013). “MDOT promotes on-road bicycling facilities”. Retrieved 11/23/14 from <http://www.michigan.gov/mdot/0,4616,7-151-9620-305194--,00.html>.

23 *Ibid.*

and a clear project development process. Here's an excerpt:

Multimodal Consideration. to ensure that the safety and mobility of all users of the transportation system (pedestrians, bicyclists and drivers) are considered equally through all phases of a project so that even the most vulnerable (e.g., children and the elderly) can feel and be safe within the public right of way. This includes a commitment to full compliance with state and federal accessibility standards for people with disabilities.

These goals helped to shape the final document, the Project Development and Design Guide.²⁴ Throughout, the guide takes the approach that non-motorized modes are fundamental to the transportation network, and all modes—bicyclists, pedestrians, public transportation, and motorists—are integrated in every aspect of design.

Yet full implementation of the principles in the award-winning guide has been slow, and in 2012, Massachusetts worked with consultants and the National Complete Streets Coalition to provide three- and six-hour training sessions across the state for state and local engineers, planners, and consultants.²⁵ The workshops highlighted specific language in the guide and provided examples, a chance for discussion, and field exercises.

Complete Streets has become an important element in continuing support for transportation funding in Massachusetts. Discussion in the state senate of a \$250 million bond for road repairs in 2011 included a proposal for a Complete Streets fund; the fund was not included, but lawmakers emphasized that they expected to see a Complete Streets approach integrated across the agency's projects.²⁶ It has also been a key part of the state's GreenDOT sustainability initiative.²⁷

California

Caltrans first directed the full accommodation of bicyclists and pedestrians in 2001 with the adoption of Deputy Directive 64, in part to comply with guidance drafted by FHWA under the federal transportation law TEA-21. Advocates in the state kept Complete Streets in the spotlight by pushing for passage of state law AB 1358 in 2008, which requires local governments to include Complete Streets policies when they update their general plans.²⁸ Also that year, Caltrans updated its policy to include transit users of all ages and abilities, and to incorporate some other advances of the Complete Streets movement.

A core statement in DD64-R1 is "The Department views all transportation improvements (new and retrofit) as opportunities to improve safety, access, and mobility for all travelers and recognizes bicycle, pedestrian, and transit modes as integral elements of the transportation system."

After delays caused by budgetary issues and personnel turnover, Caltrans has pursued a very deliberate implementation process, creating a 73-step Action Plan²⁹ in 2010 that focuses on these

24 Massachusetts Department of Transportation. (2006, January). *Project Development and Design Guide*. Retrieved 9/19/2013 from <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.

25 UMass Transportation Center. (2013, November). "Baystate Roads Program/Browse Workshops" webpage. Retrieved 11/22/13 from <http://baystateroads.eot.state.ma.us/workshops/>.

26 *Belmont Citizens-Herald*. (2011, March 28). "Road Fix Bill Advances." Retrieved 8/6/12 from <http://www.wickedlocal.com/belmont/newsnow/x1608500490/Road-fix-bill-advances>.

27 Massachusetts Department of Transportation. (2012). "GreenDOT." Retrieved 8/22/12 from <http://www.massdot.state.ma.us/greendot.aspx>.

28 National Complete Streets Coalition. "State-Level Complete Streets Policies." Retrieved 8/4/12 from <http://www.completestreets.org/webdocs/policy/cs-state-policies.pdf>.

29 California Department of Transportation. (2010, February 21). "Complete Streets Implementation Action Plan." Retrieved from http://www.dot.ca.gov/hq/tp/offices/ocp/complete_streets_files/CompleteStreets_IP03-10-10.pdf.

seven areas of implementation:³⁰

1. Highest Focus Areas (design manual and project development manual revision)
2. Guidance, Manuals, and Handbooks
3. Policy and Plans
4. Funding and Project Selection
5. Raising Awareness
6. Training
7. Research

The state is producing a number of revised guides and manuals and has already issued a new Complete Intersections Guide,³¹ a comprehensive and easy-to-follow tool that identifies actions that will improve safety for pedestrians and bicyclists at intersections and interchanges. Caltrans also commissioned a review of the potential for bicycle and pedestrian performance measures. In 2012, Caltrans updated its Highway Design Manual to fully integrate Complete Streets and incorporate a multimodal approach to highway design.³² In 2013 Caltrans published “Main Street, California—a Guide for Improving Community and Transportation Vitality,” which is an informational guide that reflects many of the recent updates to Caltrans manuals and policies that improve multimodal access, livability, and sustainability within the transportation system.³³

The state points to a number of recently completed projects:³⁴

- A half-million dollar project to convert a four-lane undivided segment of State Route 225 in Santa Barbara to two lanes, with a new center turn lane and bike lanes
- A partnership between Caltrans and the City of Arcata to make pedestrian and bicycle improvements on the Samoa Gateway project on State Route 255
- The Mission Gorge Road detour in Santee, where Caltrans considered the needs of non-motorized users during construction by having staff-pedaled bikes on the proposed detour to ensure it minimized out-of-direction travel before directing the public there. The cost of providing the detour, including a bike lane and signage, amounted to a fraction of the total project cost and increased work zone safety.

On April 11, 2014 Caltrans endorsed the NACTO guidelines for local streets and roads and as a reference for city streets that are part of the state highway system.

30 California Department of Transportation. (2010, February). Complete Streets Implementation Action Plan: Implementation of Deputy Directive 64-R1: Complete Streets - Integrating the Transportation System. Retrieved 8/4/12 from http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets_files/CompleteStreets_IP03-10-10.pdf.

31 California Department of Transportation. (2010). *Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians*. Retrieved 8/20/12 from <http://www.dot.ca.gov/hq/traffops/survey/pedestrian/Complete-Intersections-A-Guide-to-Reconstructing-Intersections-and-Interchanges-for-Bicyclists-and-Pedestrians.pdf>.

32 California Department of Transportation. Complete Streets Program website. Retrieved 8/6/12 from http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.

33 California Department of Transportation (2013). *Main Street, California: A Guide for Improving Community and Transportation Vitality*. Retrieved 10/22/2014 from http://www.dot.ca.gov/hq/LandArch/mainstreet/main_street_3rd_edition.pdf.

34 National Complete Streets Coalition. (2012, March 14). “Caltrans is Completing the Streets!” Retrieved 8/6/12, from <http://www.completestreets.org/policy/state/caltrans-is-completing-the-streets/>.

Resources

California Department of Transportation. (2010). Complete Intersections: A Guide to Reconstructing Intersections and Interchanges for Bicyclists and Pedestrians. http://nacto.org/docs/usdg/complete_intersections_caltrans.pdf.

The Caltrans Complete Intersections Guide provides guidance for designing intersections to accommodate all travelers.

California Department of Transportation. (2012). Complete Streets Program website. http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.

The Caltrans Complete Streets page provides an overview of Complete Streets at Caltrans, including links to relevant plans and design guidance.

California Department of Transportation. (2013). *Main Street , California: A Guide for Improving Community and Transportation Vitality*. http://www.dot.ca.gov/hq/LandArch/mainstreet/main_street_3rd_edition.pdf.

A guide that highlights many of the recent updates to Caltrans manuals and policies that improve multimodal access, livability and sustainability within the transportation system.

Massachusetts DOT. (2006). Project Development and Design Guide. <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.

This guide serves as a national model for road and bridge development.

McCann, B. & Rynne, S. (2010). Complete Streets Best Policy and Implementation Practices. American Planning Association Planning Advisory Service. <https://www.planning.org/pas/brochure/pdf/report.pdf>.

This report is the most comprehensive resource available, with 33 case studies.

Minnesota DOT website. Complete Streets in Minnesota. <http://www.dot.state.mn.us/planning/completestreets/>.

MnDOT's Complete Streets page provides an overview of efforts to date to implement state Complete Streets legislation and the development of an internal policy for the DOT.

National Complete Streets Coalition. (2011). State-Level Complete Streets Policies. <http://www.completestreets.org/webdocs/policy/cs-state-policies.pdf>.

This table lists all state-level Complete Streets policies, with links.

National Complete Streets Coalition: Workshops. <http://www.completestreets.org/workshops>.

The coalition offers workshops for agency personnel aimed at introducing the Complete Streets concept, developing policy language, and implementing a policy.

New Jersey DOT. (2012). Complete Streets. <http://www.state.nj.us/transportation/eng/completestreets>.

NJDOT Complete Streets page provides an overview of efforts to implement the DOT's internal policy directive, including video and resources for local governments.

New York City DOT. (2013). The Economic Benefits of Sustainable Streets. <http://www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf>.

This report explains how the NYCDOT evaluated number of potential measures of local economic vitality and found retail sales – specifically reported sales for street-level retail and

restaurant/ food service businesses – to provide the most direct and reliable indicator of the health of local businesses.

Seskin, S. & McCann, B., National Complete Streets Coalition. (2012). Complete Streets: Local Policy Workbook. <http://www.completestreets.org/webdocs/resources/cs-policyworkbook.pdf>.

Local Policy Development Workbook: While aimed at local governments, this workbook gives a detailed look at ideal Complete Streets policy language with many examples. A state level model policy guide is under development by the American Association of Retired Persons the National Complete Streets Coalition.

FOCUS AREA 5: IMPROVING OPTIONS FOR MOBILITY AND ACCESS

Provide Leadership in Promoting Bicycle and Pedestrian Travel

The Opportunity

Providing bicycle and pedestrian accommodations is inexpensive for local governments and state DOTs compared to the cost of roadway construction and maintenance, and is a good way to improve local economies. Where facilities are good and land uses relatively compact, these modes can relieve congestion, reduce the need for car parking, possibly forestall future road expansion, and allow more land to be used for housing, commercial, and retail space instead of parking, thereby boosting the tax base. They can also provide links to work and other destinations for those who cannot or choose not to drive.³⁵ Safe and convenient bicycling and walking are essential to a good transit system; many transit users begin or end their journeys with biking and walking trips that make use of crosswalks, sidewalks, curb ramps, bike racks, and other facilities.

What Is It?

Although walking and biking are an integral part of the transportation system, they are often overlooked when transportation decisions are made. Advancing policies that include provisions for bicycles and pedestrians on all roadways and state-funded projects enhances the efficiency and cost-effectiveness of the full transportation network. DOTs can also take responsibility for educating drivers, pedestrians, and bicyclists to ensure that all road users operate safely and know their legal status.

Engineering

Physical accommodations are often the first or only area that is considered with regard to improving bicycling and walking conditions. This is an important component, because allocating space in the public right of way is the first step to making it safer for those traveling by foot or bicycle.

Accommodating bicycling and walking is a cost-effective choice and adds minimal additional width to a roadway construction or reconstruction. Demand for bicycle infrastructure has become stronger in recent years, as the population seeks more active, environmentally friendly, and lower cost transportation options. In cities across the country, bike commute share has grown rapidly over the past decade, with triple-digit growth rates in a number of communities.³⁶ Non-work trips, which make up the majority of trip segments,³⁷ offer additional opportunity to diversify travel choices. For example, pedestrian and bicycle facilities near schools may encourage children to bike and walk to school, reducing congestion.

35 Federal Highway Administration. (2010, January). "2009 National Household Travel Survey." Retrieved 9/19/2013 from <http://nhts.ornl.gov/publications.shtml>. Nearly ten million households don't have access to a car, and 30 percent of the U.S. population does not drive. Half of all trips are less than three miles, and 75 percent of those trips are made by car. Bicycling and walking are inexpensive, healthy, and often as fast or faster than driving for short distances.

36 Byrnes, M. (2011, September 21). "Is Bicycle Commuting Really Catching On? And if So, Where?" *The Atlantic Cities*. Retrieved from: <http://www.theatlanticcities.com/commute/2011/09/substantial-increases-bike-ridership-across-nation/161/>.

37 McKenzie, B., & Rapino, M. (2011, September). *American Community Survey Report 15: Commuting in the United States: 2009*. Retrieved 8/6/12 from <http://www.census.gov/prod/2011pubs/acs-15.pdf>.

Non-motorized facilities can be either on-road or off-road. On-road facilities include dedicated space within the street right-of-way for bicycling and walking, such as sidewalks, median islands, well-marked crosswalks, bicycle lanes, cycletracks, shared lane markings, and paved shoulders. Off-road facilities generally refer to separate multi-use paths where bicycles and pedestrians travel separately from motorized vehicle traffic.

For on-road facilities, states can provide sidewalks, bicycle lanes, and wide paved shoulders on state highways as part of a standard highway cross-section when they are constructed or reconstructed. Some roadways can also be retrofitted without reconstruction simply by changing the markings on the existing pavement. The Urban Bikeway Design Guide from the National Association of City Transportation Officials (NACTO), which the Federal Highway Administration and California, Colorado, Georgia, Massachusetts, and Virginia DOTs recently endorsed,³⁸ provides guidance for appropriate bicycle facilities in urban areas,³⁹ as does the recently updated American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities.⁴⁰ *The Designing Walkable Urban Thoroughfares* recommended practice from the Institute of Transportation Engineers (ITE),⁴¹ also endorsed by FHWA, provides guidance on multimodal design along major urban roadways.

Accommodating bicycle and pedestrian travel on state facilities will generally involve balancing convenience and capacity for drivers with the safety and convenience of non-motorized users. For example, wide roadways designed to allow cars to travel at high speeds take longer for pedestrians to cross than narrower ones. Curb extensions make it easier for people of all ages and abilities to cross the road and may also reduce the time drivers must wait for pedestrians at traffic signals. Signal detectors embedded in the roadway should be calibrated and located so that they detect bicycles. Intersection markings must also be clearly delineated to ensure motorist compliance and protect the safety of the most vulnerable roadway users. Clearly marked crosswalks and bike lanes that are positioned to avoid conflict with turning vehicles—such as to the left of an exclusive right turn lane—are examples of necessary design principles.

Off-road facilities should have fewer at-grade roadway crossings than adjacent streets and few or no driveway crossings. Paths built immediately adjacent to roadways, such as wide sidewalks, position bicyclists to be in conflict with turning vehicles at intersections and driveways. If no separate right of way is available for a path, on-road facilities may be preferable to a side path. Off-road facilities within urbanized areas should be planned to maximize non-recreational use, making them good choices for people commuting to work, children travelling to school, or families headed to the library.

Although state DOTs traditionally tend not to design state highways for non-motorized users, many destinations may be only accessible from a state highway. In addition, state highways may be the only connection between more preferable walking and biking routes, or they may serve as a community's "main street." Unless pedestrians and bicyclists are banned from a highway, as with many expressways, it should be assumed that they will use the road. If there is no safe way to accommodate pedestrians and bicyclists within the road right-of-way, an off-road option should be provided. In other cases, it may be necessary to provide an off-road connection to bridge an important gap in the roadway network or to cross major barriers such as rail lines, major highways, or rivers.

38 Memorandum from Federal Highway Administration (2013, August 20). Retrieved 11/26/2013 from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility.cfm.

39 National Association of City Transportation Officials. "Urban Bikeway Design Guide." Retrieved 9/19/2013 from <http://nacto.org/cities-for-cycling/design-guide/>.

40 American Association of State Highway and Transportation Officials. (2012). *Guide for the Development of Bicycle Facilities*. Retrieved from https://bookstore.transportation.org/collection_detail.aspx?ID=116.

41 Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. Available at <http://www.ite.org/emodules/scriptcontent/orders/productdetail.cfm?pc=RP-036A-E>.

Funding

A state DOT's role in funding and constructing bicycle and pedestrian infrastructure varies by state, according to legislation and policy. Some states are required to spend revenues raised from fuel taxes and motor vehicle licensing solely on state highway and bridge projects, while others have more flexibility. However, it may still be possible to fund on-road pedestrian and bicycle facilities as part of the "highway."

Funding these projects will help states enhance their overall transportation network and will provide more transportation choices at a lower cost. Where funding regulations prevent such investment, states can look to alternative options to support bicycling and walking such as the multiple funding sources offered in recent years by the federal government, including the Transportation Alternatives program in the new federal transportation bill, MAP-21.⁴² One of the most important steps state DOTs can take is to use the Transportation Alternatives funds for non-motorized transportation, instead of invoking the flexibility to use their portion of this funding for other purposes.

Other federal funding programs can be used for bicycle and pedestrian programs, but are often overlooked.⁴³ Federal 402 funding to reduce traffic crashes, deaths, injuries, and property damage is one example.⁴⁴ The Congestion Mitigation and Air Quality Improvement program is used by many states for non-motorized transportation as well.

States can assume a leadership role, whether they control funding or not, by modifying requirements, providing technical assistance, and engaging local governments to consider all transportation modes in planning and design. Where funding is more flexible, DOTs can proactively solicit non-motorized projects for direct funding and ensure that state facilities include accommodations for all roadway users, including pedestrians and bicyclists. In addition, DOTs can partner with other state agencies to find new funding opportunities; for example, some Department of Natural Resources agencies have discretion over portions of the gas tax paid for fuel to be used in lawnmowers, ATVs, snowmobiles, motor boats, and other non-highway vehicles. These funds are often used for recreational trails; however, these trails can also be used as transportation corridors, or funds can be used to build important links to on-road facilities.

An investment in bicycle and pedestrian infrastructure can be a DOT's best transportation investment, providing new types of mobility at a fraction of the normal cost for both the DOT and the users, while also benefiting public health, increasing safety, and decreasing congestion. Research has shown that striping bicycle lanes makes the road safer for motorists as well as bicyclists.⁴⁵

For further information on funding non-roadway projects, please see the section of this handbook titled, "Mechanisms for Funding Non-roadway Projects."

42 Federal Highway Administration. (2012). "Map ahead for progress in the 21st century act (MAP-21)." Retrieved 9/19/13 from <http://www.fhwa.dot.gov/map21/summaryinfo.cfm>.

43 Federal Highway Administration. "Bicycle and Pedestrian Provisions of the Federal-aid Program." Retrieved 9/19/13 from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/overview/bp-broch.cfm. Note: This website does not reflect the alignment of funding programs in the federal transportation bill passed June 2012. However, many of the programs still exist and can continue to be used for bicycle and pedestrian funding..

44 League of American Bicyclists. "Section 402-State and Community Highway Safety Grant Program." Retrieved 9/19/2013 from http://issuu.com/bikeleague/docs/section_402.

45 Cockrell School of Engineering. (2006, September 17). "Bike lanes prevent over-correction by drivers, bicyclists reducing danger even on narrow roads." Retrieved 9/19/13 from <http://www.engr.utexas.edu/news/releases/3709-bike-lanes-prevent-over-correction-by-drivers-bicyclists-reducing-danger-even-on-narrow-roads>.

Education

DOTs provide safety education for many road users and cover a variety of situations. Education efforts to improve bicyclist and pedestrian safety can take many forms. Education may be aimed at non-motorized users to help them operate safely and understand their rights and responsibilities, or they may target other road users to assure a safe environment for bicyclists and pedestrians. States may use some combination of brochures, public service announcements, billboards, classes, or trainings for a variety of audiences. Further information on effective education to promote bicyclist and pedestrian safety can be found at the Pedestrian and Bicycle Information Center.⁴⁶

Encouragement

Encouraging bicycling and walking can be part of a transportation demand management program, shifting users to facilities and modes that can generally absorb more users and maintaining capacity on congested facilities. See the section in Focus Area 3 of this document on Transportation Demand Management for further information. State health departments may also encourage active transportation modes and may provide additional support, funding, and partnerships to further these efforts. The Centers for Disease Control has resources about the health benefits of bicycling and walking.⁴⁷ Partnering with state health departments can provide additional expertise and additional funding, and potentially reach a wider audience.

Implementation

State DOTs can take a variety of steps to support bicycle and pedestrian travel and improve facilities for travelers, including the following:

- **Map existing infrastructure, including facilities under local jurisdiction, to identify gaps in the walking and bicycling network.** Identify state highways, state-owned lands (such as parks) that might support an off-road facility, and state-funded projects under local jurisdiction that can provide missing links in the network. These connections are especially important where employment centers, retail destinations, or residential developments are only accessible by using a state highway or state-funded roadway. Areas with a history of pedestrian and bicycle crashes should be high priority.
- **Identify potential funding sources** for on-road and off-road non-motorized facilities. In many cases restrictions on infrastructure such as trails and paths on state-owned roadways and bridges, create barriers to funding for bicycle and pedestrian infrastructure.
- **Examine existing transportation funding** for flexibility potential.
- **Help cities or counties identify federal funding categories** that can be used for bicycle and pedestrian facilities and programs. Examples of these programs include the Highway Safety Plan (HSP), the Surface Transportation Program (STP), and the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program.
- **Establish state-sponsored funding program for bicycle and pedestrian projects and programs.** Local agencies should be allowed to apply for infrastructure projects both on and off state facilities as well as implement education and encouragement programming. Depending on a state's legislative requirements, these dollars may or may

46 Pedestrian and Bicycle Information Center. "Educate Drivers and Bicyclists." Retrieved 9/19/2013 from <http://www.bicyclinginfo.org/education/>. Or "Educate Drivers and Pedestrians." Retrieved from <http://www.walkinginfo.org/education/>.

47 Centers for Disease Control and Prevention. (2012, August 2). *CDC Transportation Recommendations*. Retrieved 9/19/13 from <http://www.cdc.gov/transportation/>.

not come from transportation trust funds.

- **Enact policies requiring appropriate multi-modal accommodation on all state-owned or state-funded roadways.** State transportation officials must work together to set guidelines on what provisions are appropriate for a wide variety of contexts.
- **Establish technical training and leadership programs for local transportation agencies.** Training can include an explanation of multi-modal transportation fundamentals, technical features of bicycle and pedestrian infrastructure, and funding opportunities from traditional and non-traditional sources.
- **Establish design guidance for local governments to use on non-state projects.** This should guide bicycle facility design along and across roads to ensure a complete system.

States can pursue several specific activities to provide leadership for pedestrian and bicycle planning, including:

- **Non-motorized Transportation Performance Measures.** States can assess the effectiveness of their investments in non-motorized transportation infrastructure through performance measures. Measuring performance and evaluating how policies and investments are contributing to bicycle and pedestrian modal goals is critical to ensuring progress toward the goals. However, developing the metrics for evaluating non-motorized projects has proven very challenging for agencies. NACTO includes performance measures for bike and pedestrian projects in the Urban Street Design Guide, and cities, MPOs, and states have set goals for funding projects. However, few have developed metrics for evaluating projects after they have been completed. Metrics can be used to assess two different categories of measures—outputs and outcomes. Output-based metrics quantify projects or policies implemented by agencies and are usually easy to measure, making them a useful first step for agencies developing a performance management system. Examples of output-based metrics include the following:
 - o Quantity of infrastructure—miles of new bike paths, bike lanes, sidewalks, or other bike and pedestrian infrastructure
 - o Infrastructure ratings—how well facilities meet the needs of users
 - o Accessibility—rating of how far one would have to travel from a given location for trips to schools, shops, restaurants, parks, grocery stores, and other destinations

Outcome-based metrics often measure the effectiveness in achieving broader goals and include the following:

- o Economic development—changes in economic activity such as property values or retail sales
- o Public Health—changes in physical activity or chronic disease rates that may result from the bicycle or pedestrian infrastructure
- o Quality of life—public perceptions about the community, aesthetics, and crime.
- o Modal shift—shifting trips from single-occupancy vehicles to alternate modes, which can reduce congestion during peak periods, improve air quality, and lessen the need for costly roadway maintenance and new highway capacity
- o Congestion and air quality
- o Safety—can be measured using the number of crashes involving bicyclists and pedestrians
- o Social equity- increase in access to opportunities and amenities for people who are

physically unable to drive or cannot afford to drive.

- **Funding Non-Motorized Facilities.** States can directly fund the planning, design, and construction of bicycle and pedestrian infrastructure on their own and non-state facilities. These facilities can complement motor vehicle capacity needs. For example, in rural areas, simply providing wide paved shoulders can greatly improve the bicycling network and improve safety for drivers. Creating a comprehensive roadway network that is safe and comfortable for all users requires partnership with cities and counties. States should identify non-motorized priorities and evaluation measures for rating and selecting applicant projects. Criteria should include compliance with state-wide bicycle plans, connections to key transit locations, environmental justice benefits, and overall utility (such as measuring the trips accommodated relative to the project cost).

Revise Policies to Support Multi-modal Transportation. States can enact policies that encourage bicycle and pedestrian transportation. Local and state transportation agencies have enacted Complete Streets policies to encourage roadway planning that accommodates all transportation modes, as appropriate for a given land use context. The National Complete Streets Coalition provides support to states looking to adopt Complete Streets policies, including sample language.⁴⁸ States can also eliminate policies that hinder bicycle and pedestrian travel, such as requirements that cyclists travel on side paths if they exist.

Case Studies

Wisconsin

Bicycling and walking has benefitted from a number of WisDOT's policies, and Wisconsin has long supported bicycling as an important transportation option. Even before the passage of the original ISTEA bill, the Wisconsin legislature prescribed a "bicycling role" for WisDOT. According to State Statute 85.023,⁴⁹ amended in 1979, WisDOT is to provide assistance in the development of bicycle facilities: "The department (WisDOT) shall assist any regional or municipal agency or commission in the planning, promotion, and development of bikeways."

The first rail-to-trail conversion in the country, the Elroy-Sparta Trail in Wisconsin, opened in 1967.⁵⁰ Since then, WisDOT has worked diligently with the Wisconsin Department of Natural Resources and local communities to convert many abandoned rail lines into non-motorized trails. These have formed the backbone of a bicycle highway system, serving both transportation and recreational purposes in large and small cities as well as rural areas.

The Wisconsin Rural Bicycle Planning Guide (2006)⁵¹ assists rural communities and counties with their planning for bicycle travel. This is important because of the significant role tourism plays in

48 National Complete Streets Coalition. (2012). "Complete streets FAQ." Retrieved 9/19/13 from <http://www.completestreets.org/complete-streets-fundamentals/complete-streets-faq/>.

49 Wisconsin Legislative Documents. Statute 85.023, "Planning for bicycle facilities." Retrieved 9/19/13 from: <http://docs.legis.wisconsin.gov/statutes/statutes/85/023>.

50 Elroy-Sparta State Trail Board. "The Elroy-Sparta State Trail." Retrieved 9/19/13 from <http://www.elroy-sparta-trail.com>.

51 Wisconsin Department of Transportation. (2006, April). Wisconsin Rural Bicycle Planning Guide. Retrieved 9/19/13 from <http://www.dot.state.wi.us/projects/state/docs/bicycle-rural-guide.pdf>.

the Wisconsin economy, including bicycle tourism⁵² as a growing segment. In 2010, the Wisconsin legislature passed the Wisconsin Pedestrian and Bike Accommodation Law, State Statute 84.01(35), a Complete Streets Act, requiring all state and state-funded transportation projects to accommodate walking and bicycling, except in narrowly defined circumstances.

In 2010, the Wisconsin legislature passed the Wisconsin Pedestrian and Bike Accommodation Law, State Statute 84.01(35),⁵³ a Complete Streets Act, requiring all state and state-funded transportation projects to accommodate walking and bicycling, except in narrowly defined circumstances.

There are a multitude of plans and policies available to both regional offices and local communities that outline both a vision for walking and bicycling for the state and guidelines on implementation:

- The 1998 Wisconsin Bicycle Transportation Plan 2020⁵⁴ outlines a vision for bicycle transportation. It has since been supplemented by a number of other publications and policies, mentioned below.
- The 2002 Wisconsin Pedestrian Policy Plan 2020⁵⁵ fulfills the same role for pedestrians. It also outlines funding sources for local governments, guidance in design and planning, education and safety programs, and training opportunities.
- The Wisconsin Guide to Pedestrian Best Practices (2010)⁵⁶ serves as a companion document to assist with the implementation of the plan's goals, objectives, and actions and serves as a reference or guidebook for state and local officials.
- Wisconsin Bicycle Planning Guidance (2003)⁵⁷ advises local communities and metropolitan planning organizations (MPOs) on how to plan for appropriate facilities and outlines basic design guidance.
- The Wisconsin Bicycle Facility Design Handbook (2004; updated 2009)⁵⁸ outlines minimum standards for facilities, both on state roadways and for state-funded projects. The handbook also provides design guidance for local communities on a variety of topics.

For many years Wisconsin has had a policy of paving the shoulders of most state roads and roads utilizing state funding. Although this policy benefits non-motorized travel, WisDOT does not use limited pedestrian and bicycle funding, such as Transportation Enhancements/Transportation Alternatives funding for this purpose.

The Wisconsin Bicycle Map is also funded and supported by WisDOT.⁵⁹ All state and county roads are

52 Bicycle Federation of Wisconsin. *The Economic Impact of Bicycling in Wisconsin*. Retrieved 9/19/13 from <http://www.dot.state.wi.us/business/econdev/docs/impact-bicycling.pdf>.

53 Wisconsin Department of Transportation. (2010, December). *Bikeways and Sidewalks in Highway Projects*. Retrieved 9/19/13 from <http://www.dot.state.wi.us/projects/state/docs/complete-streets-rules.pdf>.

54 Wisconsin Department of Transportation. (1998, December). *Wisconsin Bicycle Transportation Plan 2020*. Retrieved 9/19/13 from <http://www.dot.wisconsin.gov/projects/state/docs/bike2020-plan.pdf>.

55 Wisconsin Department of Transportation. (2002, March). *Wisconsin Pedestrian Policy Plan 2020*. Retrieved 9/19/13 from <http://www.dot.wisconsin.gov/projects/state/docs/ped2020-plan.pdf>.

56 Wisconsin Department of Transportation. (2010). "Wisconsin Guide to Pedestrian Best Practices." Retrieved from <http://www.dot.state.wi.us/projects/state/ped-guide.htm>.

57 Wisconsin Department of Transportation. (2003, June). *Wisconsin Bicycle Planning Guidance*. Retrieved 9/19/13 from <http://www.dot.state.wi.us/projects/state/docs/bike-guidance.pdf>.

58 Wisconsin Department of Transportation. (2004, January). *Wisconsin Bicycle Facility Design Handbook*. Retrieved 9/19/13 from <http://www.dot.state.wi.us/projects/state/docs/bike-facility.pdf>.

59 Wisconsin Department of Transportation. "Wisconsin bicycle maps" Retrieved 9/19/13 from <http://www.dot.wisconsin.gov/travel/bike-foot/bikemaps.htm>.

rated by how bicycle-friendly they are, and local roads, non-motorized trails, and other key information are included on the maps, which are also available to be downloaded on WisDOT's website. This tool is useful not only for road cycling, touring, and recreational rides, but also provides information to local planners on areas of the roadway system that are in need of upgrades in order to safely accommodate bicyclists.

WisDOT is also involved in education and trainings for citizens and law enforcement officials to enhance bicyclist and pedestrian safety and comfort.⁶⁰ Teaching Safe Bicycling is a one-day course offered free for those wishing to teach bicycle safety to children. It is offered in various locations each spring and frequently attracts participants from surrounding states who do not have similar opportunities locally. Enforcement for Bicycle Safety is offered through WisDOT—which also oversees the state highway patrol—as a 12-hour course to train officers on the most important law enforcement practices to reduce crashes.

Massachusetts

Over the past several decades, Massachusetts DOT (MassDOT) has shown a growing commitment to bicycle and pedestrian travel in the state. This commitment culminated recently in its Healthy Transportation Policy Directive, which prioritizes active transportation modes and identifies specific guidelines for bicycle and pedestrian design.

The state has had bicycle and pedestrian plans in place since 1998 and established a Bicycle and Pedestrian Advisory Board in 2004. The Bicycle Plan was updated in 2008 to reflect new design guidelines, a new long-range plan, and the state's vision as a leader in bicycle transportation. In 2006, prior to the release of its updated bike plan, MassDOT released its revised and expanded *Project Development and Design Guide*, which incorporates an integrated multimodal design approach and offers context sensitive design solutions. Those guidelines earned awards from the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), and the Institute of Transportation Engineers.⁶¹ In 2011, MassDOT issued a Bicycle Inventory Report, demonstrating progress made toward documenting the state's bicycle network since 2008.⁶² The agency has also demonstrated a commitment to the state's rails-to-trails program, issuing a policy in 2013 to permit the shared use of rail rights-of-way by rail lines and bicycle paths, provided the two uses are separated by appropriate fencing.⁶³

In 2010, MassDOT launched GreenDOT—a comprehensive long-term initiative to reduce environmental impacts, encourage healthy transportation and support smart growth in the state.⁶⁴ As part of this initiative, MassDOT established Mode Shift Goals aimed at tripling the share of trips made by walking, biking, and transit.⁶⁵ To achieve these goals, MassDOT issued a Healthy

60 Wisconsin Department of Transportation. "Bicycle safety education" Retrieved 9/19/13 from <http://www.dot.state.wi.us/safety/vehicle/bicycle/education.htm>.

61 Massachusetts Department of Transportation. (2006). *Project Development & Design Guide*. Retrieved 10/22/13 from <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.

62 Massachusetts Department of Transportation. (2012). *Bicycle Facilities Inventory Report*. Retrieved 10/22/13 from https://www.massdot.state.ma.us/Portals/17/docs/2011_bike_ye_rpt.pdf.

63 Rails to Trails Conservancy (2013 September) *America's Rails-with-Trails: A Resource for Planners, Agencies, and Advocates on Trails Along Active Railroad Corridors*. Retrieved 10/30/2013 from http://www.railstotrails.org/resources/flipbooks/2013_rail-with-trail-report/index.html.

64 Massachusetts Department of Transportation. (2011). *GreenDOT* webpage. Retrieved 10/15/13 from <https://www.massdot.state.ma.us/GreenDOT.aspx>.

65 Massachusetts Department of Transportation (2012, October 9). "MassDOT Announces Mode Shift Goal to Triple the Share of Travel in Massachusetts by Bicycling, Transit and Walking." Retrieved 10/15/13 from <http://www.massdot.state.ma.us/main/tabid/1075/ctl/detail/mid/2937/itemid/223/MassDOT-Announces-Mode-Shift-Goal-to-Triple-the-Share-of-Travel-in-Massachusetts-by-Bicycling--Transit-and-Walking-.aspx>.

Transportation Policy Directive⁶⁶ in September 2013, which requires all projects to improve conditions for active transportation modes and encourage their use, unless alternative plans are approved by the Secretary or CEO. The directive also encourages the use of a broad range of guidelines within the department, which includes the NACTO *Urban Bikeway Design Guide* and others.

Washington

The Governor's Performance Measurement Program has required bicycle and pedestrian performance measures since 2008 in order to track progress toward Washington State's long-range goal of reducing fatal and serious crashes involving bicyclists and pedestrians while doubling biking and walking. The Washington DOT's Local Programs Division uses mostly manual counts by volunteers to track users of the non-motorized transportation system. Manual counts address the inadequacies of the current national and state travel behavior surveys and regional household surveys, and help planners understand the rapid increase in biking and walking in urban areas. Manual counts have captured large amounts of data from across Washington in a short period of time at a very low cost. Additionally it has improved local, regional, and state planning, strengthened partnerships, and raised awareness about the need for more and better bicycle and pedestrian data. The 2012 Washington State Bicycle and Pedestrian Counts showed that bicycling increased by 10 percent and walking increased by 5.4 percent between 2011 and 2012.⁶⁷

Hawaii

Hawaii's Statewide Pedestrian Master Plan received a 2014 National Planning Excellence and Achievement Award from the American Planning Association for being the first plan in the nation with a pedestrian-only focus.⁶⁸ The plan addresses four critical transportation elements: improving safety; enhancing mobility and accessibility; improving connectivity; and encouraging priority pedestrian infrastructure. Using engineering, education, enforcement, and evaluation the plan identifies ways to improve pedestrian safety in a state that was struggling from a high number of pedestrian fatalities. Included in the plan is the Hawaii Pedestrian Toolbox, which provides guidelines and best practices for the planning, design, operation, and maintenance of pedestrian facilities. Creation of the plan included a Citizen Advisory Committee composed of stakeholders such as police officers, health officials, transit operators, and non-motorized transportation advocates. The plan includes performance measures to gauge progress and provide accountability.

Tennessee

TDOT set aside \$30 million over 3 years for a Multimodal Access Fund in October 2013 to support the transportation needs of transit users, pedestrians, and bicyclists through infrastructure projects that address existing gaps along the state highway network.⁶⁹ MPOs and RPOs identify projects and provide a 5 percent match for project costs. Some of the eligible projects under the Multimodal Fund Program include sidewalks and pedestrian crossing improvements, bus shelters, park and ride facilities, and bicycle lanes. TDOT funds 95 percent of Multimodal Access Projects that do not exceed \$1 million.

66 Massachusetts Department of Transportation (2013 September 9). "Blasting Adjacent to State Highways - MassDOT." Policy Directive P-13-0001. Retrieved 10/30/13 from <http://www.massdot.state.ma.us/Portals/0/docs/GreenDOT/DirectiveHealthyTransportation.pdf>.

67 State Smart Transportation Initiative. "Performance Measures for Non-motorized Transportation." May 2, 2014. Retrieved 11/6/2014 from <http://www.ssti.us/Events/performance-measures-for-non-motorized-transportation/>.

68 American Planning Association. (2014). *National Planning Awards 2014*. Retrieved 11/23/2014 from <https://www.planning.org/awards/2014/>.

69 Interview with the TDOT Chief of Environment and Planning. (2014, November).

In March of 2014 the town of Ripley, Tennessee received a \$988,050 grant for infrastructure improvements that will connect the University of Tennessee Martin-Ripley Campus and Ripley High School with bike lanes and improved sidewalks. Ripley was one of 13 projects selected out of nearly 40 applications submitted from communities across the state of Tennessee.

Resources

Guidance from U.S. DOT

The Federal Highway Administration (FHWA), Office of Planning, Environment, and Realty. (updated 2012, May 7) Accommodating Bicycle and Pedestrian Travel: A Recommended Approach. http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design.cfm.

This report provides policy and design guidance for transportation agencies.

U.S. Department of Transportation. (2010, March 11). United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations. http://www.fhwa.dot.gov/environment/bicycle_pedestrian/overview/policy_accom.cfm.

This outlines the U.S. DOT's current policy on bicycle and pedestrian accommodation.

National Bicycle and Pedestrian Design Guides

American Association of State Highway and Transportation Officials. (2012). Guide for the Development of Bicycle Facilities, Fourth Edition.

https://bookstore.transportation.org/collection_detail.aspx?ID=116.

This guide provides design recommendations for accommodating bicycle travel in a variety of contexts.

Institute of Transportation Engineers. (2010). Designing Walkable Urban Throughfares: A Context Sensitive Approach. Available at <http://www.ite.org/emodules/scriptcontent/orders/productdetail.cfm?pc=RP-036A-E>.

This recommended practice offers guidance and design parameters for major, multimodal roadways in urban areas.

National Association of City Transportation Officials. (2011). Urban Bikeway Design Guide. Available at <http://nacto.org/cities-for-cycling/design-guide/>.

This bicycle facilities guide is geared primarily toward urban areas.

Model State Bicycle and Pedestrian Plans

In addition Wisconsin, other states have developed useful bicycle and pedestrian plans and guides. Oregon had one of the first and best bicycle and pedestrian plans. Its planning guide is also a useful resource. Washington State's plan is also cited as example of a newer plan that incorporates the NACTO Bicycle Guide, the AASHTO Bicycle Guide, and guidance for local communities.

Hawaii Department of Transportation. (2013). Statewide Pedestrian Master Plan. <http://hidot.hawaii.gov/highways/files/2013/07/Pedest-Plan-PedMP.pdf>.

Illinois Department of Transportation. (2014). Illinois Bike Transportation Plan. <http://www.illinoisbikeplan.com/>.

North Carolina Department of Transportation. (2013). North Carolina Pedestrian and Bicycle Plan. <http://www.ncdot.gov/bikeped/planning/walkbikenc/>.

Oregon Department of Transportation. (1995). Oregon Bicycle and Pedestrian Plan. <http://cms.oregon.gov/ODOT/HWY/BIKEPED/Pages/planproc.aspx>.

Oregon Department of Transportation. (2011). Bicycle Pedestrian Design Guide. ftp://ftp.odot.state.or.us/techserv/roadway/web_drawings/HDM/Appendix_N_BikePedDesignGuide_Web.pdf.

Washington State Department of Transportation. (2008). Washington State Bicycle Facilities and Pedestrian Walkways Plan. <http://www.wsdot.wa.gov/NR/rdonlyres/F061CF6D-7B96-4E61-BF20-50EAF2716997/0/BikePedPlan.pdf>.

Additional resources for planning, education, policies, and programs

The Pedestrian and Bicycle Information Center has suggested policies and planning resources for improving state and local governments. For bicycle safety education programs, FHWA has a resource guide as well as a searchable database of programs and materials from around the country. Many more programs have been developed since the publication of the guide.

The Alliance for Biking and Walking. (2012). Bicycling and Walking in the United States: 2012 Benchmarking Report. http://www.peoplepoweredmovement.org/site/index.php/site/memberservices/2012_benchmarking_report/.

This report provides state- and city-level data on bicycling and walking and discusses a number of policy measures and provisions to support bicycling and walking.

Policies and Planning Strategies to Support Walking
http://www.pedbikeinfo.org/programs/promote_strategies.cfm.

Policies and Planning Strategies to Support Bicycling
<http://www.aarp.org/livable-communities/learn/planning-land-use/info-2013/policy-and-planning-strategies-to-support-bicycling-in-america.html>.

Performance Measures for Nonmotorized Transportation. (2014).
<http://www.ssti.us/2014/09/performance-measures-for-nonmotorized-transportation/>.

Sample state, local, and regional bicycle and pedestrian plans can be found at the Pedestrian and Bicycle Information Center. Although there is a separate link for bicycle and pedestrian plans, there is considerable overlap in the two pages, since many agencies write combined bicycling and walking plans.

Sample Bicycle and Pedestrian Plans
http://www.pedbikeinfo.org/planning/sample_plans.cfm.

FOCUS AREA 5: IMPROVE OPTIONS FOR MOBILITY AND ACCESS

Update Design Policies and Standards

The Opportunity

Policies that support Complete Streets and context sensitive solutions (CSS) are important first steps for involving more stakeholders and accommodating additional travel modes in transportation projects. A Complete Streets policy ensures that the entire right of way is planned, designed, operated and maintained to provide safe access for all users. This policy approach is intended to change the everyday decision-making processes and systems of the agency and lead to long-term changes to the built environment. Additionally, a CSS approach can improve stakeholder involvement at every stage of program delivery, helping to ensure that transportation facilities fit their surrounding context, preserve resources, and meet local needs.

Project outcomes, however, are still determined in large part by prevailing design standards within each agency. In many cases, state-level road design standards are best suited for designing high-speed rural and exurban highways, but have been applied in a wider range of contexts. This approach, sometimes referred to as “forgiving design,” incorporates high design speeds, conservative design values, and focuses on achieving high vehicle capacities. Outcomes include wider lanes, larger turning radii, and large “clear zones” adjacent to roadways, which help reduce the risks associated with driver error but also contribute to excessive land consumption, poor accessibility (particularly for non-motorized users), and unsafe travel speeds in built-up, high activity areas.⁷⁰

Context-specific design standards can address these issues and lead to accessible, lower-speed roadways that are appropriate for the surrounding context and serve a range of uses. These standards can help designers achieve the following outcomes:

1. Improved access, mobility, and safety for all modes of road user;
2. Roadways that serve additional functions along with the efficient movement of vehicles;
3. Cost-savings through “right-sized” projects and practical design.

In addition to easing the implementation of Complete Streets and CSS policies, these design standards can also support transportation demand management strategies and responsible growth initiatives.

Groups such as the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), the National Association of City Transportation Officials (NACTO), and others have each produced guidelines and recommended practices for designing context sensitive roadways. Unfortunately, the design manuals used by many state DOTs incorporate conservative minimum design values that preclude flexible design approaches,⁷¹ and engineers often lack the resources to explore a wider range of options, particularly those not sanctioned by the department. DOTs can achieve better context sensitive design outcomes by reviewing and revising their existing standards, allowing the use of a wider range of guidelines, and providing additional support to explore feasible design alternatives.

⁷⁰ Dumbaugh, Eric, and Wenhao Li. “Designing for the safety of pedestrians, cyclists, and motorists in urban environments.” *Journal of the American Planning Association* 77.1 (2010): 69-88.

⁷¹ Kueper, D. (2010). The Context Sensitive State Design Manual. *ITE Journal*, 80(11), 30–35.

What Is It?

Whereas a Complete Streets policy directs designers to take all road users into account, and a CSS initiative prepares them to work with stakeholders in a variety of contexts, design standards ultimately set the rules to which DOT staff are expected to adhere. Once designers recognize an optimal solution on a given project, they must be granted enough flexibility and given the proper guidance to achieve that outcome. In one extreme example where this occurred, a chief engineer at Missouri DOT asked district engineers not to rely on manuals for one year, but to focus on safety, communication, quality, and common sense. As a result, the engineers were able to come up with safer, more cost-effective design solutions.⁷²

On many context sensitive projects, the most appropriate design solution might require working within a constrained right-of-way without infringing on surrounding land uses and incorporating features such as pedestrian and bicycle facilities, traffic calming measures, or on-street parking. The prevailing design standards must allow these types of measures in the appropriate settings. This sometimes begins with relaxing the range of acceptable design values and creating provisions to allow certain design features.

With that said, design elements cannot be chosen arbitrarily. Regardless of the standards being applied, designers are responsible for exercising sound engineering judgment and documenting their decision-making process to ensure protection from litigation.⁷³ Flexible design standards themselves do not increase the risk of tort liability, but designers may benefit by receiving appropriate training in order to fully understand the basis for different design practices and how design criteria relate to outcomes such as safety and mobility. Agency staff may wish to refer to widely recognized guidelines and recommended practices in choosing an appropriate design solution, or the agency may choose to develop its own standards that apply in different contexts. These internal agency guidelines can also be helpful to local and county engineers within each state. Typical design elements that play important roles in context sensitive design and must be treated accordingly include:

- Cross-sectional elements (including lane widths),
- Curb radii,
- Pedestrian crossings,
- Bicycle facilities,
- On-street parking,
- Access management,
- Traffic calming, and
- Intersection types.

In reviewing design guidelines and achieving context sensitive design solutions, designers must take into account the role that controlling principles and design parameters play. Common design controls are outlined below, along with their effects on design outcomes and approaches for handling each.

Functional classification. Design guidelines often treat functional classification as a starting point for road design. The functional classification of a roadway can sometimes provide useful information about its role in the roadway network, but roadways often serve multiple functions. These functions

72 Jones, Joseph (2010 January). "Practical Design." *Public Roads Volume 73, No. 4.*, Federal Highway Administration webpage. Retrieved 11/8/13 from <http://www.fhwa.dot.gov/publications/publicroads/10janfeb/06.cfm>.

73 Parker, Terri L. (2012). *NCHRP Legal Research Digest 57: Tort Liability Defense Practices for Design Flexibility*. Retrieved 11/22/13 from http://www.nap.edu/catalog.php?record_id=14656.

are determined primarily by the road's surrounding context and are not necessarily captured by their functional classification

Location. Most state design guidelines differentiate between roadways in urban and rural areas. Some also specify suburban design standards. In many cases, these definitions do not accurately reflect the context on specific projects and, therefore, the applicable design standards may not be appropriate. To correct this, guidelines can include a more accurate variety of context areas or roadway types, as demonstrated below.

Desired level of service. Design criteria are often set to achieve a minimum desired LOS, given anticipated traffic volumes. Context sensitive design should balance the needs of all road users and recognize other road functions, such as economic development and social activities. Designers can accept a much lower LOS on certain projects and in many cases may be able to rely on network capacity for meeting mobility needs.

Design speed. Conventional practice encourages selecting the highest practical design speed, which then controls design. Instead, designers may determine a desired operating speed that is safe and appropriate in a given context, and then design the roadway to encourage travel at that speed. This single change in design philosophy can provide designers with considerable flexibility.

Design vehicle. The selection of a large design vehicle often leads to wide lanes and large turning radii, which limit pedestrian accessibility and encourage higher travel speeds. Design guidelines should acknowledge that occasional large vehicles often can be accommodated by encroaching into oncoming lanes, mounting curbs, or choosing alternative routes; then roads can be designed to accommodate a more typical design vehicle.

Implementation

In many cases, a Complete Streets or CSS policy may be the motivating force behind design standard reform and it can guide the reform process. These policies may be issued internally by a DOT, through state legislation, or by executive order. States might also choose to adopt new standards to address a particular concern, such as cost or safety, or standards that apply in specific contexts, such as urban areas or in transit oriented development (TOD) zones. To be successful, new standards should be developed with input from DOT staff and outside partners and customers to ensure “buy in” to the proposed changes.

Taking AASHTO policies and other recommended practices into account, agencies that review and revise their existing guidelines can introduce considerable flexibility. For example, a 2006 update of the Massachusetts *Project Development & Design Guide* includes key revisions such as a wider range of recommended design speeds for different roadway types (including lower acceptable values), lower minimum road width requirements, new multimodal cross-section types, and a new chapter on traffic calming measures.⁷⁴ The state's Complete Streets and CSS policies were guiding principles in that effort. Additional steps can be taken to develop guidelines for use in specific scenarios. For example, Delaware DOT released a Traffic Calming Manual,⁷⁵ for use in urban centers and master planned communities, which provides design guidance for traffic calming measures such as speed humps, traffic circles, diverters, and road narrowing.

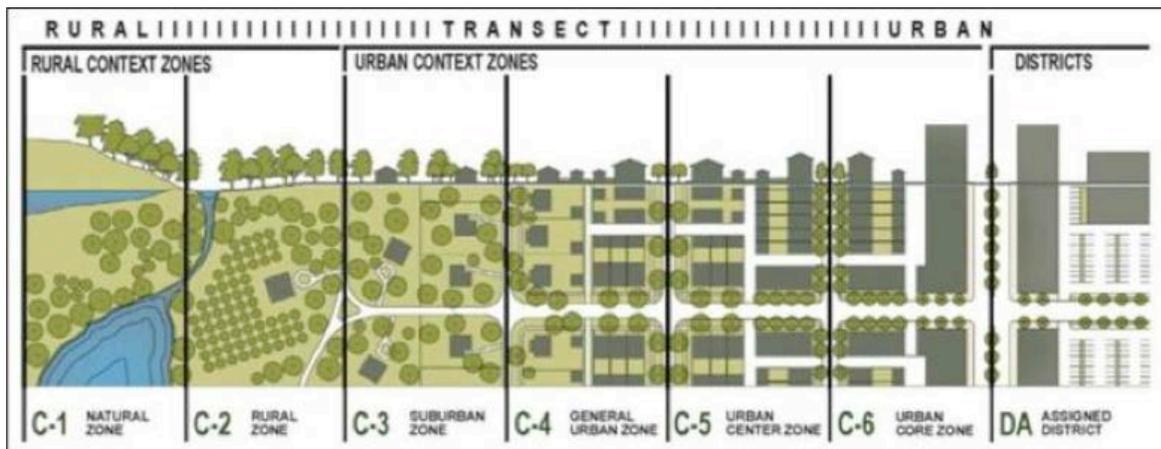
74 Massachusetts Department of Transportation. (2006). *Project Development & Design Guide*. Retrieved 10/22/13 from <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.

75 Delaware Department of Transportation. (2007). *Traffic Calming Manual*. Retrieved 10/22/13 from http://www.deldot.gov/information/pubs_forms/manuals/traffic_calming/pdf/deldotfinal.pdf.

The City of El Paso, Texas, requires the use of context sensitive street design standards—based on recommended practice from ITE⁷⁶—in specially designated Compact Urban Areas. This approach incorporates many of the principles outlined above, such as setting lower design speeds and encouraging lower operating speeds that are safe for bicycles and pedestrians. City staff and engineers are also trained to recognize difference context zones before beginning any project.⁷⁷ Each urban context zone (Figure 5.1) is associated with different cross-section types and design parameters. Other controls such as design vehicle and functional classification are also incorporated into this approach, but play considerably different roles than in conventional highway design.

Figure 5.1

Context zones ranging from rural to the most urban



Source: Institute of Transportation Engineers / Duany Plater-Zyberk and Company

Implementing these changes and encouraging the use of new design standards often requires additional staff training, increased stakeholder involvement on projects, and administrative support for engineers. Stakeholder involvement and staff training often come as part of a well-executed CSS policy (see Focus Area 4). However, implementation also may require a greater commitment of agency resources, new forms of data collection and management, and better public relations, either as part of an overarching policy or by executive order. This added commitment to achieving flexible design can ultimately lead to more efficient project delivery, improved project outcomes, and cost savings.

Case Study

New Jersey

In 2002, New Jersey DOT commissioned the Voorhees Transportation Policy Institute to review applicable design standards for state highways that pass through communities. The resulting report, *Flexible Design of New Jersey's Main Streets*, recommends relaxing minimum design criteria and allowing greater flexibility on non-controlling design elements and performance metrics. It also recommends specific strategies such as the reclassification of roadways, allowing design exceptions,

76 Institute of Transportation Engineers (2010, March). *Designing Walkable Urban Thoroughfares: A Context Sensitive*. Retrieved 10/17/13 from <http://www.ite.org/emodules/scriptcontent/orders/productdetail.cfm?pc=RP-036A-E>.

77 McCahill, C. (2013, June 12). "Designing Walkable Thoroughfares" Congress for the New Urbanism. Retrieved 10/17/13 from <http://www.cnu.org/cnu-news/2013/06/designing-walkable-thoroughfares>.

and designating overlay zones.⁷⁸

That report informed some components of the *Smart Transportation Guidebook*, published jointly by NJDOT and the Pennsylvania DOT in 2008.⁷⁹ The guidebook outlines a context sensitive approach to transportation planning and design in great detail. In addition to providing a framework for the CSS process, the guidebook provides specific design values that may be used on non-limited access roadways in different contexts. Values were derived from the AASHTO Green Book and from ITE's recommended practice, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*.

The above measures were actually proactive steps taken prior to DOT's formal approval of its Complete Streets policy in 2009—a model policy, according to the National Complete Streets Coalition.⁸⁰ Since implementing that policy, the agency has created a complete streets checklist, offered training for DOT staff, and held workshops for communities to promote local complete streets policies. The agency has also worked with the Voorhees Transportation Center to host seminars and summits featuring nationally regarded experts on street design. Some of the events have focused on aligning the efforts of various consultants working on street design projects with those of counties and communities implementing complete streets programs. In 2012, the DOT released a *Complete Streets Guidebook*⁸¹ aimed at helping communities write their own complete streets policies and in 2013 the DOT released a *Guide to Creating a Complete Streets Implementation Plan*.⁸² This most recent publication is an important step for bridging the gap between policies and project outcomes, placing considerable emphasis on revised design guidelines. As of November 2013, more than 77 local jurisdictions in New Jersey had implemented their own complete streets policies—more than in any other state. Completed DOT projects include improved pedestrian crossings, added bicycle facilities, and traffic calming measures.

Massachusetts

Having faced numerous disputes over design elements within communities, the Massachusetts DOT undertook a uniquely comprehensive and collaborative review of its design manual beginning in 2003. The updated Project Development & Design Guide was released in 2006. The update was driven by essential guiding principles such as improving safety and mobility for all road users, incorporating principles of context sensitive design, allowing greater flexibility, and providing a clear process for project development.

The updated guide introduces considerably greater flexibility and sensitivity in the use of design criteria and specific design elements. For example, the range of acceptable design speeds was broadened to include values as low as 25 mph and, in some cases, the maximum was reduced. Minimum roadway widths were reduced to 30 feet or less, along with special provisions for roads

78 Ewing, R. and King, M. (2002). *Flexible Design of New Jersey's Main Streets*. Prepared for New Jersey Department of Transportation. Retrieved 10/22/13 from <http://www.state.nj.us/transportation/publicat/flexibledesign.pdf>.

79 New Jersey and Pennsylvania Departments of Transportation (2008, March) *Smart Transportation Guidebook*. Retrieved on 10/22/13 from <http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf>.

80 AARP (2013, January). *Complete Streets in the States: A Guide to Legislative Action*. Retrieved 11/11/13 from <http://www.smartgrowthamerica.org/documents/cs/resources/cs-aarp-statelegislationtoolkit.pdf>.

81 New Jersey Department of Transportation. (2012). *Making Complete Streets a Reality: A Guide to Policy Development*. Retrieved 11/11/13 from <http://www.state.nj.us/transportation/eng/completestreets/pdf/cspolicydevelopmentguide2012.pdf>.

82 New Jersey Department of Transportation. (2012, December). *A Guide to Creating a Complete Streets Implementation Plan*. Retrieved 11/11/13 from <http://www.state.nj.us/transportation/eng/completestreets/pdf/cscreateimplementationplan.pdf>.

with exceptionally low volumes.⁸³ The guide also represents a major departure from earlier versions in its processes and use of design controls. Key aspects include:

- Greater emphasis placed on the actual role that a roadway plays, rather than its functional classification;
- A wider variety of context types (including high density suburban and central urban types) as design controls;
- Recognition of many types of road users including pedestrians, bicyclists, and transit;
- Selection of safe, context-appropriate design speeds (“target speeds”) and the use of traffic calming measures;
- Selection of desired levels of service based on local stakeholder feedback;
- Recognition that travel demands may decrease over time;
- Contextual measures of effectiveness, including community enhancement, economic development, and accessibility.⁸⁴

In addition to its content, the process through which this guide was developed is particularly unique. This process involved a task force made up of 28 individuals representing federal, state, regional, and local transportation agencies, the state legislature, the design profession, and a variety of interest groups. The manual has taken time to fully implement, given that many projects were well underway before its release; however, the agency’s recent Healthy Transportation Policy Directive requires that even ongoing projects be reviewed for conformance with the state’s goal of encouraging walking, bicycling and transit use.

Florida

In 2011, Florida DOT revised the Florida Greenbook, which contains road design guidelines for cities and counties to include an additional chapter specifically for context sensitive design of Traditional Neighborhood Development (TND) communities.⁸⁵ TNDs are characterized by features such as compact, pedestrian-scale development and low-speed, low-volume, highly connected streets. The design guidelines emphasize safe, continuous connections for all users, speed management, and careful attention to surrounding land uses. This chapter represents a fundamentally different approach than conventional transportation design, outlined in a supplemental publication, the *Traditional Neighborhood Development Handbook*.⁸⁶ These materials draw from documents such as:

- The American Association of State Highway and Transportation Officials’ *A Guide for Achieving Flexibility in Highway Design*,
- The Institute of Transportation Engineers’ *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, and
- The Center for Applied Transect Studies’ *Smart Code*.

This chapter was developed in response to a rising number of TND projects around the state and

83 Massachusetts Department of Transportation. (2010, August 11). “CSS in Massachusetts: MassDOT Project Development and Design Guide.” Retrieved 11/20/13 from <http://www.cssnationaldialog.org/documents/Continuing/CSS-National-Dialog-Continuing-Conversation-DiPaolo.pdf>.

84 Massachusetts Department of Transportation. (2006). *Project Development & Design Guide*. Retrieved 11/22/13 from <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.

85 U.S. Department of Transportation. (2011). “Florida Greenbook Chapter 19: Traditional Neighborhood Development.” Context Sensitive Solutions website. Retrieved 10/11/2013 from http://contextsensitivesolutions.org/content/reading/florida_greenbook_chapter_chapt/.

86 Florida Department of Transportation. (2011). *Traditional Neighborhood Development Handbook*. Retrieved 10/11/2013 from <http://www.dot.state.fl.us/rddesign/floridagreenbook/tnd-handbook.pdf>.

growing concerns among cities and towns that existing standards did not fit the context of these types of projects. In many cases, designers were already experienced in context sensitive design, but faced difficulty working with existing state regulations. Since its approval by the Florida Greenbook Committee, local authorities and private design firms can refer to this chapter, which has legal standing in Florida, as a resource for acceptable design practices. In many cases, this allows the designers to avoid cumbersome design exception processes and protects them from tort litigation. Moreover, the supplemental handbook offers guidance in the planning and design of transportation networks in TNDs, including considerations such as street network connectivity. This guidance can be applied to local or state projects, given that the project meets seven applicable TND principles.⁸⁷

Resources

Policy and Design Guidelines

American Association of State Highway and Transportation Officials. (2004). *A Guide for Achieving Flexibility in Highway Design*.

This guide serves as a complement to the AASHTO Green Book and instructs on the use of CSS principles to achieve greater flexibility during project development and design.

American Association of State Highway and Transportation Officials. (2012). *Guide for the Development of Bicycle Facilities*, 4th Ed.

This AASHTO publication offers guidance in the context sensitive application of bicycle treatments in most riding environments, while also incorporating the needs of motorists and pedestrians.

Institute of Transportation Engineers. (2010). *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. <http://www.ite.org/css/rp-036a-e.pdf>.

This recommended practice from ITE offers guidance in the planning and design of major thoroughfares in walkable areas based on CSS principles and on the inherent flexibility of the AASHTO Green Book; the Congress for the New Urbanism co-authored this manual. FHWA endorsed this guide in a memorandum on August 20, 2013.

Los Angeles County. (2011). *Model Design Manual for Living Streets*. <http://www.modelstreetdesignmanual.com/index.html>.

A national consortium of experts developed this multimodal street design manual for Los Angeles County through a collaborative charrette process. It was released as a customizable document to be used as-is or modified to meet local needs.

National Association of City Transportation Officials. (2012). *Urban Bikeway Design Guide*. <http://nacto.org/cities-for-cycling/design-guide/>.

This guide incorporates lessons from cities around the world to outline state-of-the-art practices for bicycle facility design in urban areas. FHWA endorsed this guide in a memorandum on August 20, 2013.

National Association of City Transportation Officials. (2013). *Urban Street Design Guide*. <http://nacto.org/usdg/>.

This guide offers parameters and templates for designing multimodal streets of various sizes in urban areas, including both interim and long-term design solutions.

⁸⁷ Based on an interview with Billy Hattaway, District 1 Secretary, Florida DOT (2013, November).