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Evaluate the Impacts of Complete Streets Policy in Louisiana

2. Author(s)
Ruijie "Rebecca" Bian, Tara Tolford, and Sirisha Gangireddy

3. Performing Organization Name and Address
Louisiana Transportation Research Center
4101 Gourrier Ave.
Baton Rouge, LA, 70808

4. Sponsoring Agency Name and Address
Louisiana Department of Transportation and Development
P.O. Box 94245
Baton Rouge, LA 70804-9245

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13. Abstract

The goal of Complete Streets is to accommodate all road users and bring attention to the needs of vulnerable road users. In the last 10 years, thousands of local/regional/state agencies in the United States (U.S.) have adopted Complete Streets policies. However, it is not clear how successfully these policies have been implemented and to what extent agencies have achieved related policy goals. The research team made a holistic review plan to observe the Policy's impacts on DOTD's inputs, activities, project outputs, project outcomes, and project impacts between 1/1/2011 and 12/31/2020 to evaluate whether/how Louisiana Department of Transportation and Development (DOTD) has made progress toward the adopted policy goals. Interviews and surveys were also conducted to better understand successes, barriers, and lessons learned in the first 10 years of DOTD's Complete Streets policy implementation. Best practices of other state Departments of Transportation (DOTs) were reviewed to

provide potential solutions to the identified challenges. Overall, much progress has been made compared with where the state started in 2010. However, shifting agency culture to balance multimodal needs is a long-term process. The research team compiled a full list of recommended actions (in "Recommendations") and highlighted those, that could potentially be done in the near term (in "Implementation Statement") for DOTD's consideration.

Project Review Committee

Each research project will have an advisory committee appointed by the LTRC Director. The Project Review Committee is responsible for assisting the LTRC Administrator or Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings.

LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

LTRC Administrator/Manager

Elisabeta Mitran
Safety Research Manager

Members

Jessica DeVille, Hong Zhang, Jennifer Branton, David Smith,
Mary Stringfellow, Laura Riggs, Chris Fakouri, Tanya Moore,
Anna Hanks, Matt Johns, and Laura Phillips

Directorate Implementation Sponsor

Christopher P. Knotts, P.E.
DOTD Chief Engineer

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by
Ruijie “Rebecca” Bian
Tara Tolford
Sirisha Gangireddy

Louisiana Transportation Research Center
4101 Gourrier Ave.
Baton Rouge, LA, 70808

UNO Transportation Institute
2000 Lakeshore Drive
New Orleans, LA 70148

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Abstract

The goal of Complete Streets is to accommodate all road users and bring attention to the needs of vulnerable road users. In the last 10 years, thousands of local/regional/state agencies in the United States (U.S.) have adopted Complete Streets policies. However, it is not clear how successfully these policies have been implemented and to what extent agencies have achieved related policy goals. The research team made a holistic review plan to observe the Policy's impacts on DOTD's inputs, activities, project outputs, project outcomes, and project impacts between 1/1/2011 and 12/31/2020 to evaluate whether/how Louisiana Department of Transportation and Development (DOTD) has made progress toward the adopted policy goals. Interviews and surveys were also conducted to better understand successes, barriers, and lessons learned in the first 10 years of DOTD's Complete Streets policy implementation. Best practices of other state Departments of Transportation (DOTs) were reviewed to provide potential solutions to the identified challenges. Overall, much progress has been made compared with where the state started in 2010. However, shifting agency culture to balance multimodal needs is a long-term process. The research team compiled a full list of recommended actions (in "Recommendations") and highlighted those that could potentially be done in the near term (in "Implementation Statement") for DOTD's consideration.

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Lastly, the authors would like to thank all the personnel who have contributed to the policy implementation in the last 10 years. All your contributions are leading the state agency towards a “Complete Streets 2.0” phase.

Implementation Statement

To implement the findings of this research effort, DOTD's Complete Streets Steering Group should reconvene to review and discuss the "Recommendations" section of this report and identify action steps, responsible leads, and timelines. A list of feasible near-term priorities recommended by the research team has been shared with the Project Review Committee (PRC) and Louisiana Complete Streets Advisory Committee (CSAC) members as requested.

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Introduction

Complete Streets are streets for everyone (including freight shipping), no matter who they are (regardless of age, ability, race, or income level) or how they travel (whether driving, taking transit, cycling, or walking) [1]. The purpose is to provide all users safe, convenient, and comfortable access through their transportation system. Over 1,500 agencies at the local, regional, and state levels have adopted Complete Streets policies in the U.S. in the last 10 years [2]. However, we know relatively little about how successfully these policies have been implemented and whether agencies have achieved their policy goals. Evaluating the effects of Complete Streets policy on agency processes and built environment outcomes is needed. The evaluation results will help state departments of transportation (DOTs) identify implementation challenges and potential improvements.

The Louisiana Department of Transportation and Development (DOTD) adopted a Complete Streets Policy ("the Policy") in 2010 as shown in Appendix A (Figure 6). The Policy was then updated in 2016 as also shown in Appendix A (Figure 7) to reference new design guidance and add clarifying language [3].

The Policy is intended to address three adopted goals:

1. Safely and efficiently accommodate all road users (motorists and non-motorists, such as but not limited to pedestrians, transit users, and bicyclists of all ages and abilities);
2. Create a network that balances integration of context sensitivity, access, and mobility for all road users;
3. Provide leadership and establish exceptional partnerships with local public agencies on implementation of the Policy.

This evaluation reports on progress toward achieving these goals by documenting the inputs, activities, outputs, and outcomes realized so far which contribute to long-term impacts (i.e., goals). The Policy first demonstrates its impacts through changes in the agency's processes and guidance documents. Theoretically, these changes should facilitate consideration and implementation of accommodating all modes in all project scopes. However, the state transportation agency has struggled to meaningfully track and quantify process-oriented implementation indicators, which makes it challenging to assess whether Louisiana is making significant progress toward adopted policy goals.

In response, the research team started reviewing DOTD's policies, guidelines, and manuals to summarize whether and how these documents were updated in the last 10 years to accommodate the Policy. This evaluation highlights the extent to which the Policy has been operationalized throughout the agency, as well as gaps and points of conflict, which may inhibit or complicate effective implementation.

The research team then reviewed construction projects funded by DOTD between 1/1/2011 and 12/31/2020. The purpose was to find out how policy, guideline, and manual updates were reflected in practice. The following tasks were undertaken: 1) investigate how many projects received exemptions from Complete Streets accommodations; and (2) understand the reasons why pedestrian and bicycle components were exempted. This review informs our understanding of the extent to which the Policy has impacted project scoping as well as any persistent barriers to implementation that may limit its efficacy. The construction project review does not cover conflict treatments (e.g., at intersections) and facilities for other road users (e.g., freight trucks and transit users) due to the lack of guidance in DOTD's existing Complete Streets documents.

The research team developed a survey questionnaire and interview questions to collect stakeholders' responses to the policy implementation, including assessment of policy comprehension and interpretation, perceptions of efficacy, and reflections on a decade of practice from a variety of viewpoints. Stakeholders' involvement (e.g., their attitude toward and awareness of the implemented policy) is of vital significance to successful policy implementation [4]. In addition, continuously engaging stakeholders in policy implementation evaluation is key to applying evaluation results successfully in practice [5].

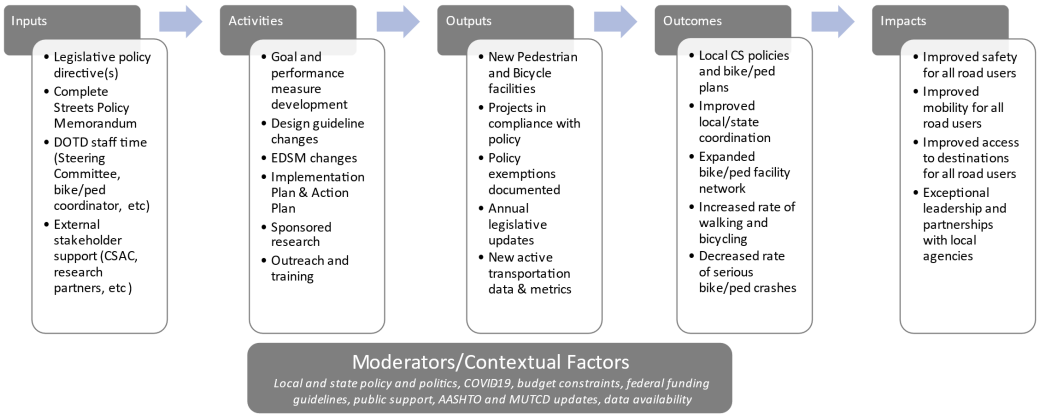
Finally, the research team collected active transportation infrastructure data and data from emerging data sources to conduct longitudinal project outcome evaluations in different contexts (i.e., urban/rural and facility type). Complete Streets projects (e.g., building sidewalks and bike lanes) can bring multifaceted benefits to their surroundings in addition to improving safety. However, before-and-after analysis regarding project outcomes (i.e., mobility, economic, and public health) is historically quite limited in practice. This study offered a solution to quantify longitudinal project outcomes from multiple perspectives to support future project selection, prioritization, and evaluation. This study also noted data source and outcome evaluation measure challenges for future improvements. The findings will benefit the private sector in diversifying/improving their data products and aid the public sector in making more data-driven decisions.

Based on information acquired from the above-mentioned work, the research team reviewed best practices from other state DOTs in solving the identified challenging issues for DOTD's

considerations. In particular, the research team conducted an in-depth review of state DOTs' practices in integrating the concepts of Complete Streets into pavement preservation. A roadmap for concept integration was developed for DOTD's consideration.

Though this study was conducted for Louisiana specifically, the evaluation procedure, data sources, methodologies, and recommendations are expected to be applicable to other states and government agencies facing challenges in implementing Complete Streets policies. Figure 1 summarizes evaluation components constituting the holistic review plan. All the evaluation components are from the policy monitoring logic model, which is the theoretical basis of this work and is introduced with more details in the Methodology section.

Figure 1. Evaluation components (i.e., Complete Streets policy evaluation logic model)



[Figure note: American Association of State Highway and Transportation Officials (AASHTO); DOTD's Engineering Directives and Standards Manual (EDSM); Manual on Uniform Traffic Control Devices (MUTCD)]

Literature Review

This section first introduces a practical framework used for policy implementation evaluation in general. Based on the general framework, the two subsequent sections introduce how Complete Streets policy implementation in practice address the components in the policy monitoring logic model. The last section summarizes gaps in the current practice of evaluating Complete Streets policy implementation.

Policy Evaluation Theory and Practice

Evaluation is considered as an integral part of policy development [6], [7]. Policy analysis may broadly be described in six basic steps: problem definition, establishment of evaluation criteria, policy alternative identification, policy alternative evaluation, presentation of alternatives, and monitoring of implemented policy [8]. A robust literature exists outlining a multitude of methods for analyzing and evaluating policy, ranging from basic and pragmatic descriptive analysis to an idealized rational model of researched analysis contingent on significant resources and typically prolonged time horizons [8].

The public health, education, and environment sectors perhaps are more active than other sectors in doing policy evaluation research. Golden reviewed the state-of-art of education policy evaluation and provided several case studies to illustrate recent evaluation practice in education [9]. Crabb and Leroy reviewed approaches in conducting environmental policy evaluations [10]. Among the three sectors, the public health sector carries out policy evaluation in practice more routinely [11]. The following paragraphs introduce the policy evaluation framework designed and used by the Centers for Disease Control and Prevention (CDC) in practice [12].

CDC's policy evaluation approach is applicable at both the state and local level [12]. In the CDC's framework, there are three main evaluation types fitting different policy development phases as explained below. Evaluating policy content appears in the early phases of policy development: problem identification, policy analysis, and strategy development [13]. When a policy comes to the phase of enactment and implementation, policy implementation evaluation begins and focuses on whether the policy is being implemented as expected [13]. Evaluating policy impacts appears during/after policy implementation and answers whether the policy produces short- and long-term outcomes as expected [13]. The current study conducted policy implementation evaluation for a state agency.

In the CDC's framework, policy implementation evaluation may focus on three interrelated perspectives [4]. The first perspective is examining components in the policy monitoring logic model, such as inputs, activities, and outputs [4]. The second perspective is identifying implementation facilitators and barriers. The third perspective is evaluating stakeholders' involvement, such as their attitude and awareness to the implemented policy. Continuously engaging stakeholders in policy evaluation is the key to applying evaluation results successfully in practice [14]. The current study adapted this practical framework from the CDC to evaluate policy implementation in the transportation sector.

Document review and analysis is a qualitative research method used in collecting data for policy implementation evaluation [15]. Document review helps understand how the implementing agency operates, determines whether policy implementation aligns with stated intent, corroborates statements made by stakeholders, and informs additional evaluation activities such as conducting stakeholder surveys and interviews [16], [17]. For a transportation agency, document review also helps in examining project development and delivery processes, which is one of the focus areas identified in Smart Growth America's State Smart Transportation Initiative [18] .

Complete Streets Policy Implementation in Practice

As in many processes of change, adopting policy is only the first step; follow-up actions are required to advance policy implementation [19]. Most states with adopted Complete Streets policies have identified initial steps to advance policy implementation, such as developing Complete Streets checklists, updating design standards, adjusting agency processes, and identifying performance measures [20]–[24]. Some states have conducted supporting research to identify best practices with implications for policy implementation, such as identifying network priorities, funding enhancements, and integrating Complete Streets into existing projects [25]. Fewer agencies have advanced formalized processes for tracking and reporting process- and outcome-oriented metrics. Even fewer have engaged in comprehensive policy or program evaluation.

Updating design guidelines is widely acknowledged as a critical early implementation step. Types of facilities for which new design guidelines may be needed include traffic signals, crosswalk markings, landscape and tree guidelines, bike facilities, intersection design, and transit facilities [20], [21], [26], [27]. The development of a statewide pedestrian and/or bicycle plan also serves as an important guide for project identification and scoping, and may also provide

established implementation goals [28]. Updating project funding evaluation criteria is a third key step to integrate the concept of Complete Streets into state processes [21], [28], [29]. Finally, a critical element of policy implementation is training, both within state DOTs and among local/regional partner agencies. The purpose of training is to ensure practitioners and decision-makers are versed in new design guidelines, policy goals, and agency procedures [21], [22], [30].

McCann and Rynne [30] outlined best practices in policy development adoption at various scales of governance through a series of case studies of early policy adopters, including Virginia DOT (VDOT), which adopted a statewide pedestrian and bicycle accommodation policy in 2004. They observed that in order to succeed, policies must be institutionalized into planning and development processes, from comprehensive planning to minor street resurfacing projects. To illustrate this need, they included VDOT's and Pennsylvania DOT's accommodation checklists and decision trees as examples of implementation tools in state decision-making. In addition, they highlighted the need for training on policy application and identification of performance measures. They also noted that evaluating impacts on vulnerable road users often requires new data, metrics, or methods. Similarly, pedestrian and bicycle planning guidance from the Federal Highway Administration (FHWA) to state DOTs [31] addresses the relationship of statewide bike/pedestrian plans to policy (including Complete Streets), institutional processes, and performance measurement, highlighting the need to examine state DOT project development processes as a key step in understanding barriers to supporting active transportation and available opportunities.

Policy Implementation Gaps Highlighted by FHWA

FHWA has initiated a call for moving to a Complete Streets design model in response to recent increases in vulnerable road user fatalities [32]. Several state, regional, and local agencies were invited to participate in the initiative, leading to a report to Congress that identifies five areas of opportunity for FHWA as it advances Complete Streets efforts [32].

First, many state and local agencies have incomplete data pertaining to multimodal network inventory data, crashes, and pedestrian and bicycle volumes [32]. Without such data, for which federal standards are underdeveloped and which many jurisdictions lack the capacity to collect [33], measurement of policy efficacy at improving conditions and outcomes for non-motorized road users is challenging. The survey and interviews conducted in the current project aimed to address this gap by first identifying potentially relevant data sources, and second by understanding the extent to which these data are currently incorporated into agency workflows (as well as opportunities to encourage data-driven planning, project selection, and delivery).

Second, FHWA recognized that state DOTs tend to prioritize reductions in traffic congestion, often by increasing capacity, a goal which may run at odds with concurrent multimodal safety objectives. When the balance between these two goals is weighted toward reducing or preventing congestion, multimodal projects or project components may become unfeasibly expensive (e.g., requiring additional right-of-way), counterproductive (e.g., increasing crossing distances), or otherwise politically unpalatable [32]. A Complete Streets policy, which does not stipulate mechanisms for project identification, or prioritization that explicitly weights multimodal safety through revisions and holistically integrates potential benefits of active transportation projects into project selection and scoping, is unlikely to achieve full implementation. The evaluation process sought to investigate project delivery processes currently in place in Louisiana, and advance FHWA's call to assess state DOT "maturity" in implementing multimodal safety in order to identify opportunities for technical assistance and methodological advancement.

Third, FHWA identifies the adoption of safety and accessibility-focused design standards and guidance as a key prerequisite for Complete Streets implementation [32]. While part of this challenge is directly linked to the pace of updates to established standards (i.e., MUTCD and AASHTO), the report acknowledges that there is more flexibility in federal design guidance than state and local practitioners often perceive. Moreover, it identifies both university-level and continuing education as playing a key role in expanding agency staff expertise to adapt to more flexible, nuanced design practices. Through stakeholder outreach, the evaluation process sought to explore the extent to which practitioners are familiar with and utilizing best-practice design guidance, as well as to identify gaps in staff expertise and opportunities to expand and reinforce curriculum for current and future personnel.

Fourth, FHWA calls for emphasizing safety for all users in the interpretation of design guidance and in project review. The report recognizes that encouraging states to use engineering judgement and taking a flexible approach has resulted in inconsistent outcomes. Broad design standards for context-sensitive design may result in Complete Streets being perceived as a burden as state and local agencies must negotiate how guidance is interpreted [32], and concerns about maintenance, liability, etc. must be resolved on a case-by-case basis. Moreover, FHWA recognizes specific gaps in current guidance, such as how transit accommodation (as pertains to road design) should best be achieved. The evaluation process first sought to verify these observations and probe barriers to consistently implement Complete Streets. The evaluation process also sought to investigate how and why the same agency-wide design standards appear to result in different outcomes across different funding programs, department sections, and/or districts. With the information, the current study then made recommendations for improved coordination and more consistent interpretation.

Lastly, FHWA highlights the need to make Complete Streets the "easiest option for all stakeholders" [32]. In order to be easy, guidance at all levels needs to be more specific, and should not create additional paperwork burdens. Equally important, becoming the easy option will require more front-end planning work to give jurisdictions the framework for how to achieve connected networks. Specifically, the report references how recent advancements have been made (such as the Bipartisan Infrastructure Law requiring bicycle and pedestrian accommodations on bridge replacements or rehabilitations), but that there is still insufficient guidance for how to address transit and freight needs, as well as resolve right-of-way (ROW) conflicts. The evaluation process sought to clarify where more systematic policy and procedure changes are needed by identifying points where practitioners experience conflict. The evaluation process also sought to learn where more guidance is needed, both among DOTD agency staff and external stakeholders who work with them. In other words, this evaluation process sought to identify what resources are needed to truly make Complete Streets the default approach.

Stakeholders in Policy Implementation

State leadership has been identified as a leading factor in local policy diffusion and more widespread acceptance of Complete Streets principles in local communities [5]. First, different offices, sections, and programs within a state DOT play distinct but interrelated roles in facilitating policy implementation [31], [34]. For example, the planning office is a key part of current and future policy implementation, both contributing to long-range planning activities and conducting feasibility studies for specific projects that determine the range of potential alternatives and define project scope. The design section is a critical junction in project delivery for policy compliance, such as examining design alternatives and reviewing project plans. Some funding programs within a state DOT may have inherent orientation toward the policy.

State DOTs cannot bring their policies to the ground without involving other agencies. Outside state DOTs, key stakeholders include FHWA division offices, metropolitan planning organizations (MPOs), local government agencies, and advocates [19], [30]. FHWA division offices ensure that federal funds are spent in compliance with regulations, while encouraging adoption of best practice. MPOs, local government agencies, and advocates play an indispensable role in supporting state DOTs' policy implementation to ensure locally funded as well as locally-initiated state-funded projects align with the goals and guidelines of the state-level policy.

Complete Streets Performance Metrics

Performance measures are widely used in gauging state DOTs' highway practices [35]. Agencies measure performance through a combination of inputs, outputs, and outcomes. Input metrics (e.g., agency resources dedicated to implementation) are most easily measured, followed by outputs (e.g., miles of new facilities completed) [36]. Outcomes are more challenging to measure, and therefore less likely to be reported, but are the most likely to link directly to adopted agency goals [30], [36]. In some cases, principles for developing effective performance metrics have been identified, but specific indicators which agencies should adopt are not listed [20], [30]. This section introduces typical output and outcome measures.

Output Measures

Outputs are the features of Complete Streets projects that distinguish them from other public works. Counting the number of relevant projects is a prevalent measure in practice. Though the measure is relatively simpler than tracking facility characteristics and necessary contexts, it at least raises the awareness of agencies and the public towards the progress made in practice. Determining what outputs to measure was also considered as an important step before understanding and evaluating outcomes [37]. Complete Streets facilities appear in three of the six Model Inventory of Roadway Elements (MIRE) categories (which include segment, intersection/junction, intersection leg, interchange/ramp, horizontal curve, and vertical grade) [38]. MIRE is a guideline developed by FHWA in 2013 that helps transportation agencies improve the quality and utility of roadway and traffic data for planning and performance measurement. Table 1 is a list of Complete Streets facilities mentioned in MIRE. FHWA's recent report in 2022 notes that pedestrian, bicycle, and transit infrastructure characteristics are incomplete in MIRE. MIRE should be updated in its next edition to support consistent inventory [32].

Table 1. Complete Streets facilities as MIRE elements

MIRE categories	MIRE elements
Segment	Left/right shoulder (type, width, paved or not, rumble strip presence/type) Sidewalk (presence) Bicycle facility (presence, type, and width) Curb (presence and type) On-street parking (presence and type) Roadway lightning (presence)
Intersection/Junction	Traffic control (e.g., pedestrian hybrid beacon) Lighting (presence)
Intersection leg	Crosswalk (presence/type)

MIRE categories	MIRE elements
	Pedestrian signal (presence, type, and activation type) Crossing pedestrian count/exposure Circular intersection: pedestrian facility and cross walk location

Urban street design guides typically include more elements [39]. National Association of City Transportation Officials' (NACTO) *Urban Street Design Guide* also mentions curb extensions, vertical speed control elements (e.g., speed humps), transit streets (e.g., bus lanes and stops), and stormwater management (e.g., pervious strips and pavement) [39]. New York City's Department of Transportation mentions even more elements in its street design manual: furniture (refers to bike share station, city bench, etc.) and landscape (refers to tree beds, sidewalk plantings, etc.) [40].

In fact, Complete Streets outputs are collected less frequently and comprehensively across an entire transportation network than some other roadway infrastructure [41]. For example, Highway Performance Monitoring System (HPMS) data (a database that includes information on operating characteristics, condition, performance, use, and extent of roadways within the national highway system) are collected and updated each year [42]. In contrast, the time gap between data collection and data inventory in the case of Complete Streets facilities could be more than 10 years [41]. In early days, an inventory of Complete Streets facilities could be created from field work or from consolidating data from districts, MPOs, or locals. In recent years, such an inventory is more likely to be created based on aerial imagery, LiDAR data, or recorded videos. For example, DOTD hired a third-party vendor, Fugro, to process the collected Automatic Road Analyzer (ARAN) data, from which sidewalks are inventoried with other road assets for Louisiana.

Some states have made progress in creating an integrated inventory. For example, Kentucky has an integrated inventory of bicycle and pedestrian facilities [43]; Florida not only pooled facility data (e.g., bike lanes, sidewalks, trails, bus/rail stations) but also provided other relevant data (e.g., speed limit, bicyclist/pedestrian crashes, and demographic data) on the same map platform [44].

Outcome Measures

As of June 2021, 25 of the state departments of transportation (DOTs) in the U.S. have adopted a Complete Streets policy [2]. Among them, 23 states have goals written explicitly in their policies. Table 2 presents policy goals adopted by each state DOT. As shown, safety is the most common goal mentioned by state DOTs. Another two goals mentioned more frequently than the others are accessibility (which typically refers to accessing major destinations and building to

Americans with Disabilities Act (ADA) standards) and mobility (which typically refers to congestion reduction). Sometimes, connectivity is clearly distinguished from accessibility. In such cases, connectivity refers to close active transportation network gap and create integrated transportation networks. Some states' policy goals go beyond safety, mobility, and accessibility. Additional goals are considered, including environment, public health, economic, users' satisfaction, and equity, which reflects a broader interpretation of the state DOT mission [28], [36], [37], [45]–[47].

Table 2. Goals written in state DOT's Complete Streets policies

Policy goal	Adopted by state DOTs of…	%
Safety	CA, CO, CT, DE, IA, IN, KY, LA, MA, MD, ME, MN, MS, NC, NJ, NV, SC, TN, TX, UT, VA	91
Accessibility	CA, CT, DE, GA, IA, IN, KY, LA, MA, MD, ME, MI, MN, NC, NJ, NV, SC, TN, VA	83
Mobility	CA, CO, CT, DE, IA, IN, KY, LA, MD, MI, MN, NC, NJ, NV, SC, TN, TX, VA	78
Environment	CT, DE, IN, NC, NJ, TX, VA	30
Connectivity	CT, DE, IN, MN, NJ, NV	26
Public health	CO, CT, IN, MA, NJ, VA	26
Economic	CO, CT, IN, ME	17
Users' satisfaction	MD, NJ, TX, VA	17
Equity	SC	4

Measures tracking safety outcomes, user volumes by mode, and level of service are common. Also common are ADA compliance, quantity of specific facility types, and a count of Complete Streets projects [21], [23], [36], [37]. Ranahan et al. did an exhaustive search of performance indicators and measures in 2014 which yielded 800 indicators [37]. FHWA also provided a guidebook in 2016 to help local, regional, and state agencies select and apply pedestrian and bicycle performance measures [48]. Table 3 is a list of common outcome indicators and measures associated with each policy goal.

Table 3. Outcome indicators and measures

Goal	Indicators and measures
Safety	Crashes and injuries for motorists, pedestrians, and cyclists (e.g., frequency, type, and severity)
	Compliance with speed limit (e.g., the percentage of drivers exceeding the speed limit)
	Risk of crime, crime-related incidents
Accessibility	Americans with Disabilities Act (ADA) compliance
	Connections to transportation system (e.g., the percentage of populations served by walking facilities within 0.5 mile)
	Connections to adjacent major destinations
Mobility	Volume of vehicles, transit riders, pedestrians, bicycle riders, and users of public space

Goal	Indicators and measures
	Vehicle Miles Traveled (VMT)
	Efficiency in parking/loading
	Trip consistency (e.g., travel time by mode, travel time reliability, the percent of person-hour change in delay)
	LOS by mode (include bicyclists, pedestrians, autos, transit users, etc.) or multimodal LOS
Environment	Air and water quality (e.g., reduction in emissions)
	Minimize impermeable surfaces, maximize vegetation on streets, maximize tree canopy cover
	Urban heat island and energy use
	Stormwater run-off
Connectivity	Network connectivity (e.g., close gap between existing biking/walking facilities)
Public health	Duration and frequency of physical activity per day
	Rates of obesity, asthma, diabetes, etc.
	Expand usable public open space
Economic	Number of new businesses and employment/Number of vacant parcels
	Retail sales and visitor spending
	Commercial and residential property values
	Foreclosure data (e.g., foreclosure risk rating)
Users' satisfaction	Perceived safety, comfort, and quality of life
	Perceived economic benefits
Equity	Vulnerable populations served
	Social Vulnerability Index

Gaps in measuring performance

Development of systems for tracking Complete Streets policy impact on the built environment is often an important prerequisite to evaluating policy outcomes. Many state DOTs lack integrated and up-to-date databases with information about the location and characteristics of pedestrian, bicycle, and transit facilities statewide, except a few states like Kentucky [43] and Florida [44]. Insufficient data inhibits the ability to track progress toward policy goals [49]. Various initiatives have begun to address gaps in data availability from existing systems, often involving labor-intensive field analyses or limited scope. For example, Maryland DOT completed a field evaluation of 900 miles of sidewalk to develop a spatial layer of pedestrian facilities [50]. New York DOT conducted an eight-corridor pilot evaluation of Complete Streets implementation, featuring qualitative surveys, count and crash data, and economic and health impact metrics [51]. Comprehensive assessments of the extent of impact of Complete Streets policy on overall active transportation networks, and/or advancements toward state-level goals linked to Complete Streets project implementation are limited. FHWA includes improving data collection and analysis as one of the five opportunity areas as it advances Complete Streets efforts [32].

Literature Review Summary

Although several studies have analyzed the content [52] and diffusion [5] of the Policy at state and local level, there has been limited research on how the actual outcomes of implementation have been documented. Several states have published at least one update on actions toward Complete Streets policy implementation [20], [53], [54] including a review of progress to-date, projects completed, key implementation steps, and anticipated future actions. Meanwhile, local and regional agencies have led the development guidance for Complete Streets evaluation [55]. However, holistic evaluations of policy implementation and outcomes are uncommon. National guidance generally emphasizes methods of assessing individual project success relative to specific goals without addressing systemic evaluation of the policy's impacts on the implementing agency or jurisdiction as a whole [46].

The North Carolina DOT (NCDOT) is one of the exceptions that evaluated their Complete Streets policy in 2018 [56]. The evaluation involved a series of stakeholder interviews to assess implementation actions and obstacles, and a review of NCDOT policies, manuals, and documents to understand how the policy has been enacted in the state. Best practices from other states were reviewed to find elements that are essential to the success of the policy. At the end of their study, performance measures were recommended to help evaluate the effectiveness of Complete Streets initiatives in the future. This evaluation process identified recommended enhancements to the Complete Streets implementation process and suggested a standardized tracking system for measuring progress. However, it did not attempt to evaluate policy outcomes on constructed projects, the built environment/transportation network overall, or on safety or mobility impacts to road users within the state.

Overall, the literature reflects a lack of established best practice for aggregating, analyzing, and reporting Complete Streets policy implementation related to project outcomes. This study addresses this gap by summarizing a replicable process for synthesizing state DOT data from multiple sources to understand the extent to which the policy is being applied, and how post-policy implementation actions affect project scoping and delivery outcomes.

Objective

The focus of this research project is to evaluate the impacts of the Complete Streets policy in Louisiana. The objectives of this research project and tasks completed to meet each objective are listed below. Subsections in "Discussion of Results" are also listed for quick referencing.

- Evaluate the policy impacts to project scoping and delivery (i.e., output)
  - Construction project review (Refer to section "Construction Project Review Results" for result summary.)
  - Survey and interviews (Refer to section "Survey and Interview Result Summary" for result summary. Appendices B and C provide more information.)
- Summarize and evaluate what changes the agency has made in terms of documents, policies, staffing, training, etc. to advance implementation of the Complete Streets policy (i.e., input and activity)
  - Agency document review (Refer to section "Changes of Policies, Guidelines, and Manuals in Louisiana" for result summary. Appendix B provides more information.)
  - Survey and interviews (Refer to section "Survey and Interview Result Summary" for result summary. Appendices B and C provide more information)
- Evaluate the policy impacts at a disaggregate level (i.e., output, outcome, and impact)
  - Output mapping and outcome evaluation (Refer to "Lessons Learned from Outcome Evaluations" for result summary. Appendices D and E provide more information.)
- Understand the contribution of outputs to outcomes in different contexts (i.e., output, outcome, and impact)
  - Outcome evaluation and statistical analysis (Refer to "Lessons Learned from Outcome Evaluations" for result summary. Appendices D and E provide more information.)

Scope

The current study evaluated the components and extent of Complete Streets policy implementation for a state agency, DOTD. The spatial scope of the evaluation covers all the Louisiana parishes (or DOTD districts). The temporal scope of this evaluation is between 1/1/2011 and 12/31/2020, which is a 10-year long period.

The scope of the agency document review included all DOTD documents pertaining to the planning, design, construction, and operation of non-access controlled roadways. Some of the documents were identified in the 2018 Complete Streets Legislative Update*,* and several additional documents were identified by the Project Review Committee and/or research team. The review did not include a review of long-range or programmatic plan documents, such as the Statewide Transportation Plan or Strategic Highway Safety Plan. Notably, the state's Complete Streets Policy references transit users and facilities (defined in the EDSM as "improvements to roadways and access that help create safe and comfortable transit stops and smooth predictable transit trips") but transit accommodations are not addressed in the Complete Streets Minimum Design Guidelines. Likewise, documents pertaining specifically to freight accommodation are not included because neither the Policy nor the EDSM explicitly reference freight transportation. Thus, this study focused on pedestrian and bicycle facilities.

In reviewing DOTD funded projects, the research team focused on whether a project considered the Complete Streets Policy and whether sidewalks, bike lanes, or multi-use paths were built to meet the Complete Streets Minimum Design Guidelines. Conflict treatments (e.g., intersection treatments) were not evaluated due to the lack of available data. Similarly, road users like freight vehicles and transit riders were not evaluated, as these are not referenced within the Complete Streets Minimum Design Guidelines.

Methodology

This research is a holistic review on the impacts of Complete Streets Policy in Louisiana between 2011 and 2020. To meet the evaluation objectives, the Policy's impacts were reviewed from multiple perspectives (i.e., input, activity, output, outcome, and impact) based on the policy monitoring logic model. The first subsection introduces the logic model in detail.

To understand changes in input and activity, the research team started reviewing relevant documents, such as DOTD's policies, guidelines, and manuals. Also, the research team reviewed construction projects funded by DOTD in the last 10 years to understand how those document changes reflected in practice. The project review procedure is described below in the second section. In addition, planners, engineers, and administrators participated in implementing the Policy and witnessed all the changes in the last 10 years. Therefore, surveys were sent out to related stakeholder groups to collect their experience; and in-depth interviews were scheduled with selected personnel who are heavily involved in implementing the Policy. The survey and interview procedures are described in the third section.

To understand outputs, outcomes, and impacts, data sources that were identified and used in mapping Complete Streets outputs and evaluating their outcomes/impacts for Louisiana are introduced in Appendix E and Appendix F, respectively. Methodology for outcome evaluation is included in Appendix F.

Logic Model for Complete Streets Policy Evaluation

Figure 1 shows the logic model developed for evaluation [57]. The first task is to review the "input" and "activity" components in the policy monitoring logic model in order to identify the extent to which DOTD has taken substantive steps toward agency-wide policy implementation. The research team reviewed the legislative and executive actions taken after policy adoption, and dozens of guidelines, manuals, forms, and standard plans or specifications with potential Complete Streets implications. This section summarizes what Louisiana has accomplished to-date. Analysis consisted of documentation of the date, responsible agency stakeholders, and nature of any changes or updates made since 2010. Also, a thorough reading to identify relevant passages of text (e.g., using key words related to the Policy) as well as sections or passages where, per Policy language, references to Complete Streets may be applicable or expected, but

such references do not appear (i.e., gap analysis). This evaluation helps determine whether policy implementation has occurred in a manner consistent with adopted policy language.

Construction Project Review Procedure

This section reviews the "output" component in the policy monitoring logic model. Specifically, transportation projects funded by the state since the Policy was adopted were reviewed in order to assess policy effects on project outputs. This evaluation helps determine whether actions aimed at guiding implementation have resulted in changes to the state's transportation infrastructure. This section introduces DOTD's highway project categories [58], seven project delivery stages [59], identifies critical project documents reviewed, and describes the implemented project review plan. The focus of project review is to find out whether Complete Streets components are being systematically included or excluded from projects and how this varies across program/funding type. Although Complete Streets include a wide variety of components, here the research team refers to sidewalks, bike lanes, or multi-use paths, etc. Overall, this review focused on construction-involved projects because: (1) these are more likely to include the above-mentioned components advancing multimodal accommodation in their project scope, and (2) the Policy does not include clear guidance for how to incorporate a Complete Streets approach into signage, signal, or other operation-focused projects.

Highway Project Categories

State DOTs may name their program (or project categories) in different ways even though the same types of federal funds are used. The following is a list of DOTD highway programs [58].

- System preservation
  - Non-interstate and interstate pavement restoration projects
  - On-system and off-system bridge preservation projects
  - Movable bridge mechanical/electrical preventive maintenance projects
- Traffic safety (Highway safety)
  - Regular program projects
  - Safe Routes to School Program (SRTS) (replaced by Safe Routes to Public Places Program, SRTPPP)
  - Local Road Safety Program (LRSP)
  - Highway-railroad safety projects at public crossings
  - Highway-railroad grade separation projects

- Capacity expansion
  - Economic development
  - Growth management
  - Capacity expansion
- Operations system
  - Intelligent Transportation Systems (ITS) projects
  - Traffic control device (e.g., interstate signs and pavement markings) replacement/upgrade projects
  - Roadway flood mitigation projects (i.e., drainage)
  - Weigh station projects
  - Safety rest area projects
  - Ferry projects
  - Transportation System Management (TSM) (turn lanes, enlarging corner turning radii, bus pullouts, etc.)
  - Access management
- Intermodal connector projects
- Congestion mitigation/air quality improvement projects
- Transportation Alternative Program (TAP, previously known as Transportation Enhancement Program, TEP)
- Pass-through capital funding
  - Urban systems (improvements in metropolitan planning areas)
  - Recreational trails

Facilities serving pedestrians and bicyclists are mentioned in different ways in DOTD's Highway Project Selection Process. First, pedestrians and bicyclists are explicitly mentioned in describing the Transportation Alternative Program. Second, the following two project categories touch on the topic briefly. The Intermodal Connector projects emphasize connecting highways with railways but do not exclude opportunities to provide pedestrian facilities. Ferry projects include the number of pedestrian crossings as a performance indicator. Third, safety projects are selected based on reviewing crash records so facilities improving safety for pedestrians and bicyclists are implicitly included. Implicit inclusions should also apply in other project categories (e.g., congestion mitigation/air quality improvement projects and recreational trails).

Project Delivery Stages

At DOTD, Stage 0 is to investigate project feasibility. A critical stage document is the Stage 0 Preliminary Scope and Budget Checklist, which explicitly asks a question about the feasibility of

implementing the Policy. The checklist with the specific question became effective in practice in 2011.

Stage 1 (Planning and Environmental Process) is to: (1) better define project scope and select a preferred alternative during the environmental process, and (2) establish more detailed project cost. According to its stage manual, Stage 1 should not be an obstacle for Complete Streets dedicated projects or other projects focusing on "minor widening/adding shoulders (no additional lanes)" [60].

Stage 2 (Funding) is to: (1) update cost estimate developed in Stage 1, (2) identify funding sources, get approvals, and set up the budget, and (3) set the project delivery date. If a project remains in Stage 2 for over three years with no action, re-evaluating Stage 1 documents is required.

Stage 3 (Final Design Process) is to: (1) manage scope to avoid "scope creep," (2) set up a budget for all aspects of the project with appropriate funding sources, and (3) adhere to and monitor the budget. The project scope, schedule, and estimated cost are finalized in Stage 3. A project is not expected to have major changes in the rest of the project development stages, which include letting (Stage 4), construction (Stage 5), and operation (Stage 6). Therefore, reviewing documents after Stage 3 is not necessary. A critical set of documents for Stage 3 includes Preservation, Rehabilitation and Replacement (PRR) Report, Final Design Report, and Design Exception Form. However, these stage documents became effective since 2013 or later, so are not available for all projects within the review period. In addition, a question regarding the Policy implementation was added even later (i.e., 2020 for *PRR Report* and 2018 for the other two). To remedy this issue, the research team reviewed Final Construction Plan—another major document in Stage 3. The Final Construction Plan has the lowest document missing rate among all documents reviewed. This strategy helped flag projects that did not meet the Complete Streets Minimum Design Guidelines. Design reports/exceptions of those flagged projects were then collected and reviewed to track what might be the design obstacles.

The following section describes the project review process, which is based on project delivery stages, stage document availability and completeness, document transfer time/manpower minimization, and output maximization. Although the specific systems, documents available, and data points extracted will vary at other agencies, it is intended to be a transferable, replicable methodology for evaluating state DOT project outputs and outcomes.

Construction Project Review Process

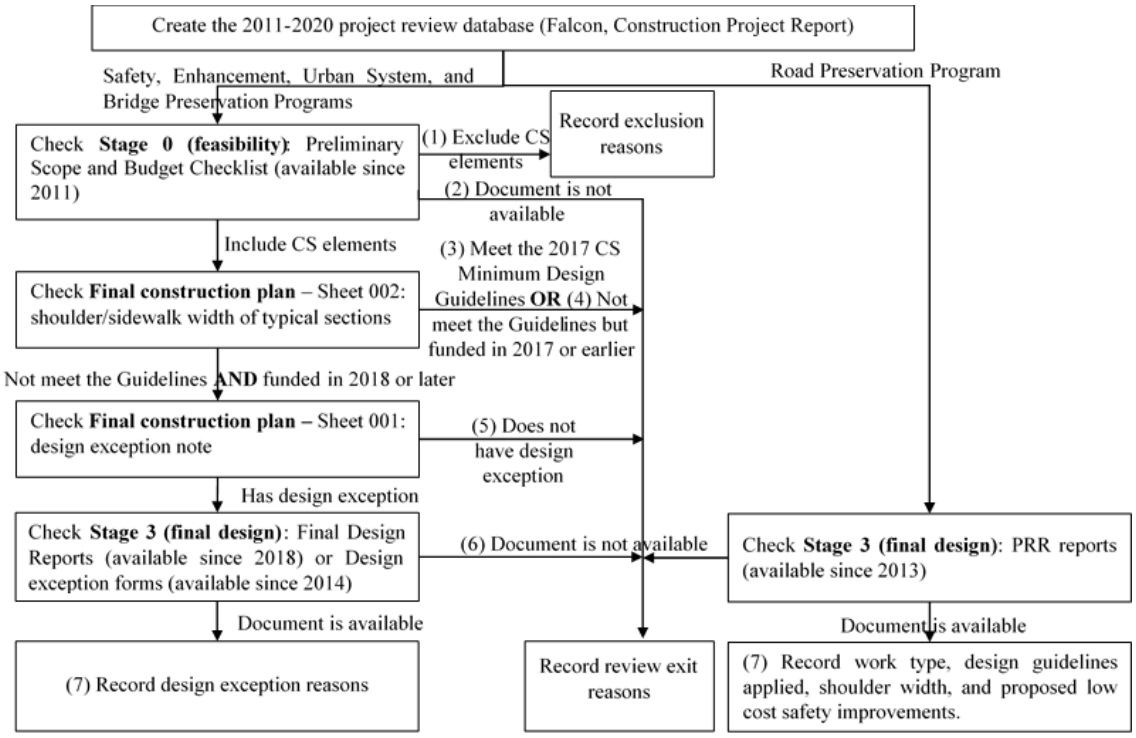
Figure 2 shows the entire project review process. The project review pool was constructed by retrieving project records from DOTD's bidding system with additional information pooled from other project management systems. The bidding system shows that a total of 3,234 projects were funded (typically referred to as "let" within DOTD) between 1/1/2011 and 12/31/2020. The plurality are from the Road or Bridge Preservation Programs (40%). About 20% of the projects from Preservation programs were randomly selected (based on year and DOTD district) to control the workload and generate unbiased review results. Other major programs include Safety (9%), Transportation Alternatives (3%, previously known as Enhancement), and Urban System (6%). All of the projects from these programs were reviewed. Other programs (such as Road Transfer, Maintenance, and Operation Efficiency) are less relevant to the study purpose and thus were excluded.

There are seven document review exits in the review process for Safety, Enhancement, Urban System, and Bridge Preservation programs. "Exit" means the document review process ends for a project. The first two exits are in reviewing the Stage 0 document. Some projects do not require a Stage 0 study, while some projects (especially in early years) used an "old" Stage 0 form without the Complete Streets question. These projects without feasibility responses to Complete Streets were excluded from further reviews (i.e., Exit 2) because exemption reasons would be hard to determine. In cases with feasibility responses, some projects clearly stated that implementing the Policy would not be feasible (i.e., Exit 1). Exemptions are allowed in a few instances according to the Policy [3] and the Engineering Directives and Standards Manual (EDSM) [61]. The EDSM provides definitions of various active transportation facilities and terms, outlining how the Policy will be incorporated into all projects and processes, and defining a process for implementation. The research team categorized exemption reasons claimed in the documents into three general types: out of project scope (e.g., sign installation projects; excessive cost of adding bicycle, pedestrian, or transit facilities); lack of need (e.g., interstate projects; no observed walking/biking activities); and meets the Policy already (e.g., current shoulder width meets the Complete Streets Minimum Design Guidelines). Evaluation of the validity of these exemption reasons (e.g., whether a lack of observed pedestrian activity indicates a true lack of demand) or appropriateness (e.g., whether a paved shoulder is a suitable Complete Streets accommodation for a particular context) was not part of this stage of the evaluation.

The next three exits are located in reviewing final construction plans. Sheet 001 is the cover page, where a design exception (when it exists) is marked. Sheet 002 (typically is more than one page and marked by a, b, c...) shows the width of shoulders, sidewalks, bike lanes, or multi-use

paths on typical sections. Projects meeting the Complete Streets Minimum Design Guidelines (i.e., presence of a 4' min. paved shoulder or 5' min. sidewalk, bike lane, or cycle track) exited from Exit 3. Projects not meeting the Complete Streets Minimum Design Guideline but funded in 2017 or earlier exited from Exit 4. Then projects not meeting the Complete Streets Minimum Design Guideline but funded in 2018 or later were checked whether any design exception was requested. If no design exception was requested, a project exited from Exit 5.

Figure 2. Project review process



(Figure note: "Falcon" is DOTD's project plan system.)

The last two exits are located in reviewing final design documents. When a design exception was requested, the research team reviewed design documents and recorded design exception reasons. A project exited from Exit 7 if its design documents or Sheet 001 provided enough design exception information. If not, a project exited from Exit 6.

The review process for Road Preservation program is different. This is because the program does not require Stage 0 studies. The most relevant and informative project document is the Preservation, Rehabilitation and Replacement (PRR) Report. The report in its most up-to-date version records design guideline, existing value, proposed value, and design exception/waiver

applied on each design feature. In addition, the report also documents low-cost safety improvements applied in a preservation project.

Survey and Interview Procedure

This section presents survey/interview questions and procedures that were used in collecting stakeholders' responses to, insights about, and perceptions of policy implementation at the state level in Louisiana. The survey was distributed following the Dillman procedures [62]. Survey recipients were personnel who regularly work on projects involving state roadways and/or funds administered by the state agency, such as employees of DOTD, local/regional government, private sector, and advocacy groups. Some of the survey respondents were then invited for in-depth interviews to collect more information.

Survey Instrument and Distribution

The purpose of this survey was to better understand successes, barriers, and lessons learned in the first 10 years of DOTD's Complete Streets policy implementation. Questions were divided in five sections, with several sub-themes for each category (Table 4). The research team conducted several rounds of pilot survey testing to ensure that the questions were easily understandable.

Table 4. Survey questions

Theme and Description	Question Topic	Key Themes in Responses
1. Respondent Background *affiliation, role, working tenure, and geographic region*	1.1 Organizational affiliation	40 DOTD responses, 20 external responses
	1.2 Professional role	Designers, engineers, administrators (DOTD), Planners (external)
	1.3 Tenure	Generally senior staff with long tenures among DOTD respondents
	1.4 Geographic scope	Majority DOTD HQ; Two DOTD districts missing
2. Policy Familiarity and Diffusion *familiarity with the Policy goals and its applicability*	2.1 Concept familiarity	Strongest within Engineering; lower in Planning
	2.2 Policy objectives	Majority correctly identify; plurality associate additional objectives beyond those explicitly adopted with Policy

Theme and Description	Question Topic	Key Themes in Responses
	2.3 Agency actions taken	Strong awareness of policy, design guidance, and training; limited recognition of checklist supports, CSAC, or performance measures
	2.4 Policy applicability	Limited awareness of policy applicability to operations, preservation projects or letting, construction, operation stages
	2.5 Policy exceptions	Lack of clarity around the role of costs, need/demand assessment, and right-of-way acquisition
	2.6 Local policy diffusion	No significant findings (insufficient geographic representation among external respondents)
	2.7 Policy lead/contact(s)	Approximately half aware of appropriate contact(s)
	2.8 Stakeholder support	DOTD staff and external respondents differed in level of support and key allies/detractors
3. Project Development, Planning, and Design *familiarity and improvement suggestions for tools, plans, manuals, and guidelines*	3.1 Project prioritization	External respondents more critical of concept integration in prioritization processes
	3.2 Local involvement	Significant opportunity for outreach to increase awareness and support
	3.3 Planning tools	Limited awareness and use of existing resources
	3.4 Design guidance	Differing opinions between DOTD, external respondents
	3.5 Gaps in guidance/support	Transit, bicycle accommodation, preservation,
4. Performance measurement, accountability, and training *familiarity with the Implementation plan, participation in DOTD's Complete Streets training module and other related trainings, and implementation barriers*	4.1 Implementation plan	Broad awareness of process/document but limited evidence of use in practice
	4.2 Changes to performance metrics	Limited input received: detailed breakdowns of improvements by project/element type, tracking of local Complete Streets policies and design manuals, reporting and analysis of policy exemptions, and revisions to traffic engineering manuals to reflect Policy goals noted
	4.3 Spatial data	More facility data (including local) desired; detailed crash analyses needed
	4.4 Equity	limited policy or discussion related to equity at DOTD (Title VI); strong interest among external stakeholders

Theme and Description	Question Topic	Key Themes in Responses
	4.5 Training	Fewer than half of DOTD respondents indicate completion; over 25% do not think it is effective
5. Barriers and Next Steps	5.1 Implementation barriers	DOTD: cost, anticipated project complication or delay, and maintenance; External: organizational culture and lack of political will
potential actions to enhance future Complete Streets Policy implementation in Louisiana	5.2 Staff capacity	Strong (but note inconsistent capacity statewide)
	5.3 Local participation	Cost-share is a concern, but more input from local agencies needed
	5.4 Policy satisfaction	Reported higher among DOTD staff than external stakeholders
	5.5 Implementation efficacy	Reported higher among DOTD staff than external stakeholders
	5.6 Public support	Reported lower among DOTD staff than external stakeholders
	5.7 Key successes	Policy adoption, EDSM and Minimum Design Guidelines, specific projects
	5.8 Future priorities	Local outreach; preservation projects; staff training; dedicated funding; design guidance updates

The survey was developed with Qualtrics software and distributed via email to a compiled list of over 40 DOTD administrators, program managers, and other personnel identified as likely to have valuable insights into policy implementation, at both DOTD Headquarters and at each DOTD district. These key personnel were encouraged to share the survey with staff in their office, section, program, and/or region in order to broaden the respondent pool. In addition, the survey was distributed to a list of selected personnel who are not affiliated with DOTD but are directly involved in the Complete Streets Policy development and/or implementation, including MPO and municipal agency staff, FHWA district officers, consultants, and members of the DOTD Complete Streets Advisory Council (CSAC). The survey was launched on 6/25/2021 and closed on 8/4/2021, with at least three points of contact made to remind recipients of the request.

A total of 60 individuals substantively completed the survey, including 40 DOTD personnel and 20 non-DOTD personnel. DOTD respondents primarily consisted of designers, engineers, and administrators. They represent all regions of the state and a variety of agency sections. Non-

DOTD respondents are principally planners and advocates who work extensively with local and/or state government agencies, with a specific focus on Complete Streets.

Interview Instrument and Administration

In order to gain more insight into topics pertaining to research themes around the Complete Streets Policy and implementation, the research team sampled a subset of DOTD and non-DOTD respondents with in-depth knowledge of DOTD programs or agency operations. Three sets of interviewees were identified: two DOTD personnel directly involved in Complete Streets Policy implementation, five DOTD program managers representing a range of offices/sections/programs, and four non-DOTD personnel with extensive background working closely with DOTD on programs or projects.

Interviews were intended to take approximately 30 minutes and elicit open ended responses focused on successes, barriers, and opportunities for ongoing Complete Streets Policy implementation. An outline of interview topics (shown in Table 5) was provided in advance of the interviews. Not all questions were asked to each interviewee, and some questions were modified to better fit the interviewee or the flow of the conversation. Conversations were semi-structured to allow for exploration of topics within each interviewee's expertise, within three broad areas: (1) impactful actions and processes of change, (2) conflicts and challenges in policy implementation, and (3) opportunities for innovation and partnership to continue to advance Complete Streets goals in Louisiana.

Interviews were conducted between June and August 2021 via Zoom and were recorded; transcripts were prepared subsequently to each interview. After the final interview, transcripts were reviewed and annotated to highlight key words, names, concepts, or ideas which were frequently mentioned. The column on the right-hand-side in Table 5 shows key themes which emerged in responses.

Table 5. Interview questions

Theme	Question topic	Key themes in responses
1. Respondent Role	• Your/your office's role in DOTD Complete Streets (CS) Policy implementation	• Compliance • Culture change • Encouragement
2. Policy Familiarity and Diffusion	• Changes in DOTD processes or practice since the CS Policy was adopted and policy 'wins'	• Foundational documents • Training • Checkpoints
	• Possible conflicts between the CS Policy and other agency policies, documents, and/or practices	

Theme	Question topic	Key themes in responses
	• Design flexibility and guidance	
	• CS training, outreach, and support	
3. Project Development	• Pathways, processes, and leaders for identifying CS projects	• Consistency • Early interventions • Problem solving • Outreach • Coordination • Leadership • Preservation
	• Tools, data, and processes for CS project prioritization	
	• Project scoping and planning: with and without Stage 0 process	
	• Additional recommendations and guidance for integrating CS Policy into all types of projects	
	• Potential actions to enhance quality of submissions for competitive funding, integration of CS Policy in local plans and Transportation Improvement Plans (TIPs)	
4. Performance Measures	• Use and definition of equity as planning/funding consideration	• Safety • Demand • Satisfaction • Routine data collection • Analysis toolkits
	• CS performance metrics & data management practice	
5. Barriers and Next Steps	• Barriers to implementation of CS policy: local agencies, MPOs, and DOTD	• Ambiguity • Inconsistency • Ad-hoc implementation • Institutional inertia • Budget constraints
	• Recommended actions and next steps to advance CS Policy goals	• Encouragement • Promotion • Communication • Calibration

Discussion of Results

This section presents results from process change review (which covers both agency documents and funded construction projects), survey responses, interview conversations, and lessons learned from outcome evaluations.

Changes of Policies, Guidelines, and Manuals in Louisiana

Policy Implementation Process

In response to a 2009 legislative directive from the Louisiana legislature to study Complete Streets policy, DOTD convened a Complete Streets Work Group (CSWG) to develop formal policy language and a report outlining recommendations for implementation in Louisiana [63]. The CSWG report was submitted to the Secretary of Transportation and relevant legislative committees for review in January 2010. The Complete Streets Policy (included in the CSWG report) was formally adopted by DOTD in July 2010. The Policy was then updated in 2016 to reference new design guidance, add clarifying language about local government coordination, and modify the scope of internal and external training opportunities or resource supports (removing "enforcement" and "encouragement" and adding "planning"). The revised Policy also substitutes the more flexibly interpreted word "should" in lieu of the "will" of the previous policy in two instances and eliminates prescriptive language about preferred bicycle facility types. Finally, an exception clause pertaining to maintenance agreements was removed (now addressed in the EDSM), as was a reference to the Americans with Disabilities Act Accessibility Guidelines (ADAAG). These changes were intended to more clearly align the Policy with DOTD's mission and scope, as well as with design guidance developed subsequent to the original policy.

Since the Policy was adopted, a variety of implementation actions have been taken to institutionalize multimodal accommodation on state routes and within state-funded programs. The 2010 CSWG report outlines various actions needed across six broad categories to effectively implement the policy, as well as the roles and responsibilities of involved stakeholders. Of the 80 recommended actions, 33% have been substantively completed over the last decade, while an additional 54% are in some state of implementation (Table 6). With the exception of legislative updates to align state law with policy intent, most of these actions were not substantively initiated until 2015 or later. In many cases, additional research is required to understand the

extent of activity and identify remaining actions needed. Many actions listed represent ongoing processes (e.g., partnering with local governments) which do not have a specific "completion" point. Only a few actions do not appear to have been implemented at all, including: (1) provision of bicycle detection at actuated traffic signals where appropriate; (2) assignment of a pedestrian and bicycle liaison at each district office to ensure full Complete Streets policy implementation; (3) systematically upgrading pedestrian infrastructure and accessibility on transit routes; and (4) facilitating statewide monitoring of Complete Streets maintenance needs. A detailed summary of the findings of the CSWG report review is included in Table 9 in Appendix B.

Table 6. Complete Streets 2010 work plan implementation actions progress review

	Completed Actions		In progress/partially fulfilled		No Action Taken		Needs additional research	
	%	#	%	#	%	#	%	#
Restructure Procedures	35%	9	58%	15	7%	2	0%	0
Rewrite the Manuals	25%	5	60%	12	5%	1	10%	2
Retrain the Planners and Engineers	0%	0	50%	2	50%	2	0%	0
Retool Measures to Track Outcomes	44%	4	33%	3	0%	0	23%	2
Legislative Updates	100%	4	0%	0	0%	0	0%	0
Partner with Local Governments	24%	4	65%	11	5%	1	6%	1
Overall	33%	26	54%	43	7%	6	6%	5

In Spring 2013, DOTD developed a formal legislative update to partially fulfill the request of the state legislature as per House Concurrent Resolution (HCR) 100 of the 2012 legislative session [64]. This document reflects updates since the 2010 CSWG report, as well as proposed adjustments to the organizational structure of internal and external stakeholders involved in Policy implementation and the inclusion of a Complete Streets consultant to facilitate the process. The 2014 legislative session revisited the topic of Complete Streets with Act 470 [65], which called for maintenance of the Complete Streets Policy and the establishment of a standing advisory committee comprised of a variety of stakeholders to oversee and report on its implementation, including the development and adoption of process- and outcome-oriented performance measures. This led to the formation of the Complete Streets Advisory Council (CSAC) in 2015, which was initially tasked with advising in the development of goals and metrics to assess policy implementation. Throughout CSAC's first year of meetings, the group developed a series of draft recommendations for goals, strategies, objectives, and performance measures intended to measure progress toward a safe and accessible network.

Performance Measurement and Benchmarking

Subsequent to delivery of the draft recommendations to DOTD by CSAC in 2016, the Complete Streets Steering Group (CSSG) was formed in DOTD to internally vet and adopt performance measures and advance progress on policy implementation overall. While CSAC continued to meet quarterly to discuss relevant items of interest, CSSG developed final Complete Streets goals: (1) safely and efficiently accommodating all road users, (2) creating a network that balances integration of context sensitivity, access, and mobility for all road users, and (3) providing leadership and establishing exceptional partnerships with local public agencies on policy implementation.

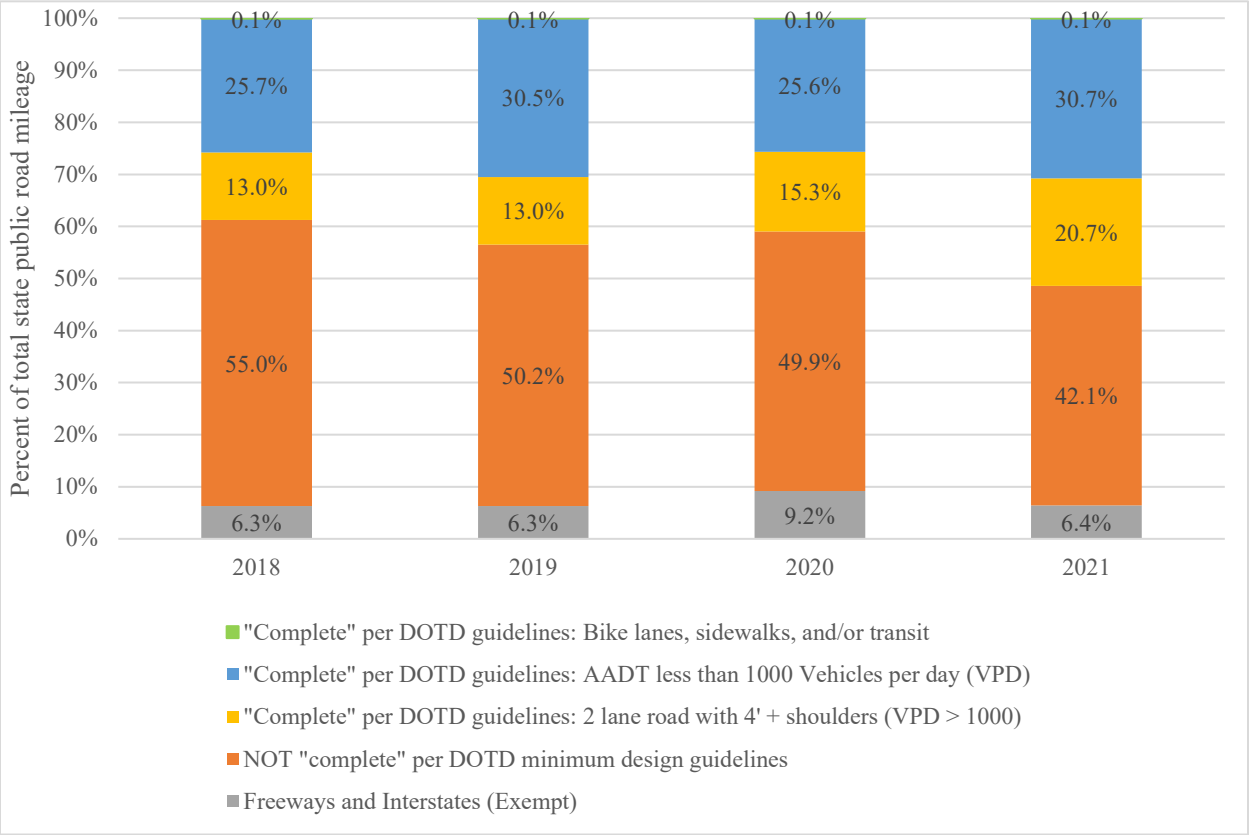
Drawing on CSAC's work, CSSG then finalized a series of objectives and performance measures aligned under these three goals as part of the development of a working draft implementation plan (circulated among DOTD staff engaged in CSSG as well as to CSAC members, but never finalized or published) which identified a need to automate reporting processes and periodically reevaluate performance measures to ensure that data provided is useful to advancing policy goals. Notably, this included developing a more nuanced understanding of crash rates and mode share, beyond data sources available at that time. CSSG also developed a draft action plan (likewise circulated but not finalized or published) breaking down 24 specific actions and the DOTD division or entity responsible for them. However, some sections do not appear to have been completed, and target completion dates and lead individuals responsible for each action are missing in most cases. In addition, the current performance measures identified in the draft action plan lack specific target benchmarks or dates which make it difficult to evaluate whether policy implementation is effectively progressing towards desired outcomes. Summary reference tables of proposed (Table 10) and adopted (Table 11) performance metrics, as well as the actions recommended in the draft action plan (Table 12), are provided in Appendix B.

Beginning in 2017, DOTD's Safety Section began to compile and publish an Annual Complete Streets Update intended for distribution to the state legislature as per the requirements of Act 470 [65]. DOTD created a position "Pedestrian, Bicycle, and Transit Design Expert" in the Traffic Engineering section in 2021, who will: (1) be responsible for future annual updates, (2) serve as a primary point-of-contact for both internal and external stakeholders for guidance pertaining to Policy implementation, and (3) play a key role in review of project documents for Policy compliance. The annual update focuses on: (1) highlights from the preceding year (e.g., major new projects, initiatives, research, programs, and/or plans relating to Complete Streets); (2) statistics about pedestrian and bicycle crashes; (3) documentation of annual output based on performance measures; (4) assorted supporting attachments (e.g., list of documents to be

reviewed for Policy compliance, survey results, and supplemental visualizations of data); and (5) resolutions from CSAC approving the legislative update.

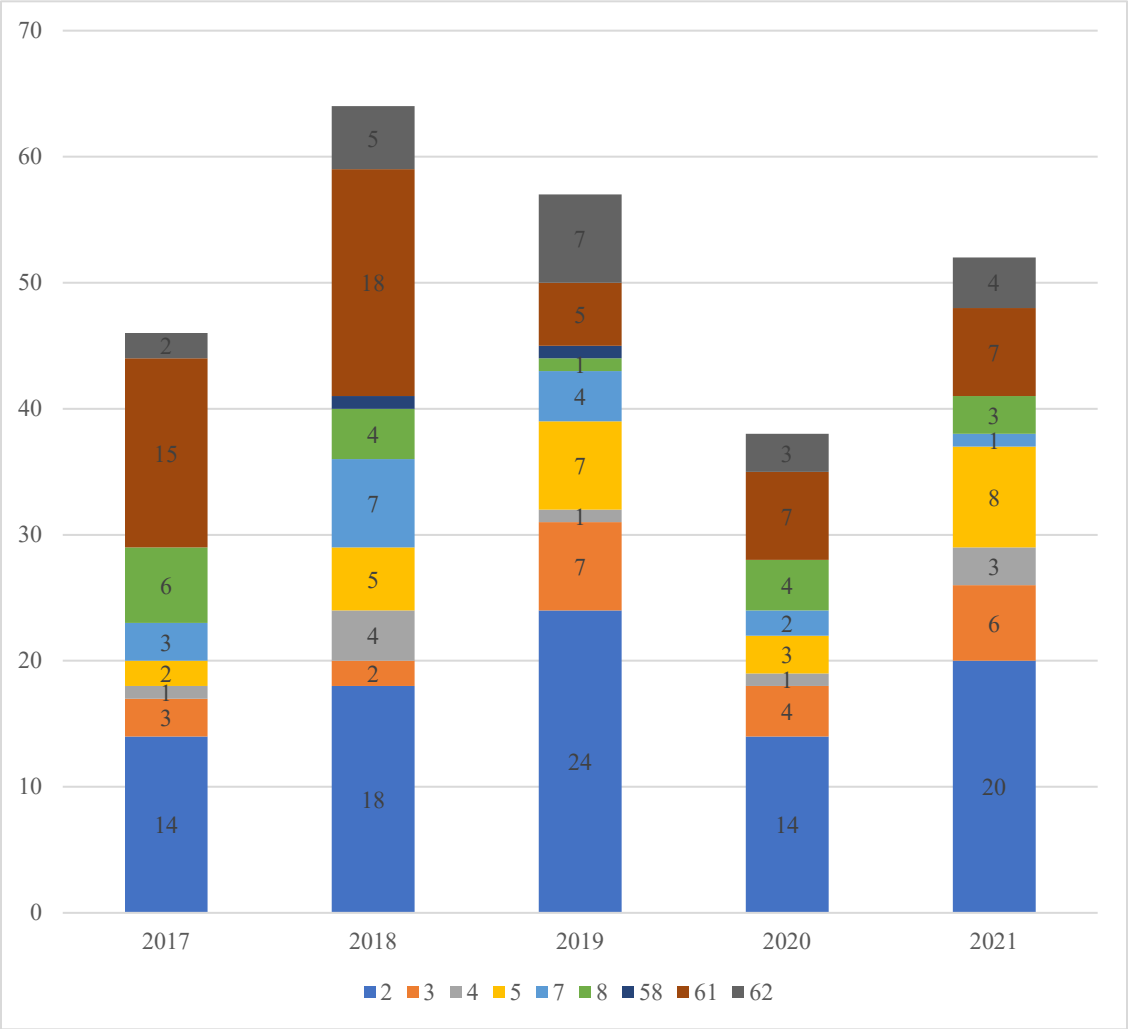
This update has included a compilation of local and regional Complete Streets plans and policies around the state as an indicator of DOTD's efficacy as an "exceptional partner" to local public agencies. As of December 2022, at least 18 cities, parishes, or MPOs (out of the 64 parishes and 11 MPOs in Louisiana) have developed pedestrian and/or bicycle plans, and at least six local or regional Complete Streets policies have been formally adopted. Active transportation content meeting DOTD's definition of a Complete Streets plan may appear in other local and regional plan documents, although these have not yet been comprehensively reviewed. In addition, since 2018, DOTD has published a series of State Route Indicators (Figure 3) highlighting progress toward reducing the total mileage of state routes which do not meet DOTD's Complete Streets Minimum Design Guidelines (principally through increased mileage of roadways with shoulders) as well as identifying the number and location of projects with clearly identifiable Complete Streets components by DOTD district, per year (Figure 4). However, these summary indicators do not clearly reflect the extent to which the Policy is being consistently applied across all agency departments, such as by including the number and percent of projects by funding program which comply with the Policy. It is not clear whether resulting projects align with adopted design guidelines, such as by development of a spatial inventory with detailed project characteristics that allow analysis of design outcomes relative to current guidelines. In addition, it is unclear whether DOTD's actions to implement the Policy have accelerated progress toward agency goals (given that the adopted Policy goals largely lack target benchmarks against which to assess).

Figure 3. DOTD Complete Streets legislative report state route condition, 2018-2021



(Data Source: DOTD Complete Streets Legislative Reports, 2018-2021)

Figure 4. Number of DOTD projects with Complete Streets components by District, 2017-2021



(Note: a DOTD District map is presented in Figure 5.)

Agency Document Updates

Another important step toward full and effective implementation of Complete Streets is the systematic review and updating of agency documents, including design guidelines, checklists, and manuals to ensure the intent and language of the Complete Streets Policy is reflected and that pedestrians, bicyclists, and transit users are considered at every stage of project development and delivery. With support from DOTD personnel, the team compiled a list of 59 documents which Complete Streets Policy would be likely to impact, and reviewed these to determine: (1)

the date of any updates, (2) whether the document references Complete Streets directly or indirectly (language pertaining to walking, bicycling, or transit), and (3) whether the document aligns or conflicts with current Policy language (i.e., the 2016 revised policy). The majority of these documents (76%) have been updated in the last decade since the Policy was adopted, and 56% directly reference the Policy or clearly align with its intent to provide accommodation for all modes and all users. Another 10% of documents have not been updated since 2010, and none of these were found to align with a Complete Streets approach. The remainder were either unavailable at the time of review, or were found to be inapplicable. A complete list of documents reviewed is provided in Table 13 in Appendix B.

A new Complete Streets Engineering Directives and Standards Manual (EDSM) was developed and adopted by DOTD in 2016 [61], providing definitions of various active transportation facilities and terms; outlining how the Policy will be incorporated into all projects and processes; and defining a process for implementation. Subsequently, a complementary update was made to the DOTD's Minimum Design Guidelines [66], defining minimum acceptable facilities, as well as preferred accommodations for pedestrians and bicyclists in urban and rural areas. The Complete Streets Minimum Design Guidelines are not exhaustive, providing "preferred" values only for sidewalk offsets from the travel lane, but not distinguishing "preferred" from "acceptable" values for sidewalk width or for any bicycle facilities. Nor do the Complete Streets Minimum Design Guidelines differentiate between types of roadway functional classifications (other than interstates) or provide guidance for all types of facilities. In some cases, the language in the Complete Streets EDSM and the Complete Streets Minimum Design Guidelines conflicts. Despite these limitations, these two documents form the foundation of Complete Streets Policy implementation, providing for the first-time, definitive guidance for how, specifically, Complete Streets should be incorporated into project scopes and roadway designs.

In addition to these key updates, a project scoping (Stage 0) checklist was updated in 2010 (and effective in practice in 2011) to include a section referencing the Policy, as have several manuals used by practitioners to guide various stages of project delivery. Several other EDSMs and standard plans which deal in whole or in part with pedestrian or bicycle facilities have likewise been recently updated. Finally, application guidelines and templates for several key competitive grant programs which fund many active transportation projects have been updated to either directly include a Complete Streets section or to solicit information about multimodal accommodation that closely aligns with Policy goals.

Eight documents reviewed have not yet been updated and do not appear to align with the Policy intent. Notably, this includes the Stage 0—Manual of Standard Practice [67], which is the

document guiding the early stages of project scoping and planning, and the Pavement Preservation Manual, which directs the design and planning of major and minor rehabilitation projects where low-cost Complete Streets enhancements could be integrated [68].

Among the 14 documents which have been updated but do not reflect a clear alignment with a Complete Streets approach, six were updated between 2011 and 2015 before the Complete Streets EDSM and Complete Streets Minimum Design Guidelines were adopted. Among those updated more recently, some documents include some references to either pedestrian or bicycle accommodation, but not explicitly reference the Policy and/or do not provide guidance for specific design or operational elements important to effective multimodal accommodation, which might be expected within the document's scope.

Collectively, the review of agency documents indicates that while DOTD has made significant progress toward institutionalizing the original and revised Complete Streets Policies in both project scoping processes and competitive funding cycles, additional review and updates are needed to ensure consistent policy application, particularly on projects which are not inherently focused on active transportation. In addition, even among documents which have been updated to reflect a Complete Streets approach, additional guidance may be needed to more explicitly clarify how the Policy should be applied in relation to the particular type of project or aspect of design. Finally, even among updated documents that have spurred meaningful change in the agency's approach to project scoping, design, and delivery, stakeholder interviews reflect a recognition that additional review and revision may be needed: (1) to improve consistency of policy application and encourage more flexible, contextually appropriate facility design; and (2) to address gaps or omissions in policy language such as the role and planning of freight transportation within a Complete Streets policy context. These findings reflect that: (1) clear Complete Streets design guidance should be one of the first major implementation steps completed following policy adoption, so that other agency documents may be subsequently reviewed and updated to check for alignment; and (2) policy implementation is an iterative and ongoing process and key documents should be revisited regularly to ensure they are meeting practitioner needs and leading to desired on-the-ground outcomes.

Construction Project Review Results

Table 7 presents project review results by category. "Exit" means the document review process ends for a project. Each exit represents a different meaning as explained in the table. For example, "Exit (1)" means a project document did not reflect consideration of Complete Streets

elements in its Stage 0. The value recorded in each cell represents how many projects exit from the review process. For example, 143 Safety-HSIP projects excluded Complete Streets elements in their Stage 0.

Some project categories (such as Road Transfer, Maintenance, and Operation Efficiency) and interstate preservation projects are less relevant to the study purpose so they were excluded from the review. At Exit 1, the most common exemption reason is project scope: 93 in Safety-Highway Safety Improvement Program (HSIP) (where 30 were for low-cost safety improvements, 16 for traffic flow improvements, 27 for miscellaneous, 10 for asphalt pavement, and 10 for other); 33 in Safety-Other (where all were for sign purchase/installation purpose); 29 in Enhancement (where all were for signing and landscaping); 50 in Urban System (where 41 were for pavement preservation and the remaining 9 for others); and 13 in Bridge Preservation. The second most common exemption reason is lack of need: 53 in Safety-HSIP (where 10 were interstate projects), 12 in Urban System, and 5 in Bridge Preservation. Some of the projects (i.e., 6 in Safety-HSIP) declared a road section met the Policy because of existing wide shoulders. Note that a project may use multiple exemption reasons in their responses to the Complete Streets feasibility question.

At Exit 2, a significant number of projects used a pre-Policy Stage 0 checklist. Based on collected information, the average time lapse from a Stage 0 study to the project funded time is three years. In some extreme cases, the time lapse can be over 10 years. Overall, there is a certain time lag for projects (which may have been scoped years earlier) to adopt the most up-to-date version of forms in practice.

Table 7. Project review results by program category

Stage	Exit ID and descriptions	Safety-HSIP	Safety-Other	Enhancement	Urban System	Bridge Preservation	Road Preservation (Non-interstate)
(Start)	Total	219	73	98	178	388 (81 selected)	768 (156 selected)
Stage 0: Feasibility	Exit (1): exclude Complete Streets elements	143	33	29	56	20	(na)
	Exit (2): stage 0 checklists are missing	67	0	0	114	1	(na)
Final plan	Exit (3): meet the 2017 *Guidelines*	4	36	54	2	9	(na)
	Exit (4): does not meet the *Guidelines* but let in 2017 or earlier	4	3	10	3	33	(na)
	Exit (5): does not meet the *Guidelines* and let in 2018	0	1	4	0	11	(na)

Stage	Exit ID and descriptions	Safety-HSIP	Safety-Other	Enhancement	Urban System	Bridge Preservation	Road Preservation (Non-interstate)
	or later + does not have design exception						
Stage 3: Design	Exit (6): does not meet the *Guidelines* and let in 2018 or later + have a design exception but without exception reasons	0	0	1	0	0	26
(End)	Exit (7): does not meet the *Guidelines* and let in 2018 or later + have a design exception with exception reasons	1	0	0	3	7	130

(Note: "HSIP" stands for Highway Safety Improvement Program. "Safety-Other" refers to other safety programs, such as Local Road Safety Program (LRSP), Safe Routes To School (SRTS), and Safe Routes to Public Places Program (SRTPPP). 'na' means not applicable. Shaded cells mark outstanding values when look at the table vertically, i.e., making comparisons within each project category.)

At Exit 3, a significant number of Safety-Other (i.e., 90%, 36/40) and Enhancement (i.e., 78%, 54/69) projects were found to meet the 2017 Complete Streets Minimum Design Guidelines. Among them, 61% of the Safety-Other projects and 35% of the Enhancement projects were funded before 2017.

At Exits 4 and 5, the most significant finding is that a large percentage of Bridge Preservation projects do not meet the Complete Streets Minimum Design Guidelines. Among the 60 Bridge Preservation projects that did not exit from Exit 1 or 2, the research team found 59 of them responded "Too early in the process to know" to the Complete Streets feasibility question. When such a project reached Stage 3 for design, it typically considered the "Shoulder Width/Type" Design Guidelines (i.e., 2 ft. min paved shoulder) instead of the Complete Streets Minimum Design Guidelines (i.e., 4 ft. min paved shoulder). All of them are Off-System Bridges (i.e., non-DOTD owned structures), which require collaboration and agreements with local authorities to determine needs and maintenance liability.

At Exit 7, for non-Preservation projects, exemption reasons include matching the existing section design, tree preservation, and right-of-way acquisition. In the case of Bridge Preservation, parish council resolutions were applied for Complete Streets exemptions (because they are Off-System Bridges not owned by DOTD). The most noticeable case is the Road Preservation projects, which are typically referred to as Preservation, Rehabilitation and Replacement (PRR) projects. First, the time lapse from a PRR report time to the project funding time is much shorter than the other projects (i.e., the average is 0 year and the maximum is 2 years). Second, these projects followed the 2010 Pavement PRR Minimum Design Guidelines [69]. According to the applied design guidelines, PRR projects for minor rehabilitation and preservation purposes were asked to

match existing; and PRR projects for replacement and major rehabilitation purposes were required to have 2 ft. min paved shoulder (which is considered "acceptable" for urban roads in the 2010 Pavement PRR Minimum Design Guidelines) [69]. Third, the research team found the PRR report form was updated several times since its adoption in 2013. A question asking to specify low-cost safety improvement was added to the PRR report form in 2015. Among the 68 PRR projects funded since 2016, 50 responded to the low-cost safety improvement question. Typical answers include adding shoulder wedge, having rumble strips, and restriping. A question regarding Complete Streets was added to the PRR report form in 2020. However, the number of eligible PRR projects funded since this modification is not sufficient to reach meaningful conclusions.

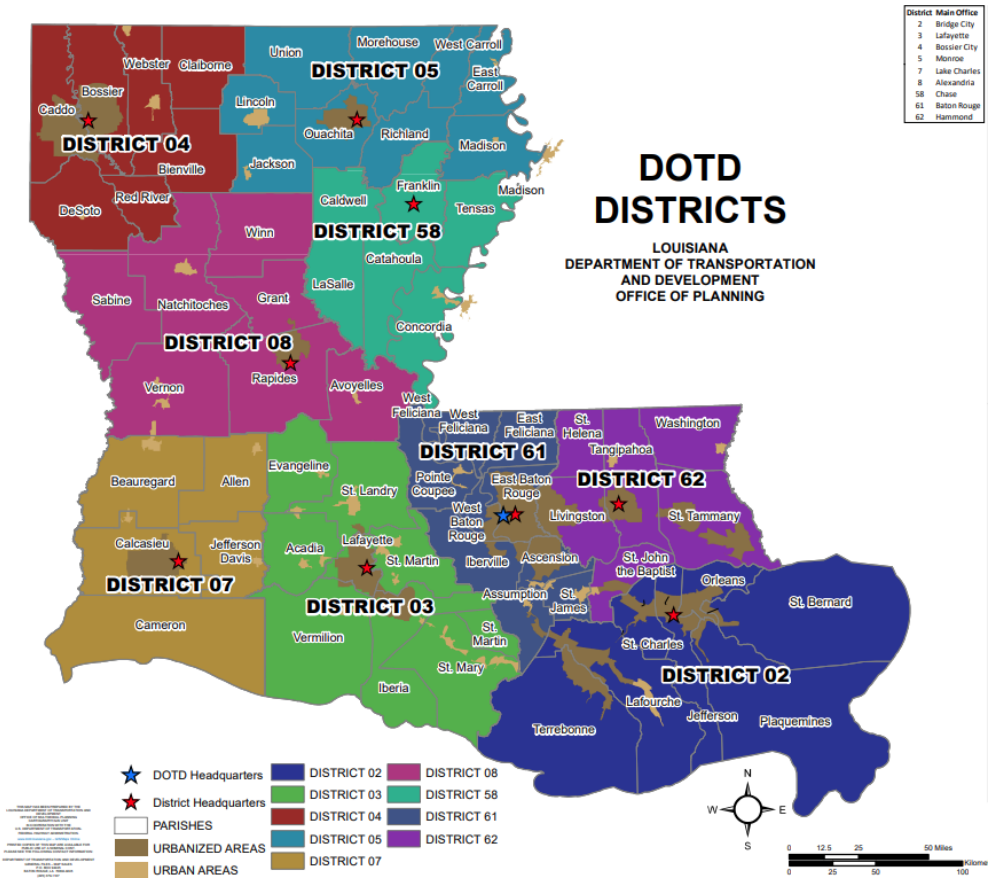
By DOTD District

Figure 5 shows DOTD districts and Table 8 presents construction project review results by DOTD district. First, two districts (Districts 2 and 62) have more Enhancements, Safety, and Urban System projects than the other districts. District 58, which does not have any urbanized area, has the fewest number of such projects. The amount of such projects could be related to the size of urban/urbanized area in each district.

Second, beyond District 58, Districts 5 and 8 have higher rates in excluding Complete Streets elements from projects. However, District 5 also has a higher rate of projects meeting the 2017 Complete Streets Minimum Design Guidelines. Its rate is similar to that of District 2.

Third, District 3 has a higher rate of projects, which were let before 2017, not meeting the 2017 Complete Streets Minimum Design Guidelines.

Figure 5. DOTD districts



(Figure source: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Data_Collection/Mapping/District%20Maps/DOTD_District_11x17.pdf)

Table 8. Project review results by DOTD district

DOTD districts	District 2	District 3	District 4	District 5	District 7	District 8	District 58	District 61	District 62
Total number of projects	**133**	**36**	**53**	**62**	**36**	**49**	**10**	**80**	**108**
% exclude Complete Streets elements	32%	47%	55%	63%	39%	61%	70%	50%	54%
% have Complete Streets elements and meet the 2017 *Guidelines*	24%	14%	6%	23%	22%	12%	10%	14%	16%
% have Complete	7%	14%	4%	4%	0%	4%	0%	7%	5%

DOTD districts	District 2	District 3	District 4	District 5	District 7	District 8	District 58	District 61	District 62
Streets elements but not meet the 2017 *Guidelines*									
Main city	New Orleans	Lafayette	Bossier	Monroe	Lake Charles	Alexandria	Chase	Baton Rouge	Hammond

(Note: This table only counted Enhancement, Safety, and Urban System projects. Shaded cells marked outstanding values when look at the table horizontally, i.e., making comparisons among districts.)

Survey and Interview Result Summary

This section summarizes major findings from the survey/interviews and identifies key successes and barriers in policy implementation. Content is organized as five major opportunities for Louisiana as it advances its Complete Streets Policy implementation in the next step. As noted below, the five opportunities are not stand-alone but are interrelated with each other. For full survey and interview results, please refer to Appendix C and Appendix D.

Update Major Documents in All Project Delivery Stages

There are seven stages in DOTD's project delivery: project feasibility study (Stage 0), environmental study (Stage 1), funding (Stage 2), final design (Stage 3), letting (Stage 4), construction (Stage 5), and operation (Stage 6) [59]. The Complete Streets Policy is intended to apply to all stages of project delivery. However, based on survey responses, over 60% of the DOTD respondents report strong awareness of policy applicability to earlier stages (feasibility, environmental, and design), but fewer (i.e., less than 30%) recognize policy applicability to later project stages (letting, construction, and operation). This finding possibly indicates a need to provide resources explaining why and how the Policy applies at each project delivery stage. For instance, application of the Policy to project letting may refer to ensuring contractors are adequately trained to successfully implement Complete Streets design elements [70]. In construction, application of the Policy may refer to maintaining safe accommodations for people walking and bicycling through or around the construction site [71].

There is a lack of clarity about policy applicability and roles even among offices/sections who are contributing to those earlier project delivery stages. For example, the planning office contributes to Stage 0, while the design section contributes to Stage 3. Some interviewees in design roles asserted that by the time a project gets to them, it's too late in the process to "add on" pedestrian and bicycle components, while others involved in planning counter that design decisions are ultimately outside their purview and many changes are inevitably made after the

planning phase. Both statements can be simultaneously true. However, guidance is needed to articulate the roles of all sections more clearly. The roles of planning include long-range planning (to define local, regional, and statewide network development and goal setting) and specific project scoping (to consider the potential need for pedestrian and bicycle accommodation). The roles of design include identifying specific and feasible solutions to address that accommodation need. Key documents used by the two offices/sections have been updated within the last 10 years (e.g., the Engineering Directives and Standards Manual, Complete Streets Minimum Design Guidelines, Stage 0 Checklist, and Design Report). These document updates are also recognized as top policy implementation success by the survey respondents and interviewees. While policy adoption was a necessary prerequisite to action, systematic implementation was impossible without first updating the manuals and guidance utilized by agency staff. The inclusion of a Complete Streets question in major project delivery documents of the two offices/sections are also considered to be key checkpoints for accountability. This finding further indicates additional staff training may be needed to ensure future document updates are well disseminated, while an internal platform hosting all policy related materials is needed to facilitate training and build awareness continuously.

There are additional opportunities to continue updating planning and design documents. Based on the survey responses, only 40% of all respondents think the current design guidelines are adequate in providing guidance for designing pedestrian and bicyclist facilities on state owned roadways. Respondents also indicate a gap in explicit content pertaining to transit accommodation, with over 30% of DOTD respondents disagreeing that current guidelines adequately address the needs of transit users. When asked about recommended changes to guidelines, most respondents indicated a need for more nuanced and flexible guidance for various contexts (i.e., land use and roadway functional class).

Funding is also among the earlier project delivery stages. About 60% of the DOTD respondents think the Policy applies to this stage, indicating a lack of clarity among the remainder about how the Policy should factor into key decisions. Based on survey responses, the primary barriers to Complete Streets implementation identified by DOTD respondents are cost (about 85%) and anticipated project complication/delay (about 30%). An associated point is that local cost share is perceived by 53% of the DOTD survey respondents as a barrier in implementing the Policy. Multiple interviewees also mentioned that there is relatively little money available to address the backlog of needed Complete Streets projects in relative to the state's other infrastructure needs. Some interviewees expressed optimism that federal support for walking and bicycling, which has been increasing in recent decades, would continue to grow. Meanwhile, some interviewees also noted that developing reliable state funding streams – and the ability to use these for projects

serving active transportation users – is also imperative. Some interviewees cite a lack of a clear process for coordinating multiple funding streams. Significant project changes that incur additional cost (e.g., preservation only to construction involved) may need to combine funding from multiple programs. Overall, lack of reliable and coordinated funding for Complete Streets implementation is a barrier to more rapid advancement toward policy goals. All these findings re-emphasize the importance of an internal platform supporting funding Q&A (e.g., what funding is available and who to contact. These funding issues might also explain why non-DOTD survey respondents think organizational culture (about 65%) and lack of political will (about 47%) are the biggest issues in the existing policy implementation.

Project selection/prioritization underpins seven project delivery stages. Based on survey responses, about 77% of the DOTD respondents and only 24% of the non-DOTD respondents think the state agency is highly or somewhat effective in soliciting local input in project selection and prioritization. This finding indicates more outreach could be done. For example, several interviewees note that proactive planning efforts at both the state and local level are needed to identify future priorities in the pedestrian and bicycle network. This highlights the necessity of developing and integrating statewide and local/regional long-range plans to guide overall network development and prioritization. This, in turn, is expected to require: (1) more involvement from the Office of Planning, (2) more interaction and collaboration with District offices and other agencies (e.g., MPOs and local municipalities) in supporting local plan development, and (3) more robust data support. In addition, the existing project selection/prioritization process and criteria require DOTD agency document updates for clarification and a public facing platform for document sharing. The combination of these efforts would greatly improve DOTD's ability to implement the Policy consistently and effectively.

Upgrade Project and File Management Platform/System

First, the current project management system needs upgrades to help with more efficient project delivery. Several respondents observed inconsistency in how individual project managers are responding to the Complete Streets questions in Stage 0 Checklist and Design Report. This finding indicates that practitioners need additional guidance to ensure that checkpoints are effectively used. Responses could be improved by using digital forms (reducing 'NA' responses) and providing answer templates (improving response quality) in an upgraded project management system. The recorded answers will also enable convenient content analysis for future policy implementation evaluation. In addition, the upgraded system needs to facilitate inter-office/section communication. If all DOTD offices/sections are encouraged to exchange

major project decision documents via the consolidated project management system, this would clarify decision-making processes.

Second, an internal platform is needed to host all Complete Streets related documents (e.g., policy, guidelines, manuals, and plans) and tools (e.g., planning tool and benefit-cost analysis tool). Based on survey responses, existing plans and tools are underutilized, even among respondents whose work would be expected to interact with such resources. For example, no DOTD respondents report being more than "moderately" familiar with the DOTD Bicycle and Pedestrian Master Plan, with over 25% not familiar with this resource at all. Relatedly, about 15% of the DOTD respondents report using the plan in their work. A "one-stop" platform will assist DOTD personnel looking for right documents to understand their roles in policy implementation, fulfil their job responsibilities in daily work, and clarify concerns/questions related to the Policy.

Third, a public facing platform is needed. First, this external platform will assist DOTD in communicating with other stakeholders. This external platform would: (1) establish clear channels of communication from the state agency to its public and local agency partners (e.g., initialize effective 'Call for Projects'); (2) clarify opportunities for local input in decision-making (e.g., project selection/prioritization criteria and time); and (3) help DOTD and advocates work together more productively (e.g., by providing model MOUs or templates for developing projects that link external funding for Complete Streets elements outside of state-led project scope). Second, this external platform could also highlight success stories to promote project success, build policy awareness, and encourage more regular and robust project outcome analysis.

Develop Program Specific Guidance

The Complete Streets Policy is generally intended to apply to all project categories. Based on survey responses, over 60% of respondents reflect knowledge of the Policy's applicability to new construction, major rehabilitation, and replacement projects. There is less consensus (i.e., less than 40%) around the policy's applicability to operations, preservation, and minor rehabilitation projects.

For road preservation projects, the confusion originates from their stand-alone design standards and procedures, which have not been fully updated for policy compliance. First, a facile "exemption" from the Complete Streets Policy on the grounds of right-of-way availability is common among survey respondents (over 40%). About 30% of the DOTD respondents and 60% of the non-DOTD respondents think more guidance is needed for integrating the concept of

Complete Streets into preservation projects. Several interviewees also state additional guidance to help designers "solve the right problem" within the constraints of this program is needed. Second, preservation projects are led by Districts, highlighting the need for outreach and training around possible interventions in different contexts (urban, rural, and transitional) within roadway constraints. Some interviewees also note that District Administrators (and by extension local agencies) need to "drive" these discussions as they are responsible for determining project scope within their budget allocation for each roadway type. Ultimately, coordinating closely with local and regional planners to identify walking and bicycling priorities may be needed to facilitate future decision-making. Given the number of road preservation projects let annually and the untapped potential of enhancements to support active users within the existing right-of-way numerous survey/interview respondents identified road preservation program as an important area of opportunity for the next phase of Policy implementation. Appendix G summarizes practices of other state DOTs in integrating the concept of Complete Streets into pavement preservation. The appendix also provides a tentative concept integration roadmap for DOTD's pavement preservation program.

Policy ambiguity increases when it comes to bridge preservation projects. Off-system bridge projects (i.e., non-DOTD owned structures) receive final design approval from local (parish) authorities, representing one gap in Policy application noted by interviewees. Guidance for off-system bridge program to aid locals in prioritizing Complete Streets accommodation where appropriate is needed, particularly in light of recent changes to U.S. code mandating such accommodation on most bridge projects (23 USC §217).

Maintenance is another program/aspect needing more specific guidance. Maintenance burdens are technically shared between local jurisdictions and DOTD, depending on whether improvements are within the state-owned right-of-way and the nature of those improvements. Some elements of Complete Streets (e.g., sidewalks and bicycle facilities) are explicitly required to be paid for and maintained by local agencies. Typically, building shoulders is the default option in the absence of a maintenance agreement. Maintenance and liability agreements were identified as a barrier in some cases, particularly for unfamiliar treatments or elements (e.g., vertical elements of protected bike lanes) for which established maintenance schedules or protocols have not been developed. Thus, providing specific guidance to allow the maintenance program to develop and keep a repository of modal maintenance agreements is needed. Although barriers regarding the availability of resources to conduct maintenance will persist given limited local capacity and funding, DOTD can help alleviate the burden of drafting clear and legally defensible language to reduce friction related to Complete Streets design.

Training, Education, and Local Support

Interviewees broadly agree that more opportunities for training and outreach are needed to improve policy impacts and empower both DOTD personnel and non-DOTD partners to advance successful Complete Streets projects.

1. **More training opportunities for DOTD staff and business partners**

The agency has already developed an introductory training module explaining the Policy which all employees are required to take. However, only 45% of the DOTD respondents affirm that they have completed the required Complete Streets Training Module. Several interviewees also note that it is unclear whether the training is being enforced. More importantly, the training module only explains the "why" for Complete Streets but not the "how." Survey responses suggest that DOTD personnel are not familiar with existing tools. For example, only 6% of the DOTD respondents are extremely/very familiar with the Bicycle Planning Tool, while only 15% report they have used the tool in their daily work. The commonality among these respondents is shorter work tenures and lower familiarity with the policy. All the findings suggest a need for enhanced policy education, especially among newer staff.

2. **Enhance Early Career Education**

Multiple stakeholders highlighted the imperative of reaching new planners and engineers early: ideally, as part of their basic training and curriculum at the college or university level. Several stakeholders note that design and engineering for active transportation was not part of their own educational background. This finding reflects that universities in the state should be encouraged to incorporate active transportation planning and design concepts, such as developing a topic-specific graduate course for advanced studies. This would help foster a culture of multimodal accommodation for many years to come.

3. **Provide support to locals**

Both DOTD and non-DOTD interviewees observed that outreach to provide compatible introductory and advanced training to local agencies is necessary. Currently local jurisdictions are unevenly supported. In many jurisdictions, competing priorities simply outweigh the desire to improve conditions for non-motorized users, while in a few places, direct pushback has stymied efforts to advance policy goals. Continued outreach and leadership are needed to ensure this result. In addition, interviewees cited the need to focus on potential economic benefits, and not just safety benefits, in order to persuade local stakeholders of the merits of Policy implementation.

The DOTD should consider expanding its partnership with Local Technical Assistance Program (LTAP) to deliver more training for planning, context-sensitive design, and operation (rather than "just ticking checkboxes"); more frequent and proactive communication about local and national best practices, success stories, and potential funding sources; and development and/or promotion of model design guides to illustrate alternatives for a variety of situations. This could take the form of workshops or modules, resources/guides, and direct communication to help develop a shared vocabulary for multimodal access improvement.

Improve Data Collection for Performance Measures

This action should be of first priority as it supports opportunities identified in the previous subsections.

1. **Process measures**

Process refers to inputs and activities in the logic model (shown in Figure 1). While the compilation and publication of annual legislative reports outlining Complete Streets progress in the state are a valuable asset, the specific numbers reported therein in some cases lack context (e.g., simple counts rather than percentage of total projects) and/or targets (annual or long-term) and do not clearly indicate successes or challenges. As a result, the performance measures do not adequately point toward areas for improvement and/or implementation next steps.

2. **Output measures**

Spatial data around pedestrian and bicycle accommodation is an important asset in terms of long-range analytic capabilities but of limited use in year-over-year benchmarking. Some stakeholders report that this is in an interim stage of development. Complete Streets projects are being tracked by control section and log mile and mapped as part of Complete Streets performance measurement, but not necessarily as a routine component for asset management. In general, stakeholders cite a need for enhanced tools for assessing the pedestrian and bicycle network and evaluating connectivity – as well as processes or protocols which encourage widespread use of the tools.

3. **Outcome measures**

Multiple stakeholders expressed a lack of clarity around how different programs assess the need for Complete Streets and the inputs or data considered. Approaches to safety analysis for vulnerable road users appear to vary across programs and geography. Lack of demand or

exposure data was identified as a barrier to planning and performance measurement, and indicated a need for expanded and more consistent quantitative data sources.

Some stakeholders cite the need for more project and program-level evaluation in order to understand the outcomes of investments and to highlight successful projects. Communities need to see the benefits of the Policy in order to overcome resistance to change of the status quo generally, as well as to justify spending money on construction, operation, and/or maintenance.

Stakeholders were also asked to identify any mechanisms for assessing and prioritizing equitable outcomes during the interview. Some stakeholders identified the National Environmental Policy Act (NEPA)/federal environmental justice legislation as the primary formal mechanisms for ensuring that negative impacts are identified and mitigated. However, there is no formal policy or agency-wide metric assessing equity outcomes currently in place, except a few program-specific exceptions.

Lessons Learned from Outcome Evaluations

The research team used DOTD crash data and passively collected data for longitudinal performance evaluations at the project level. Proxy measures where needed were proposed to assess outcomes that were previously found challenging to measure without distributing survey questionnaires or raising privacy concerns. Two case studies with different facilities and covering different areas were conducted to demonstrate the potential applications of these data sources for routine evaluation that goes beyond simply assessing the number and severity of crashes. This section summarized data limitations and challenges that came across in completing the case studies, as well as issues that need future attention. Please refer to Appendix F for full outcome evaluation data sources, methodology, and case study results.

Safety Analysis

First, the longitude/latitude information of a crash is likely to be recorded on the roadside instead of its actual crash location. The authors applied different distance thresholds (i.e., 25 ft., 50 ft., 100 ft., and 150 ft.) to capture crashes on/near the road segments under evaluation. Future analysts may need to carefully adjust the distance thresholds to fit a particular evaluation case. For example, local streets could be very close to each other; applying a large threshold in such a case may capture crashes on adjacent streets instead of on the one under evaluation.

Second, traffic volume on state-owned routes is immediately available to DOTD, but traffic volume on local streets is not available or not immediately available to DOTD. There is no central repository to keep traffic volume data collected by different entities—DOTD, MPOs, local government, etc. DOTD funds local projects through programs like Local Road Safety Program (LRSP), Safe Routes to School (SRTS), or Safe Routes to Public Places Program (SRTPPP). As a result, DOTD is not able to evaluate outcomes achieved from those projects due to the inconvenient (or perhaps non-existent) access to local traffic volume data.

Third, the absence of bicyclist and pedestrian volume data makes the safety evaluation incomplete [32]. DOTD and other local authorities should consider prioritizing pedestrian and bicyclist count collection for high-crash risk locations. Previous and ongoing LTRC research projects as well as several locally funded initiatives have collected short- and long-duration count data. However, DOTD does not currently conduct systematic non-motorized traffic monitoring and these activities are not yet widespread among local agencies or MPOs. Videos recorded for counting purposes (whether by DOTD, local agencies, research entities, or consultants engaged in traffic analysis) could also be used in analyzing walking/biking/driving behavior to better solve safety problems for those locations and improve transportation system performance.

Fourth, abnormal crash rate increments may need our attention during certain periods or in certain contexts. For example, the crash rate increases during the early construction period, which may raise some concerns pertaining to work zone safety issues. Another example is that small towns may observe higher speeding rates more frequently than metropolitan areas. Authorities might want to examine safety issues in rural contexts and take safety improvement actions if needed.

Mobility Analysis

The Regional Integrated Transportation Information System (RITIS) provides valuable input to mobility evaluations. However, as an emerging data source, RITIS has its limitations in the current situation and needs future improvements. First, urban areas generally have better data coverage in scope (i.e., covering more places) and granularity (i.e., more RITIS segments in smaller pieces) while most rural areas are generally in an information desert. An RITIS segment in a rural area is often longer than a road segment under performance evaluation. The data inequity status and the potential of inducing misrepresentation issues could leave rural communities without sufficient data supports and make them less competitive in securing funding. In addition, RITIS segment IDs currently do not directly link with state DOTs' Linear

Referencing System (LRS) used in Highway Performance Monitoring System (HPMS). Additional geo-information or an identification table is needed to join data from the two sources (i.e., RITIS and state DOTs) [72].

RITIS provides longitudinal traffic data for road segments, but there is no traffic data for recurring/longitudinal mobility evaluations at intersections. The absence of data leaves intersection evaluation without a convenient data support. In addition, the current practice does not consider delay for bicyclists and pedestrians at intersections. The recently published NCHRP report starts including pedestrian and of bicycle delay as performance measures and discusses treatments reducing pedestrian and bicycle delays [73]. State DOTs may want to consider including travel delay for pedestrians and bicyclists in evaluating intersection performance to keep their practice up to date.

There are various congestion measures for road segments and each of them has their own merits and restrictions. Texas A&M Transportation Institute's (TTI) speed reduction factor may be the most widespread congestion measure. However, the calculated speed reduction factor value could be biased sometimes because the free flow speed sometimes could be much higher than the posted speed limit (especially in rural areas). If such free flow speed is used in calculations, the results lead to a finding of severe "congestion" in such cases, while speeding is the actual issue that needs to be addressed. Overall, free flow speed, average speed during peak hours, and speed reduction factors should all be reported to help practitioners gain a full picture.

The two projects evaluated as case studies generally found that modifications to improve safety, mobility, and accessibility for people walking and bicycling did not induce heavier motorized traffic congestion. In addition, the project with sidewalks/bike lanes contributes to traffic calming in an urban context. The shoulder expansion project may raise concerns about speeding issues in a rural context, indicating a need for in-depth safety analysis in the future.

Accessibility Analysis

First, SafeGraph has been updating its place list and tracking closed/open businesses since early 2020. Thus, to track active businesses, reporting the number of public places preferably should be based on the public place IDs actually appearing in the activity datasets (i.e., "patterns.csv" files provided by SafeGraph) instead of the point of interest (POI) attribute tables (i.e., "core_poi.csv" files provided by SafeGraph).

Second, the number of devices counted in SafeGraph affects reporting the number of visits. The number of visits could increase significantly (more than 40%) from year to year in some cases

without standardizing the number of devices counted. The following are two relevant suggestions. The first suggestion is for future outcome evaluation studies and practices—scaling factors of finer spatial scale should be applied to address regional disparity concerns and to improve evaluation accuracy. For example, the current study found the ratio between the number of devices seen in 2021 and that in 2020 is 0.91 at the national level (see the first column on the right hand side in Table 21 in Appendix F). After looking into the data by state, the ratio for Louisiana in the same time period is 0.99. SafeGraph started providing the number of devices seen by state in July 2020, so future studies have better opportunities to apply state-level scaling factors. The second suggestion is for data providers—regional disparities may also exist within a state (e.g., urban vs. rural). When data privacy allows, providing scaling factors in even finer spatial scale should benefit outcome evaluations to be made in different contexts.

Third, the scaled number of visits should be reported along with other accessibility measures (e.g., dwell time) to keep stakeholders aware of the data quality. This operation should facilitate unbiased result interpretations. For example, there were outstanding dwell time variations for activities at banks and mortgage companies in the second case study. However, such unusual variations are more likely due to small samples instead of travel behavioral changes.

Analyze Project Outcomes with Control Groups

Additional data were collected for control groups as comparisons. The analysis procedure, supporting data, and comparison details are included in Appendix F.

First, safety outcomes show up quickly relative to project completion. However, crash reduction impacts could be weakened after several years following project completion. Future studies may want to explore potential reasons, such as land use changes, new travel patterns, and pavement deterioration. Public authorities may want to conduct recurring safety evaluations to preserve project safety outcomes for a longer period. In addition, work zone safety in rural areas needs attention to control crash risk. A potential spot of greater crash risk is the transitioning areas between work zone and no-construction zone.

Second, mobility outcomes are not so significant compared with safety outcomes in terms of relative magnitude of change. An additional question of interest might be whether the road diet implemented on Government Street increases motorized traffic congestion on parallel arterial routes such as Florida Boulevard. It should be noted that it is not feasible to isolate the impact of implementing a road diet from that of building sidewalks/bike lanes in this case because construction involving the two improvements was carried out simultaneously on Government

Street. However, motorized traffic congestion did not increase on Florida Boulevard during the period for which data was evaluated (i.e., the speed reduction factor maintains around 55% on Florida Boulevard both before and after the Government Street project). Future studies may also want to calculate a posted speed limit non-compliance rate by hour to find out which time period in a day has a higher non-compliance rate and come up with more effective traffic calming solutions.

Third, longer periods of "after" data are needed to confirm accessibility outcomes, which are linked with economic and public health benefits. Highway functional classes (and traffic volume) may also affect the number of visits to public places, which requires additional data and analysis for more accurate impact quantifications. Future studies may want to explore: (1) how visit changes statistically relate to economic and public health benefit changes and (2) how the change of land use (i.e., type of public places) contributes to visit changes.

The collected data is small in its sample size due to data availability, which calls for future analysis with a larger sample size to reinforce the analytic approach and validate the analysis results. This study serves as a preliminary test and enables project outcome quantifications from multiple perspectives, which could benefit communities pursuing projects that fit various local needs.

Conclusions

This study first reviewed DOTD's processes and guidance documents to find out how the Complete Streets Policy has been accommodated by the agency in the last 10 years. The study then collected and reviewed construction project documents in the last 10 years to find out how these updates were reflected in practice. A survey and interviews were conducted to collect stakeholders' perceptions regarding policy implementation in Louisiana. Lessons learned from outcome evaluations pointed out gaps that perhaps are common for most of the state DOTs in the United States. A comprehensive evaluation on Complete Streets policy implementation at the state level is uncommon and represents a potential model for other jurisdictions interested in quantifying policy results.

Based on the agency document review, the following policy implementation processes take significant time: (1) updating policies, guidelines, and manuals; (2) having updates reflect in daily practice (such as updating project forms); and (3) having new projects adopt the most up-to-date version of forms. The process is iterative as updates to one document may reveal new changes necessary elsewhere. Overall, culture change from focusing on auto-mobility to balancing accommodations for all modes is a long-term challenge. This finding explains a perceived slow pace of policy implementation especially by stakeholders outside of DOTD in Louisiana. Regardless of the perceived slow pace, much progress has been made in DOTD since 2010. Most of the implementation actions identified at that time have been advanced or completed [63]. Half of the actions identified by the Complete Streets Steering Group Action Plan in 2018 have been completed, partially fulfilled, or are currently in progress though work remains to identify responsible parties and specific targets for some actions.

Based on the survey/interview responses, several stakeholders report substantial progress over the last 10 years and major shifts in the degree to which active transportation is considered, discussed, and advanced, but stakeholders still report a perception of a slow pace of change. Gaps in policy awareness and diffusion are also apparent, highlighting a need for ongoing outreach and sustained leadership to encourage broad institutional support for Policy implementation. The stakeholder surveys and interviews highlighted the need for continued development of design guidance to fit a variety of contexts; more training to diffuse policy expertise throughout the agency (and its contractors); and development of enhanced input datasets and tools to aid planners and designers in decision-makings. Responses also highlighted opportunities for DOTD to exhibit leadership and be an exemplary partner to local agencies,

while taking opportunities to identify and promote previous success. Refer to “Emphasize Outreach and Education” in the Recommendations section for more details.

Based on the project review, additional efforts are needed to facilitate more frequent project reviews and performance tracking, such as upgrading the existing project management system. Refer to the following two subsections in Recommendations section for more details: “Integrate Internal Project Management Systems” and “Enhance Documentation of Complete Streets Consideration.” In addition, more attention should be given to Preservation, Rehabilitation and Replacement (PRR) projects to make more significant progress on influencing the built environment. Refer to the last section in Appendix G for a tentative Complete Streets concept integration roadmap for DOTD’s Pavement Preservation Program. Similarly, opportunities for concept integration also exist in other DOTD programs, such as Operation Program and Local Road Safety Program (LRSP). At last, this study only considered longitudinal treatments as emphasized in the Policy. Opportunities exist in addressing conflict treatments at intersections and their integrations into various DOTD programs.

Based on project outcome evaluations, data and measurement gaps exist. First, statewide active transportation infrastructure data (including spatial presence and facility attributes) needs to be collected and updated routinely. Refer to “Further Develop Statewide Spatial Data” in the Recommendations section for more details. Second, data source and outcome evaluation measure challenges exist and need future improvements. Refer to “Facilitate and Expand Project-Level Outcome Analysis” in the Recommendations section for more details. Third, rural areas may need more attention regarding data availability (e.g., traffic volume), speeding concerns, and work zone safety matters.

There has been considerable recent momentum within the agency for accelerating action plan implementation, and this research has helped identify gaps where attention is now needed. Now the state agency is in a “Complete Street 2.0” phase in which the basic framework is in place and key elements have been advanced. The current study results and subsequent works are expected to help the state agency reinforce the foundations, build capacity, identify training/education needs, and establish stronger partnerships with local governments.

Recommendations

In the course of this research, a wide range of issues pertaining to data systems, design guidance, and outreach and education emerged from data analysis and/or discussion with stakeholders. While some of these issues and concerns are specific to Louisiana, many are issues shared across jurisdictions. These issues, categorized by overarching theme, are summarized below along with recommended next steps and a preliminary list of stakeholders likely to be involved. We also performed a scan of national best practices to identify examples of resources, practices, and programs that may serve as useful models for some of the below recommendations. Summary findings from the best practice research may be found in Appendix H.

Update and Improve Data Systems

Several recommendations for next steps DOTD can take to enhance Complete Streets Policy implementation pertain to expanding availability of relevant data or making better use of existing data by improving systems for accessing, applying, and contextualizing information from disparate sources to quantify progress and identify opportunities for improvement.

Streamline and Contextualize Complete Streets Legislative Reports

While the compilation and publication of annual legislative reports outlining Complete Streets progress are a valuable asset, the specific numbers reported therein in some cases lack context (e.g., simple counts rather than percentage of total projects) and/or targets (annual or long-term) and do not clearly indicate successes or challenges. As a result, the performance measures do not adequately point toward areas for improvement and/or implementation next steps. Benchmarking data to indicate that implementation activities continue to occur is an important step; however, effective implementation and evaluation requires clear targets against which to measure progress.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: (1) Agency document review and (2) survey and interview

Recommended actions:

- The internal Complete Streets Steering Group should re-convene to review the most recent legislative report and identify target benchmarks and goal timelines where appropriate (if it is

not possible to define a target or timeline, the group should consider eliminating or revising the metric).

- Staff responsible for producing annual legislative reports should articulate methodology of output tracking to ensure consistency from year to year.
- Provide denominators to normalize metrics from year to year where feasible (e.g., percent age of project by program) for projects, funds allocated, staff, etc.
- Contextualize data reported with additional metrics, such as facility use (e.g., counts) and equity impacts (e.g., populations served, improved accessibility).
- Define and consistently use specific equity criteria in performance measurement.

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Data Collection and Management Analysis Section; DOTD Transportation Planning Section; CSAC

Further Develop Statewide Spatial Data

In order to adequately track policy implementation as well as evaluate accessibility improvements such as those listed above, spatial data capturing the nature and extent of active transportation infrastructure needs to be routinely collected and synthesized into a comprehensive statewide database. In addition, sensor-based road network data collected for DOTD (i.e., Automated Road Analyzer, ARAN) inadequately captures relevant information about Complete Streets; is updated less frequently than optimal; and there is no public-facing platform for viewing or retrieval of statewide active transportation infrastructure data.

Project objective(s): "Evaluate the policy impacts at a disaggregate level"

Task(s) completed: Output mapping and outcome evaluation

Recommended actions: This research project has included a preliminary effort to compile existing data sources around the state to work toward the eventual development of a publicly accessible database/spatial layers showing existing (and where available, proposed) bicycle facilities, pedestrian facilities, and transit routes/stops. In order to support routine data collection, the following actions are recommended:

- Provide additional support for geographic information system (GIS) group responsible for maintaining and integrating datasets, to reflect the increasing importance of timely, detailed

spatial information for data-driven decision making and to expand the utility of such data for both project development and performance measurement.

- Create/update a template for streamlined spatial data collection at DOTD project close-out to include all facility characteristics of interest (e.g., facility type, width, user modes, etc.), and define the process and personnel involved in compiling this data and consolidating into spatial layers by more and/or type (e.g., line features versus point features).
- Identify opportunities for adjusting future post-processed sensor-based road network data collection to include marked crosswalks, bicycle lane markings and symbols, transit stops, curb ramps, etc.
- Conduct statewide analysis of right-of-way (ROW) feasibly available for non-motorized use in order to facilitate network-level complete streets planning. This could include mapping utility ROWs, using existing GIS and traffic volume data to identify with excess lane width or capacity relative to demand and functional class, etc.
- Continue to support development of demand and volume data for non-motorized road users as a key input for planning, design, and evaluation.
- Publish spatial layers online (web viewer and/or download) and include on Complete Streets web page.

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Data Collection and Management Analysis Section (Mapping Unit); DOTD Transportation Planning Section

Facilitate and Expand Project-Level Outcome Analysis

More detailed crash analysis (e.g., to understand crash types, particularly as pertains to vulnerable road users), cost benefit analysis, and overall outcome analysis (potentially including economic impact and user satisfaction metrics) is needed to improve investment efficiency and build public trust and buy-in, particularly for innovative design.

Project objective(s): “Evaluate the policy impacts at a disaggregate level” and “Understand the contribution of outputs to outcomes in different contexts”

Task(s) completed: Output mapping and outcome evaluation

Recommended actions: This research effort provides a pilot methodology for outcome evaluation linked to adopted Policy goals and using readily available data. However, other analytic

techniques, data sources, and approaches may be appropriate to address specific agency objectives or community concerns, such as:

- As part of Stage 0 studies and/or through partnerships with local agencies or research entities, collect motorized traffic volume and non-motorized traffic volume starting from one-year before project construction and three consecutive years after project completion for major Complete Streets projects. The collected data will directly support uniform safety evaluations, mobility improvement justifications, and accessibility benefit proofs.
- Highlight project outcomes on DOTD's Complete Streets website to encourage Complete Streets considerations.
- Routine development of "before and after" case studies to highlight how DOTD projects change the built environment and improve conditions for all road users can provide valuable research data for ongoing policy and design improvements as well as grow awareness of and support for a complete streets approach.
- Assessment of economic impacts of projects (on real estate values, sales receipts, etc.) is of particular importance for commercial corridors, while user satisfaction and perceptions of safety, or health outcome and physical activity impacts may be important to local partners in DOTD project communities for understanding the impact of neighborhood-level or systemic interventions. As part of project planning and delivery for Complete Streets projects, DOTD and local stakeholders should identify opportunities and resources for such analyses.
- Develop models/indices to infer economic and health impacts based on human activity data records (passively collected through mobile devices).
- Collection of marked crosswalk and signal data as part of periodic road network data collection can facilitate robust and systemic evaluation of intervention impacts across the state over time.

Key Stakeholders involved: DOTD Data Collection and Management Analysis Section; LTRC; CSAC; Universities; Advocates

Integrate Internal Project Management Systems

Having documents for different project stages and programs all in different digital locations makes it very difficult to track the life of the project and conduct cross-cutting analysis of agency performance relative to Complete Streets goals. In order to facilitate meaningful benchmarking and improve agency efficiency, updates to overall agency data systems and processes to fully

digitize and ensure that Policy implementation can be tracked and monitored for all projects, at all stages of project delivery.

Project objective(s): "Evaluate the policy impacts to project scoping and delivery"

Task(s) completed: (1) Construction project review and (2) survey and interview

Recommended actions:

- Work toward fully digital project delivery with an initial goal to eliminate remaining paper-based forms and workflows.
- Include need more detailed breakdowns of project types/elements in forms and checklists to "tag" complete streets components across all project management and database systems.
- Create linked relational database for project files to reduce redundancy and facilitate comprehensive tracking of project through delivery process and annual performance assessment.
- As an interim measure, develop "User Guide" to inventory and map project-related documentation at all stages across agency districts, divisions, programs, etc.

Key Stakeholders involved: DOTD Executive Leadership/Administrators, DOTD Project Management Section

Enhance Documentation of Complete Streets Consideration

Our review found that Stage 0 and Stage 1/Stage 2 documents often lack detail as pertains to Complete Streets Policy compliance. It is often unclear the extent to which Complete Streets alternatives have been considered, with many "n/a" or excessively vague (e.g., "too soon to tell" or "insufficient ROW") responses to checklist questions intended to elicit information about Policy adherence.

Project objective(s): "Evaluate the policy impacts to project scoping and delivery"

Task(s) completed: (1) Construction project review and (2) survey and interview

Recommended actions:

- List feasibility exemption reasons for selection (ideally in a drop-down menu in digital format) and prompt user to justify/explain selection (e.g., data and methods used to determine

exempt status), and/or develop a stand-alone exemption form (See Appendix H) to ensure clear and thoughtful explanations.

- Prompt user to disclose which local plan was used and whether/how local input and data were integrated into proposal/scope/design, including documenting surrounding roadway, connectivity, and local plan context (if applicable) for bridge projects; and to document that Complete Streets-oriented alternative(s) have been considered and compared.
- Assign a dedicated person or team to review all Stage 0 Complete Streets responses across DOTD programs and clearly articulate review criteria and review timing in the project delivery process.
- Update Stage 0 Manual to align with Stage 0 checklists; highlight Complete Streets considerations and possible treatments.
- Enhance project documentation to require project planners, managers, and designers to articulate rationale for selecting a particular alternative (i.e., "show their work" in assessing safety and mobility issues and determining scope.

Key Stakeholders involved: DOTD Document Owners, particularly for Stage 0 and Stage 1/Stage 2 (e.g., Transportation Planning Administrator, Environmental Engineer Administrator, Funding Administrator)

Expand Specificity of Guidance and Support Innovative Design

The second major theme of research findings pertains to opportunities to build upon the existing design guidance pertaining to Complete Streets to more thoroughly and specifically address a variety of roadway and community contexts and address special needs within the transportation system. Providing additional guidance—while allowing adequate room for professional judgement and context-sensitivity—can improve the likelihood of safety, mobility, and accessibility gains for all road users.

Revise Complete Streets Minimum Design Guidelines

While the implementation of the Complete Streets EDSM and Minimum Design Guidelines marked a critical step in the right direction to Policy implementation, the range of roadway types and community contexts to which the Policy applies is wide. Currently, there is limited design guidance for how best to select and design facilities at intersections (including signal design and

operation); on and approaching bridges; on transit routes; on critical freight routes; and where other land use, social, or environmental factors influence active transportation feasibility and demand. Additional design guidance—in addition to bare minimum standards of accommodation to "meet" the policy language—would be beneficial. In addition, agency documents are currently updated on an as-needed basis. Active transportation design has evolved rapidly in recent decades, often faster than national standards (e.g., AASHTO, MUTCD), with their years-long update processes. However, considerable federal guidance does exist to facilitate expansion of state DOTs' "repertoire" of allowable facilities, and several states have charted a path for implementing FHWA interim approvals, etc.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: (1) Agency document review and (2) survey and interview

Recommended actions:

- DOTD can define a standardized process/schedule for review and update of agency documents and design guides: this can include a brief annual scan of the document list developed through this research as part of annual reporting processes and identification of specific areas for improvement, as well as definition of triggers which would automatically initiate a review process, such as adoption of new AASHTO guidance (e.g., recently released Pedestrian Facilities Guide update or anticipated forthcoming updated Guide for the Development of Bicycle Facilities, a draft of which is available for review).
- Clarification of specific points of process within various funding sources and project types at which complete streets evaluation is appropriate would also improve consistency of outcomes agency-wide.
- DOTD can continue, based on the above-elaborated schedule, to revise design guidance to address identified needs or gaps. For instance, the existing Complete Streets Minimum Design Guidelines already provide for inclusion of "preferred" standards, though preferred values for some facilities/contexts identified are not listed.
- In addition, greater specificity is needed to provide guidance for bridges through updates to the Bridge Design Manual and to aid locals in prioritizing complete streets accommodation on off-system bridges where appropriate. For instance, DOTD can provide project scoping guidance and analysis local jurisdictions to aid in assessing need for accommodation. Additional in-depth research is needed to identify best practices for integration of Complete Streets on bridge projects.

- Additional guidance for designers to provide a "menu" of options based on project, context, and community goals is advised, including but not limited to:
  - Guidance for use of technology or design available under FHWA Interim Approval pending AASHTO or MUTCD updates, e.g., bicycle actuated signals;
  - Development of DOTD standards for incorporation of green infrastructure (e.g., sidewalks with permeable surfaces, bioswales, and other solutions for managing stormwater runoff) within state right-of-way;
  - Guidance for capacity analysis/lane reductions (e.g., a road diet decision-making tool)
  - Guidance for traffic calming and speed management techniques; and
  - Guidance for identifying existing or potential conflicts between non-motorized road users and freight vehicles and balancing the needs of all user groups at intersections, along segments or corridors, and across the transportation network.

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; Document Owners (e.g., DOTD Office Administrators and DOTD Bridge Design Section); Program Managers; FHWA

Create Context-Dependent Transit Design Guidance

Although DOTD has developed basic guidance for context-sensitive transit facilities and identification of projects/corridors with existing or planned transit impacts (Access Connection Permit Supplement—Bus Shelters And Benches*),* additional guidance is needed to ensure that transit users are fully considered as part of complete streets implementation and to ensure that state-owned roadways that also serve as transit corridors—common on urban arterials in particular—address the needs of transit users.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: (1) Agency document review, and (2) survey and interview

Recommended actions:

More nuanced guidelines should be considered for varying roadway contexts (e.g., rural, suburban, and urban) for addressing discrepancies between local policy and/or current practice and adopted state guidance (e.g., allowing advertising, variable curb offsets, near vs. far-side placement, etc.) The goal should be to ensure that local transit facilities meet a minimum

standard for safety and access statewide and to encourage features that support Complete Streets Policy implementation, rather than to define a standardized design irrespective of context beyond which local jurisdictions or transit agencies may not deviate. To this end, a subcommittee of below-listed stakeholders should convene to define shared goals and planning principles for ensuring that road projects with potential transit impacts (and conversely, transit projects and services impacting state routes) are coordinated to support Policy goals.

Key Stakeholders involved: DOTD Public Transportation Section; DOTD Americans with Disabilities Act (ADA) Program; DOTD Traffic Engineering Section; Local Transit Agencies

Codify Requirements for Complete Streets Accommodation during Construction

Description of issue, barrier, or opportunity for improvement: Complete Streets Policy applies to all stages of project delivery, including construction. However, too often, work zone traffic plans inadequately accommodate people walking, bicycling, and using transit and temporary changes to roadway configurations during sometimes lengthy periods of disruption, which create hazards and barriers to accessibility for non-motorized road users. Additional guidance is needed to ensure that such impacts are minimized or mitigated and temporary traffic control measures support safety for all road users.

Project objective(s): "Summarize and evaluate what changes the agency has made" and "Understand the contribution of outputs to outcomes in different contexts"

Task(s) completed: (1) Agency document review, (2) survey and interview, and (3) output mapping and outcome evaluation

Recommended actions:

- Develop and disseminate resources explaining why and how the Policy applies at each stage of project development.
- Outreach to contractors and consultants to articulate DOTD's needs pertaining to Policy compliance during the construction phase is needed. At a minimum, contractors engaged in road construction, rehabilitation, or maintenance activities must be required to include pedestrian, bicycle, and transit user accommodation in traffic control plans, and DOTD must ensure policy compliance.
- Mandatory training to ensure comprehension of Policy goals and requirements is recommended as a prerequisite to contract eligibility.

Key Stakeholders involved: DOTD Project Letting and Construction Managers; DOTD Construction Section; Contractors, Consultants; FHWA

Include Intersections and Operations to Address "All Projects and All Stages"

Stakeholder outreach revealed that there is limited understanding of how DOTD's Complete Streets Policy applies to projects that are located at spot locations (like intersections) and/or only involved operation improvements. Active transportation accommodation approaching and through intersections presents particular challenges, many of which are managed through traffic signal design and operation in complement with physical changes to street striping, curbs, medians, etc. Additional guidance is needed to facilitate effective planning for safe and efficient roadway operations that facilitates all users and all modes.

Project objective(s): "Evaluate the policy impacts to project scoping and delivery"; "Summarize and evaluate what changes the agency has made"; and "Evaluate the policy impacts at a disaggregate level"

Task(s) completed: (1) Survey and interview, (2) agency document review, and (3) output mapping and outcome evaluation

Recommended actions:

- Develop resources explaining why and how the Policy applies at each stage of project development.
- Provide training for agency staff and contractors engaged in traffic operations about the needs of non-motorized road users, strategies to improve pedestrian and bicycle safety, mobility, and access, transit operations and technology, etc.
- Develop clear guidelines for multimodal intersection design and operations, including signal timing, emerging technology, ADA accessibility, etc.

Key Stakeholders involved: DOTD Operations Division; DOTD Highway Safety Section; DOTD Traffic Engineering Section; LTRC/LTAP; ITS; ADA; FHWA

Integrate Complete Streets into Pavement Preservation Program

Complete Streets policies are theoretically applicable to all types of projects from new construction/reconstruction to preservation/rehabilitation. Based on a review of state DOTs' efforts to integrate the concept into pavement preservation programs (Appendix G), the primary

strategies for concept integration include low-cost safety improvements, road diets, and project upgrade. Considering the share of preservation projects funded by each year, improving Complete Streets concept integration practice in these programs can help DOTD to make more significant and rapid progress on influencing the built environment.

Project objective(s): "Evaluate the policy impacts to project scoping and delivery" and "Summarize and evaluate what changes the agency has made"

Task(s) completed: (1) Survey and interview, (2) agency document review, and (3) construction project review

Recommended Actions:

- Update the "Baseline Safety Improvement Checklist" to include safety considerations for bicyclists and pedestrians.
- Prioritize speed management as a critical low-cost safety countermeasure during and after preservation work to reduce crash risk.
- Conduct a statewide road diet study incorporating mobility needs, roadway and traffic characteristics (including freight considerations), and public responses in order to develop decision-support tools for road diet implementation.
- Investigate the possibility of moving from one-year project list to three-year project list so that the possibility of including facilities serving biking and walking demands can be discussed as early as possible.
- Create a clear channel (including point of contacts and procedure) to communicate project upgrade and funding opportunities.
- Update key design documents (e.g., PRR and 3R Minimum Design Guidelines) to align with best practice and optimize uptake of low-cost safety improvements, road diets, and project upgrades in preservation projects.

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Pavement Preservation Program; DOTD Transportation Planning Section; DOTD Road Design Section; DOTD District Pavement Offices; DOTD District Complete Streets Liaisons

Emphasize Outreach and Education

Finally, the third theme of recommendations from this study pertains to the imperative for ongoing development of both public-facing and internal resources and supports to increase awareness and understanding of Complete Streets Policy, ensure that all parties involved in the project as well as long-range planning and project delivery are able to effectively define and address multimodal needs, and broaden statewide support for streets that are safe and accessible for all users.

Revise, Adopt, and Publish Complete Streets Implementation & Action Plan

Leadership in Complete Streets requires transparency about the direction and actions taken by DOTD to implement the Policy. A draft Complete Streets Implementation Plan and Action Plan were developed by the internal Complete Streets Steering Group, but not all sections were completed and the document was never finalized, adopted, or published. Revisiting these documents to guide the overall prioritization, timing, and resource needs of next steps for full policy integration and implementation (including but not limited to the recommendations contained herein) can help ensure timely, coordinated action by clearly articulating roles and responsibilities among key stakeholders, as well as targets for completion.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: (1) Survey and interview and (2) agency document review

Recommended actions:

- Reconvene the internal Complete Streets Steering Group for one or more strategic planning meetings to review the draft 2018-2021 Implementation Plan and Action Plan (summarized in Appendix B, Table 12), as well as the next steps identified within this evaluation report.
- Draft a 2023-2026 Implementation Plan and share with the Complete Streets Advisory Council for review and feedback.
- Finalize and adopt a revised Implementation Plan outlining priority actions, action leads, and target timelines.
- Publish the finalized Implementation Plan on the DOTD Complete Streets web page, and share with relevant internal and external stakeholders to promote awareness of DOTD Complete Streets Policy implementation efforts and needs.

Stakeholders: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Transportation Planning Section (including Planning Unit and Programming Unit); CSAC

Publish Public Pedestrian/Bicycle Data Portal

Louisiana currently lacks a public facing platform for statewide Complete Streets data. Moreover, many stakeholders reported lack of awareness of implementation actions taken, such as checklists, CSAC, identification of performance metrics, and enhanced data collection actions initiated. DOTD's Complete Streets web page has been recently updated and now provides access to the Policy and previous legislative reports as well as information about CSAC, links to other relevant content such as bicycle laws, maps, and design standards (such as the EDSM, Complete Streets Minimum Design Guidelines, and ADA Transition Plan and Map). However, the site needs ongoing update and expansion to provide value to local agencies as well as DOTD personnel and the general public.

Project objective(s): "Summarize and evaluate what changes the agency has made" and "Evaluate the policy impacts at a disaggregate level"

Task(s) completed: (1) Survey and interview and (2) output mapping and outcome evaluation

Recommended actions:

Update and expand the current Complete Streets web page to include additional design, policy, and spatial information such as:

- The Complete Streets Implementation Plan (once revised and adopted).
- Local policies and plans (including links to relevant transportation sections of comprehensive plans and long-range transportation plans where dedicated Complete Streets/bicycle and pedestrian plans have not been adopted).
- A dashboard of key performance indicators.
- An interactive map showing active transportation facilities/projects.
- Updated design and safety guidance (as it is developed).
- Information about funding opportunities for Complete Streets projects.
- Examples of DOTD Complete Streets projects and outcome evaluations as available.

Stakeholders: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Transportation Planning Section (including Planning Unit and Programming Unit); DOTD Data Collection and Management Analysis Section (Mapping Unit); Local Government and Transit Agencies; MPOs; CSAC; Advocates

Enhance Training Opportunities for Staff and Partners

DOTD has developed a basic introduction to Complete Streets—focused on why DOTD has adopted the policy approach—which all DOTD personnel are required to complete. Other training opportunities have been offered intermittently with direct or indirect links to Policy goals. However, stakeholder surveys indicate that most agency personnel have not completed this training (or do not remember doing so), and advanced training and guidance is likely needed for those most directly involved in project scoping, design, and review. Existing DOTD resources, such as the Statewide Bicycle and Pedestrian Plan and Bicycle Planning Tool, are underutilized and/or unknown to many agency stakeholders. The development of mechanisms by which to better integrate these resources into staff workflows, and training on use where applicable, is needed. In addition, additional training opportunities are needed for contractors working with DOTD as well as local agency partners.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: Survey and interview

Recommended actions:

More training and guidance are needed among staff involved with project scoping to strengthen analytic approaches to assessing current or future demand, evaluating alternative scenarios, and balancing project-specific objectives with network-level goals. This may include:

- Training and communication to clarify that a lack of connecting facilities, rural context, or presence of alternative routes do not necessarily and in isolation indicate an absence of need, for instance, would help improve quality of Stage 0 and Design report responses. Workshops, trainings, and showcases centering Complete Streets implementation, including expanding awareness of the existence and use of the Complete Streets EDSM and Minimum Design Guidelines, specific instruction in adequately responding to Complete Streets questions in checklists and design reports, etc., would result in more consistent outputs across programs.
- Continued reinforcement around why Complete Streets has been adopted is imperative to advance and strengthen the agency's ability to identify and approach safety, accessibility, and

mobility problems, develop a shared vocabulary, and give planners and designers tools and design ideas to draw from will help shift agency culture toward a more integrated multimodal approach.

- Provide guidance and protocols to encourage and facilitate use of multimodal resources, including training on how to use the Bicycle Planning Tool, training on how to design context-sensitive bicycle facilities linked to tool outputs, and guidance on how to use the tool to support project plans or proposals. Incorporating a Bicycle/Pedestrian Level of Service (LOS) component into project development processes would be useful for ensuring that tool outputs are applied as inputs for demand analysis in order to optimize use of this asset and justify its maintenance while strategically addressing identified needs on "priority 1" state routes.
- DOTD's private sector partners and contractors need guidance to clarify the role and obligations of contractors in Policy implementation, to ensure that requisite experience and expertise to successfully deliver projects accommodating all modes. This could take the form of making completion of a basic training course a prerequisite to being awarded contracts.
- Stakeholders recommend developing partnerships with civil engineering programs in Louisiana to encourage them to incorporate active transportation planning and design concepts into curricula, such as development of a topic-specific graduate course for advance studies.

Key Stakeholders involved: DOTD Transportation Planning Section; DOTD Traffic Engineering Section; Consultants; Local Agencies; General Transportation Community; Civil Engineering Programs at Universities/Colleges; LTRC/LTAP

Support Consistent Regional Implementation

Survey results indicated that public support for Complete Streets is regionally inconsistent; policy implementation is inconsistent across regions and DOTD districts; and additional outreach is needed to ensure that DOTD District employees are aware of resources available at DOTD headquarter (HQ) to support Policy implementation.

Project objective(s): "Summarize and evaluate what changes the agency has made"

Task(s) completed: Survey and interview

Recommended actions:

- The DOTD Bicycle, Pedestrian, and Transit Design Expert should continue to conduct regional outreach, including outreach to local agencies, around Complete Streets design, operations, etc.
- DOTD can also designate/identify bike/pedestrian liaisons at each district office, and target these staff for additional training as "ambassadors" to work with local governments.
- LTAP should be engaged as a partner to deliver more training for designing and engineering holistic and context-appropriate designs, sharing more frequent and proactive communication about local and national best practices, success stories, and potential funding sources, and development and/or promotion of model design guides to illustrate alternatives for a variety of situations. This could take the form of workshops or modules, resources/guides, and direct communication to help develop a shared vocabulary for multimodal design.
- Developing a library of in-state case studies illustrating success could be an important tool for DOTD to steward policy implementation across jurisdictions and communicate to the public regarding safety, complete streets, etc. Such outreach can also help DOTD and advocates work together more productively by establishing clear channels of two-way communication among agencies at all project delivery stages (as well as routine planning and project identification processes).
- Adopting more standardized walking/biking demand assessment methods and digital form templates that provide prompts for project leads can help improve consistency of inputs across programs and districts.
- Establish criteria for encouraging funding prioritization of Complete Streets within all programs.
- Create a community engagement plan for improving local/community participation in project selection, design, and implementation and provide a clear mechanism for public notice/feedback for projects where Policy exceptions are granted.

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Transportation Planning Section (including Planning Unit and Programming Unit); DOTD District Offices; MPOs; LTAP; Local Agencies

Provide More Local Planning, State Planning Support

Description of issue, barrier, or opportunity for improvement: Although numerous local and regional agencies have adopted a Complete Streets approach in Louisiana and several have

developed local comprehensive or transportation plans that address walking and bicycling, many communities (especially small and rural jurisdictions) still lack local plans with a clear vision for an active transportation network. Relatedly, local input in project selection and prioritization, the key driver for several DOTD programs and funding sources, could be improved. While active transportation is specifically integrated into funding evaluation criteria for some programs, not all project prioritization processes explicitly consider multimodal benefits. As the Bipartisan Infrastructure Law (BIL) is implemented, revisions to agency processes to align with federal guidelines may be needed. Finally, maintenance and liability were cited as top barriers to more widespread implementation of Complete Streets.

Project objective(s): "Summarize and evaluate what changes the agency has made" and "Evaluate the policy impacts to project scoping and delivery"

Task(s) completed: (1) Survey and interview and (2) construction project review

Recommended actions:

- Support implementation of DOTD's pilot transportation plan program and similar resources to support local planning.
- Encourage, incentivize, and/or require local plans as a prerequisite to accessing funding opportunities (e.g., Local Road Safety Program, LRSP). Local planning efforts should be informed by land use context, future growth projections, etc., rather than simple itemized lists of fundable projects.
- Ongoing outreach to local jurisdictions for planning and project identification in support of more coordinated statewide complete streets implementation.
- Clarify roles and capacity of DOTD to support long range and project-level planning and encourage DOTD planning section to engage proactively in developing standardized methods for reviewing proposed projects against existing local/regional plan documents where present (e.g., through development and use of digital map platform integrating existing and proposed facilities as part of project scoping), to identify multimodal network gaps, integrate Complete Streets in Statewide Transportation Plan.
- Update project selection and prioritization criteria to incentivize projects that support Complete Streets, in alignment with federal guidance.
- Develop a funding guide outlining how to coordinate funding across multiple programs in order to achieve multiple goals with one project simultaneously, such as linking

transportation and state climate mitigation goals (with Complete Streets as one mitigation strategy through VMT reduction, as well as land use policy changes that address both needs).

- Proactively include equity criteria in project selection/evaluation (e.g., SRTPP Program, which awards more points for projects addressing safety issues in low-income census block areas.
- Research best practices and develop model maintenance schedules and protocols; model agreement templates for state-local partnerships around Complete Streets to streamline the process for DOTD Maintenance Section to follow and maintain a repository of local maintenance agreements as well as resources detailing potential supplementary funding sources for active transportation facility maintenance (e.g., for trash and debris removal, sidewalk repair, repair or replacement of protected bikeway vertical elements, lighting, etc.). Models should identify possible options for funding maintenance needs, and specifically highlight needs of complete streets infrastructure (as well as ways to minimize maintenance costs through materials selection, cooperative endeavor agreements with neighboring jurisdictions to share equipment, maintenance protocols and training, etc.).

Key Stakeholders involved: DOTD Highway Safety Section; DOTD Traffic Engineering Section; DOTD Transportation Planning Section (including Planning Unit and Programming Unit); DOTD District Offices; MPOs; LTAP; Local Agencies; University Partners

Acronyms, Abbreviations, and Symbols

Term	Description
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ADOT	Arizona Department of Transportation
ADT	Average Daily Traffic
ARAN	Automatic Road Analyzer
ASCE	American Society of Civil Engineers
BIL	Bipartisan Infrastructure Law
BLOS	Bicycle Level of Service
Caltrans	California Department of Transportation
CBT	Computer Based Training
CDC	Centers for Disease Control and Prevention
CDOT	Colorado Department of Transportation
cm	centimeter(s)
CS	Complete Streets
CSAC	Complete Streets Advisory Council
CSSG	Complete Streets Steering Group
CSWG	Complete Streets Work Group
DOT	Department of Transportation
DOTD	Louisiana Department of Transportation and Development
EDSM	Engineering Directives and Standards Manual
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
ft.	foot (feet)
FTA	Federal Transit Administration
GIS	Geographic Information System
GTFS	General Transit Feed Specification

Term	Description
HCR	House Concurrent Resolution
HDM	Highway Design Manual
HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
IPA	Institute for Public Administration
lb.	pound(s)
LEO	Louisiana Employees Online
in.	inch(es)
ITS	Intelligent Transportation System
LOS	Level of Service
LRS	Linear Referencing System
LRSP	Local Road Safety Program
LTAP	Local Technical Assistance Program
LTRC	Louisiana Transportation Research Center
m	meter(s)
MassDOT	Massachusetts Department of Transportation
MDG	Minimum Design Guidelines
MIRE	Model Inventory of Roadway Elements
MMLOS	Multimodal Level of Service
MnDOT	Minnesota Department of Transportation
mph	Miles Per Hour
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NAICS	North American Industry Classification System
NCDOT	North Carolina Department of Transportation
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration

Term	Description
NJDOT	New Jersey Department of Transportation
OST	Office of the Secretary
PBIN	Pedestrian and Bicycle Infrastructure Network
PLOS	Pedestrian Level of Service
POI	Point of Interest
PRR	Preservation, Rehabilitation and Replacement
RITIS	Regional Integrated Transportation Information System
ROW	Right of Way
RPO	Rural Planning Organization
SHSP	Strategic Highway Safety Plans
SRTPPP	Safe Routes to Public Places Program
SRTS	Safe Routes To School
TAP	Transportation Alternative Program
TDOT	Tennessee Department of Transportation
TEP	Transportation Enhancement Program
TIP	Transportation Improvement Plan
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
UDOT	Utah Department of Transportation
USBR	United States Bicycle Routes
VDOT	Virginia Department of Transportation
VMT	Vehicle Miles Traveled
VPD	Vehicles per Day
WSDOT	Washington Department of Transportation

References

[1] Smart Growth America, “National Complete Streets Coalition | Smart Growth America.” https://smartgrowthamerica.org/program/national-complete-streets-coalition/ (accessed May 16, 2020).

[2] Smart Growth America, “Complete Streets policies nationwide | Smart Growth America,” 2021. https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/policy-development/policy-atlas/ (accessed Jun. 30, 2021).

[3] LADOTD, “Louisiana Department of Transportation and Development: Complete Streets Policy (Revised),” 2016. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Complete_Streets/Misc Documents/cs-la-dotpolicy.pdf

[4] CDC, “Evaluating Violence and Injury Prevention Policies Brief 4: Evaluating Policy Implementation,” *Policy evaluation brief series*, 2013. https://www.cdc.gov/injury/pdfs/policy/Brief 4-a.pdf (accessed May 06, 2022).

[5] S. Moreland-Russell, A. Eyler, C. Barbero, J. A. Hipp, and H. Walsh, “Diffusion of Complete Streets policies Across US communities,” *J. Public Health Manag. Pract.*, vol. 19, no. 3 Suppl 1, May 2013, doi: 10.1097/PHH.0B013E3182849EC2.

[6] D. S. Van Meter *et al.*, “The Policy Implementation Process: A Conceptual Framework,” *Adm. Soc.*, vol. 6, no. 4, pp. 445–488, Jul. 1975, doi: 10.1177/009539977500600404.

[7] P. Sabatier and D. Mazmanian, “The Implementation of Public Policy: A Framework of Analysis,” *Policy Stud. J.*, vol. 8, no. 4, pp. 538–560, 1980, doi: 10.1111/J.1541-0072.1980.TB01266.X.

[8] C. V Patton, D. S. Sawicki, J. J. Clark, R. Taylor, F. Group, and Y. Routledge, *Basic Methods of Policy Analysis and Planning Third Edition*, 3rd ed. New York, New York, USA: Routledge, 2016. Accessed: Mar. 22, 2022. [Online]. Available: http://surjonopwkub.lecture.ub.ac.id/files/2019/01/Basic_Methods_of_Policy_Analysis_and_Planing.pdf

[9] G. Golden, “Education policy evaluation: Surveying the OECD landscape,” *OECD iLibrary*, 2020. https://www.oecd-ilibrary.org/docserver/9f127490-

en.pdf?expires=1652364791&id=id&accname=guest&checksum=BEA486A7B16E92AF60E24DA74E239C5A (accessed May 12, 2022).

[10] A. Crabb and P. Leroy, "The Handbook of Environmental Policy Evaluation," *Handb. Environ. Policy Eval.*, May 2012, doi: 10.4324/9781849773072.

[11] CDC, "Program Evaluation Home - CDC," *CDC*, 2022. https://www.cdc.gov/evaluation/ (accessed May 08, 2022).

[12] J. Leeman *et al.*, "An Evaluation Framework for Obesity Prevention Policy Interventions," *Prev. Chronic Dis.*, vol. 9, no. 6, Jun. 2012, doi: 10.5888/PCD9.110322.

[13] CDC, "Evaluating Violence and Injury Prevention Policies Brief 1: Overview of Policy Evaluation," *Policy evaluation brief series*, 2013. https://www.cdc.gov/injury/pdfs/policy/brief 1-a.pdf (accessed May 06, 2022).

[14] CDC, "Evaluating Violence and Injury Prevention Policies Brief 7: Applying Policy Evaluation Results," *Policy evaluation brief series*, 2013. https://www.cdc.gov/injury/pdfs/policy/Brief 7-a.pdf (accessed May 08, 2022).

[15] CDC, "Evaluating Violence and Injury Prevention Policies Brief 6 : Policy Evaluation Data Considerations," *Policy evaluation brief series*, 2013. https://www.cdc.gov/injury/pdfs/policy/Brief 6-a.pdf (accessed May 08, 2022).

[16] CDC, "Data Collection Methods for Evaluation: Document Review," *CDC*, 2018. https://www.cdc.gov/healthyyouth/evaluation/pdf/brief18.pdf (accessed Mar. 22, 2022).

[17] G. A. Bowen, "Document Analysis as a Qualitative Research Method," *Qual. Res. J.*, vol. 9, no. 2, 2009, doi: 10.3316/QRJ0902027.

[18] Smart Growth America, "The Innovative DOT: A handbook of policy and practice," 2016. Accessed: Mar. 22, 2022. [Online]. Available: https://smartgrowthamerica.org/wp-content/uploads/2016/08/the-innovative-dot.pdf

[19] T. Tolford, B. Fields, T. Longoria, and M. C. Becker, "Evaluation of Complete Streets Policy Implementation by Metropolitan Planning Organizations," 2015.

[20] CH2MHILL, "Complete Streets Task Force: Complete Streets Legislative Report," Honolulu, Hawaii, 2010. [Online]. Available: https://files.hawaii.gov/dotadmin/library/legislature/2011/ACT 54- SLH 2009 REPORT -

2011- - COMPLETE STREETS TASK FORCE -Part 1 of 2.pdf

[21] IOWADOT, “Iowa Bicycle and Pedestrian Long Range Plan,” 2018. Accessed: Jul. 20, 2021. [Online]. Available: https://iowadot.gov/iowainmotion/modal-plans/bicycle-pedestrian-plan

[22] Minnesota Department of Transportation, “Technical Memorandum 14-08-TS-02: Complete Streets Guidance and Procedures,” 2014. http://www.dot.state.mn.us/planning/completestreets/docs/2014/Sept14/CompleteStreetsTechMemo.pdf (accessed May 10, 2021).

[23] Kimley-Horn and Associates, “NDOT Complete Streets Policy,” 2017. doi: 10.1044/leader.ppl.22062017.20.

[24] Vermont Agency of Transportation, “Complete Streets Guidance,” 2012. doi: 10.4135/9781483346526.n150.

[25] FDOT, “A National Synthesis of Transit and Complete Streets Practices,” 2018. [Online]. Available: https://www.fdot.gov/docs/default-source/transit/documents/FDOTCO_ANationalSynthesisofTransitinCompleteStreets_FinalReport_20180508.pdf

[26] Georgia DOT, “Georgia Design Policy Manual,” 2021. [Online]. Available: http://www.dot.ga.gov/PartnerSmart/DesignManuals/DesignPolicy/GDOT-DPM.pdf

[27] WSP and P. Brinckerhoff, “2017 State of New Jersey Complete Streets Design Guide,” 2017. [Online]. Available: http://njbikeped.org/wp-content/uploads/2017/05/Complete-Streets-Design-Guide.pdf

[28] Sprinkle Consulting, “Colorado Statewide Bicycle and Pedestrian Plan,” 2015. [Online]. Available: https://www.codot.gov/programs/bikeped/building-a-bike-ped-friendly-community/Bike_Ped_Plan/BikePedStatePlan

[29] J. Nicholls, S. Cannon, S. Duffy, and R. Stevens, “Washington ’ s Complete Streets & Main Street Highways Program: Case Studies and Practive Resource,” 2011. [Online]. Available: https://www.wsdot.wa.gov/research/reports/fullreports/780.1.pdf

[30] B. McCann and S. Rynne, “Complete Streets: Best Policy and Implementation Practices,” 2010. Accessed: May 28, 2020. [Online]. Available:

https://www.planning.org/publications/report/9026883/

[31] A. Biton, D. Daddio, and J. Andrew, “Statewide Pedestrian and Bicycle Planning Handbook,” Sep. 2014. Accessed: Jul. 20, 2021. [Online]. Available: https://rosap.ntl.bts.gov/view/dot/12156

[32] FHWA, “Moving to a Complete Streets Design Model: A Report to Congress on Opportunities and Challenges,” 2022. [Online]. Available: https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-03/Complete Streets Report to Congress.pdf

[33] USGAO, “Pedestrians and Cyclists: Better Information to States and Enhanced Performance Management Could Help DOT Improve Safety | U.S. GAO,” *U.S. Government Accountability Office*, 2021. https://www.gao.gov/products/gao-21-405 (accessed Sep. 21, 2022).

[34] LADOTD, “LADOTD Louisiana Local Public Agency Manual,” 2017. Accessed: Sep. 21, 2022. [Online]. Available: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Administration/LPA/Manual/LPA Manual.pdf

[35] NCHRP, “NCHRP 20-05: Synthesis of Information Related to Highway Practices,” 2021. https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=507 (accessed Sep. 30, 2021).

[36] R. Sanders, E. MacDonald, and A. Anderson, “Performance Measures for Complete, Green Streets: A Proposal for Urban Arterials in California,” 2010. http://www.uctc.net/research/papers/UCTC-FR-2010-12.pdf (accessed Jun. 11, 2021).

[37] M. E. Ranahan, J. A. Lanaker, and J. L. Maisel, “Evaluating the Impact of Complete Streets Initiatives,” Buffalo, 2014. [Online]. Available: https://udeworld.com/documents/pdfs/IDeACenter_GoBike_CompleteStreets_web.pdf

[38] N. Lefler, Y. Zhou, D. Carter, H. McGee, D. Harkey, and F. Council, “FHWA Safety Program Model Inventory of Roadway Elements MIRE 2.0,” 2017. Accessed: Dec. 10, 2020. [Online]. Available: https://safety.fhwa.dot.gov/rsdp/downloads/fhwasa17048.pdf

[39] NACTO, “NACTO Publications: Design Guides and Design Guidance,” *NACTO*, 2021. https://nacto.org/publications/#design-guides-design-guidance (accessed Oct. 28, 2021).

[40] NYCDOT, “New York City Street Design Manual,” New York City, 2015. [Online]. Available: https://www1.nyc.gov/html/dot/downloads/pdf/nycdot-streetdesignmanual-interior-lores.pdf

[41] H. Louch, K. Voros, and E. David, “Availability and Use of Pedestrian Infrastructure Data to Support Active Transportation Planning,” Washington, DC, 2020. doi: 10.17226/25995.

[42] “Highway Performance Monitoring System (HPMS) Field Manual - Policy | Federal Highway Administration.” https://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/ (accessed Oct. 28, 2021).

[43] Kentucky.gov, “Bicycle and Pedestrian Facility Inventory Map | KYTC,” 2021. https://transportation.ky.gov/BikeWalk/Pages/Bicycle-and-Pedestrian-Facility-Inventory-Map.aspx (accessed Oct. 28, 2021).

[44] FDOT, “ConnectPed Public,” 2021. https://fdot.maps.arcgis.com/apps/webappviewer/index.html?id=0e179df3bae4403cbac896f42f98fe13 (accessed Oct. 28, 2021).

[45] NJDOT, “Complete & Green Streets for All: Model Complete Streets Policy & Guide,” 2020. [Online]. Available: https://www.state.nj.us/transportation/eng/completestreets/pdf/CS_Model_Policy_2020.pdf

[46] S. Seskin, H. Kite, and L. Searfoss, “Evaluating Complete Streets Projects: A Guide for Practitioners,” Washington DC, 2015. [Online]. Available: https://smartgrowthamerica.org/resources/evaluating-complete-streets-projects-a-guide-for-practitioners-2/

[47] Kittelson & Associates, “Final Evaluation Criteria,” 2021. [Online]. Available: https://www.oregon.gov/odot/RPTD/RPTD Document Library/5.1-Final-Evaluation-Criteria-Memo.pdf

[48] C. Semler *et al.*, “Guidebook for Developing Pedestrian and Bicycle Performance Measures,” 2016. [Online]. Available: http://www.fhwa.dot.gov/environment/bicycle_pedestrian%5Cn12b.

[49] Jagannath Mallela, S. Sadasivam, and N. Lefler, “MIRE Element Collection Mechanisms and Gap Analysis,” 2012. [Online]. Available:

https://safety.fhwa.dot.gov/rsdp/downloads/elementcollectionmechanism.pdf

[50] Maryland DOT, “Americans with Disabilities Act (ADA) Self Evaluation of Access to Public Right of Way (PROW) Facilities,” 2009. [Online]. Available: https://www.sha.maryland.gov/opr/ada self evaluation 5-09 final.pdf

[51] J. A. Lenker, J. L. Maisel, and M. E. Ranahan, “Measuring the Impact of Complete Streets Projects: Preliminary Field Testing,” Buffalo, NY, 2016. [Online]. Available: https://pavementsurfacecoatings.com/wp-content/uploads/2019/12/Documents/MeasuringImpactCompleteStreetsProjects.pdf

[52] J. M. Porter, J. M. Lee, M. Davis, S. J. Bryan, P. S. Corso, and S. L. Rathbun, “Complete streets state laws & provisions: An analysis of legislative content and the state policy landscape, 1972–2018,” *J. Transp. Land Use*, vol. 12, no. 1, pp. 619–635, 2019, doi: 10.5198/jtlu.2019.1512.

[53] CTDOT, “Complete Streets Report: Breaking Through Barriers for Non-Motorized Transportation Users,” Newington, CT, 2013. [Online]. Available: https://portal.ct.gov/-/media/DOT/documents/dbikes/CompleteStreets/ReportTransCommrRepComplStv02013VIEWpdf.pdf?la=en

[54] RIDOT, “Rhode Island ’ s Complete Streets Action Plan Legislation and Policy Updates,” 2015. [Online]. Available: http://www.dot.ri.gov/documents/community/safety/complete_streets.pdf

[55] Broward MPO, “Broward Complete Streets Evaluation Toolkit: User Manual,” Broward, Florida, 2015. [Online]. Available: http://www.browardmpo.org/images/WhatWeDo/completestreetsinitiative/EvaluationToolkit.pdf

[56] WSP USA, “NCDOT Complete Streets Evaluation,” 2018. [Online]. Available: https://connect.ncdot.gov/projects/BikePed/BikePed Documents/complete-streets-evaluation-final-report.pdf

[57] CDC, “Evaluating Violence and Injury Prevention Policies Appendices,” *Policy evaluation brief series*, 2013. https://www.cdc.gov/injury/pdfs/policy/Appendices-a.pdf (accessed May 08, 2022).

[58] LA DOTD, “Overview of the DOTD Highway Project Selection Process,” *dotd.la.gov*.

http://www.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Traffic_Engineering/Traffic Engineers Meeting/2012/S3 Romeo -Highway Project Selection Process.pdf (accessed Jan. 19, 2021).

[59] LADOTD, "Louisiana Department of Transportation and Development Project Delivery Manual 2013," Baton Rouge, LA, 2013.

[60] LA DOTD, "Stage 1-Planning/Environmental Manual of Standard Practice," 2018. Accessed: Jan. 19, 2021. [Online]. Available: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Environmental/Pages/Stage_1.aspx

[61] LADOTD, "Engineering Directives and Standards: Complete Streets (No. II.2.1.14)," 2016. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/EDSM/EDSM/EDSM_II_2_1_14.pdf (accessed Oct. 17, 2020).

[62] D. A. Dillman, "Survey Implementation," in *Mail and Internet Surveys: The Tailored Design Method*, 2nd ed., Hoboken, NJ: John Wiley & Sons, Inc., 2007, pp. 149–193. Accessed: Jul. 31, 2019. [Online]. Available: https://books.google.com/books/about/Mail_and_Internet_Surveys.html?id=d_VpiiWp51gC

[63] BKI, "Complete Streets Work Group: Final Report," Baton Rouge, LA, 2010. [Online]. Available: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Complete_Streets/Misc Documents/Complete Streets Final Report 07292010.pdf

[64] LADOTD, "Complete Streets Implementation Legislative Update," 2013. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Highway_Safety/Complete_Streets/Legislative Updates/Spring 2013 Legislative Update.pdf (accessed Jul. 26, 2021).

[65] "LA Rev Stat § 48:22.1 (2015)," 2015. https://law.justia.com/codes/louisiana/2015/code-revisedstatutes/title-48/rs-48-22.1 (accessed Jul. 26, 2021).

[66] LADOTD, "LADOTD Minimum Design Guidelines," *LADOTD*, 2017. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Memoranda/Minimum Design Guidelines.pdf (accessed Feb. 10, 2021).

[67] LA DOTD, “Stage 0 - Manual of Standard Practice,” *dotd.la.gov*, 2014. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Pages/Stage_0.aspx (accessed Jan. 19, 2021).

[68] LADOTD, “Pavement Preservation Manual,” 2010. [Online]. Available: http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Systems_Preservation/Pages/Documents.aspx

[69] LADOTD, “Guidance for Preservation Rehabilitation Replacement (PRR) Projects,” 2010. http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Systems_Preservation/Documents/Guidance for Preservation_Rehabilitation_Replacement (PRR) Projects 09_30_10.pdf (accessed Oct. 17, 2020).

[70] SGA, “Complete Streets Implementation: A Brief Guidebook,” *Smart Growth America*, 2016. https://smartgrowthamerica.org/wp-content/uploads/2016/09/Implementing-Complete-Streets-Policy_Brief-Guidebook.pdf (accessed Sep. 21, 2022).

[71] J. W. Shaw, W. Bremer, M. V Chitturi, A. Bill, and D. A. Noyce, “Guidelines for Work Zone Designers - Pedestrian and Bicycle Accommodation,” *Federal Highway Administration*, 2018. https://workzonesafety-media.s3.amazonaws.com/workzonesafety/files/documents/training/fhwa_wz_grant/uw_wz_designer_guidelines_pedestrian_bicycle_accommodation-508.pdf (accessed Sep. 21, 2022).

[72] RITIS, “Regional Integrated Transportation Information System,” 2022. https://ritis.org/intro (accessed Apr. 09, 2022).

[73] NASEM, “Traffic Signal Control Strategies for Pedestrians and Bicyclists,” 2022. https://www.nap.edu/catalog/26491/traffic-signal-control-strategies-for-pedestrians-and-bicyclists (accessed Feb. 15, 2022).

[74] FHWA, “Bikeway Selection Guide,” 2019. Accessed: Jan. 27, 2022. [Online]. Available: https://safety.fhwa.dot.gov/ped_bike

[75] N. Stamatiadis *et al.*, “An Expanded Functional Classification System for Highways and Streets,” Washington DC, 2018. doi: 10.17226/24775.

[76] LADOTD, “DOTD Geospatial Gateway,” *LADOTD*, 2021.

https://maps.dotd.la.gov/portal/apps/sites/#/app-public (accessed Feb. 04, 2021).

[77] R. Bian and T. M. Tolford, "Evaluating the Implementation of the Complete Streets Policy in Louisiana: A Review of Practices and Projects in the Last 10 Years," *Transp. Res. Rec. J. Transp. Res. Board*, pp. 1–16, 2022, doi: 10.1177/03611981221115726.

[78] R. Mitra and P. Mitchell Hess, "Complete Streets Evaluation: Understanding Complete Streets in the Greater Golden Horseshoe," 2015. [Online]. Available: https://www.tcat.ca/wp-content/uploads/2015/03/Complete_Streets_Evaluation_19Mar2015-1.pdf

[79] M. A. Hanson, "Measuring the Impact of Complete Streets Projects on Bicyclist and Pedestrian Safety in Sacramento County, CA," Sacramento, CA, 2017. [Online]. Available: https://smartech.gatech.edu/bitstream/handle/1853/58532/m._alex_hanson_measuring_the_impact_of_complete_streets_projects.pdf

[80] Florida Health and Hillsborough MPO, "A Health Impact Assessment of the George Road Complete Streets Implementation Plan," Tampa, Florida, 2017. [Online]. Available: http://www.planhillsborough.org/wp-content/uploads/2017/02/George-Rd-HIA-Report-DRAFT-FOR-COMMITTEE.pdf

[81] Smart Growth America, "Powerful new tool for helping local communities evaluate the potential benefits of Complete Streets projects - Smart Growth America," *Smart Growth America*, 2021. https://smartgrowthamerica.org/benefits-of-complete-streets_site/ (accessed Sep. 14, 2021).

[82] New Orleans Police Department, "NOPD - Data - City of New Orleans," *nola.gov*, 2022. https://www.nola.gov/nopd/data/ (accessed May 16, 2022).

[83] Baton Rouge Police Department, "Baton Rouge Crime Incidents | Open Data BR," *Open Data BR*, 2022. https://data.brla.gov/Public-Safety/Baton-Rouge-Crime-Incidents/pbin-pcm7 (accessed Apr. 26, 2022).

[84] LexisNexis, "LexisNexis® Community Crime Map," *LexisNexis*, 2022. https://communitycrimemap.com/ (accessed Apr. 26, 2022).

[85] CentralSquare Technologies, "CrimeMapping.com - Helping You Build a Safer Community," *CrimeMapping.com*, 2022. https://www.crimemapping.com/ (accessed Apr.

26, 2022).

[86] FBI, “Crime Data Explorer,” *FBI Uniform Crime Reporting Program*, 2022. https://crime-data-explorer.app.cloud.gov/pages/home (accessed Apr. 26, 2022).

[87] A. Das, A. Pande, M. Abdel-Aty, and J. B. Santos, “Characteristics of urban arterial crashes relative to proximity to intersections and injury severity,” *Transp. Res. Rec.*, no. 2083, pp. 137–144, 2008, doi: 10.3141/2083-16.

[88] LA DOTD, “Guidelines for Conducting a Crash Data Analysis using the Number-Rate Method and Overrepresented Determination,” 2016. Accessed: Aug. 24, 2021. [Online]. Available: http://www.dotd.la.gov/planning/highway_safety.

[89] B. Liu, A. Shams, J. Howard, S. Alexander, A. Hughes, and A. Pande, “Assessing Complete Street Strategies Using Microscopic Traffic Simulation Models,” 2020.

[90] A. Stevanovic, D. Kan, and T. Hill, “Multiresolution Analysis of the Impacts of Complete Streets on Efficiency, Safety and Environment of Urban Corridors,” 2020. [Online]. Available: https://trid.trb.org/View/1508668

[91] FTA, “The National Transit Database (NTD) | FTA,” *Federal Transit Administration*, 2022. https://www.transit.dot.gov/ntd (accessed May 16, 2022).

[92] gtfs.org, “General Transit Feed Specification,” *gtfs.org*, 2022. https://gtfs.org/ (accessed May 16, 2022).

[93] TRB, *Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis*. National Academies Press, 2016. Accessed: Apr. 12, 2022. [Online]. Available: https://www.trb.org/Main/Blurbs/175169.aspx

[94] K. Huff Herbie and R. Liggett, “The Highway Capacity Manual’s Method for Calculating Bicycle and Pedestrian Levels of Service: the Ultimate White Paper,” 2014. [Online]. Available: https://www.lewis.ucla.edu/wp-content/uploads/sites/2/2014/09/HCM-BICYCLE-AND-PEDESTRIAN-LEVEL-OF-SERVICE-THE-ULTIMATE-WHITE-PAPER.pdf

[95] T. Afrin and N. Yodo, “A survey of road traffic congestion measures towards a sustainable and resilient transportation system,” *Sustain.*, vol. 12, no. 11, pp. 1–23, 2020, doi: 10.3390/su12114660.

[96] D. Schrank, B. Eisele, and T. Lomax, “2021 Urban Mobility Report,” 2021.

[97] Texas A&M Transportation Institute, “Urban Mobility Report — Mobility Division,” 2022. https://mobility.tamu.edu/umr/ (accessed Mar. 02, 2022).

[98] J. Prieger, “The Economic Benefits of Complete Streets.” 2014. [Online]. Available: http://vibrantneo.org/wp-content/uploads/2014/03/VibrantNEO_EconomicBenefitsofCompleteStreets.pdf

[99] NYCDOT, “The Economic Benefits of Sustainable Streets,” New York City, 2014. [Online]. Available: http://www.ssti.us/wp/wp-content/uploads/2014/01/dot-economic-benefits-of-sustainable-streets.pdf%0Ahttp://www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf

[100] V. Perk, M. Catalá, M. Mantius, and K. Corcoran, “Capturing the Benefits of Complete Streets,” no. December, p. 74p, 2015, [Online]. Available: http://www.dot.state.fl.us/research-center/Completed_Proj/Summary_PTO/FDOT-BDV26-977-04-rpt.pdf%255Cnhttp://www.nctr.usf.edu/wp-content/uploads/2016/01/BDV26-977-04-Final-Report.pdf%255Cnhttp://ntl.bts.gov/lib/56000/56700/56793/BDV26-977-04-Final-Report.p

[101] J. Canfield, B. Yang, and H. Whitlow, “Evaluating Landscape Performance: A Guidebook for Metrics and Methods Selection,” 2018. doi: 10.3153/gb001.

[102] CDC, “PLACES: Local Data for Better Health | CDC,” *CDC*, 2022. https://www.cdc.gov/places/index.html (accessed May 16, 2022).

[103] NACTO, “Designing for All Ages and Abilities: Contextual Guidance for High-Comfort Bicycle Facilities,” *NACTO*, 2017. https://nacto.org/wp-content/uploads/2017/12/NACTO_Designing-for-All-Ages-Abilities.pdf (accessed Mar. 15, 2022).

[104] FHWA, “Bicycle Lanes - Safety | Federal Highway Administration,” 2022. https://safety.fhwa.dot.gov/provencountermeasures/bike-lanes.cfm (accessed Aug. 31, 2022).

[105] B. Khedri, D. Malarkey, and D. MacKenzie, “Emerging Practices in Multimodal Design and Performance Measurement: Review of Recent Literature and Practical Documents,”

Transp. Res. Rec., pp. 1–13, Mar. 2022, doi: 10.1177/03611981221082545.

[106] FHWA, “Proven Safety Countermeasures | Federal Highway Administration - Safety | Federal Highway Administration,” 2021.

[107] K. M. Mahoney, F. Julian, and H. W. Taylor Jr., “Good Practices: Incorporating Safety into Resurfacing and Restoration Projects,” 2006.

[108] J. Tsai, Y. Wu, and C. (Ross) Wang, “Optimization of Safety on Pavement Preservation Projects,” 2011.

[109] K. Knapp *et al.*, “Road Diet Informational Guide,” 2014.

[110] FHWA, “Road Diet Policies - Safety | Federal Highway Administration,” 2020.

[111] U.S. Department of Transportation Federal Highway Administration, “Incorporating On-Road Bicycle Networks into Resurfacing Projects,” 2016. [Online]. Available: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/resurfacing/resurfacing_workbook.pdf%5Cnhttps://trid.trb.org/view/1401476

[112] J. Cohn, E. Sperling, F. & Peers, P. and B. I. Center, and F. H. Administration, “Improving Pedestrian and Bicycle Connectivity During Rehabilitation of Existing Bridges,” no. November, p. 15p, 2016, [Online]. Available: http://www.pedbikeinfo.org/cms/downloads/PBIC_WhitePaper_Bridges.pdf%0Ahttps://trid.trb.org/view/1435136

[113] NCDOT, “North Carolina Complete Streets Planning and Design Guidelines,” 2012. [Online]. Available: https://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf

[114] Colorado DOT, “PROCEDURES FOR ADDRESSING SAFETY REQUIREMENTS ON RESURFACING , RESTORATION , REHABILITATION (3R),” no. July, 2001.

[115] CDOT, “Roadway Design Guideline,” 2018.

[116] CDOT, “Colorado DOT Bicycle and Pedestrian Policy.pdf,” 2017.

[117] “Pedestrian Safety,” *Pediatr. Clin. Pract. Guidel. Policies*, no. January, pp. 1323–1323, 2021, doi: 10.1542/9781610020190-part05-pedestrian.

[118] M. S. Scott, A. P. Scientist, and C. M. Beck, “Complete Streets in Delaware : A Guide for Local Governments,” 2011.

[119] FDOT, “Manual of uniform minimum standards for design, construction and maintenance for streets and highways (Florida Greenbook),” 2011.

[120] GDOT, “Georgia Pedestrian Safety Action Plan,” 2018.

[121] GDOT, “Georgia Bicycle Safety Action Plan 2018,” 2018.

[122] M. Marti, J. Giese, and R. Kuehl, “Complete Streets Implementation Resource Guide for Minnesota Local Agencies,” no. February, pp. 1–54, 2013.

[123] MnDOT, “Complete streets Minnesota Department of Transportation,” 2016.

[124] North carolina DOT, “NCDOT complete Streets Planning and design guidelines,” *Complet. streets Plan. Des. Guidel.*, no. July, 2012.

[125] TDOT, “MULTIMODAL PROJECT SCOPING,” 2018.

[126] TDOT, “Pedestrian Accessibility & Bicycle Accommodation Checklist,” 2015.

[127] T. Bicycle and A. Committee, “Strategic Direction Report: Opportunities for TxDOT’s Bicycle Program,” no. December, 2015.

[128] W. DOT, *Washington State DOT Design Manual*, no. September. 2021.

[129] CTDOT, “Comprehensive Pedestrian Safety Strategy,” 2021.

[130] TDOT, “TDOT puts Complete Streets policy into practice – State Smart Transportation Initiative – UW–Madison,” 2020.

[131] State of Delaware, “Complete Streets policy,” 2010.

[132] TxDOT, “Strategic Direction Report: Opportunities for TxDOT’s Bicycle Program,” 2015.

[133] USDOT, “U.S. Department of Transportation Transit, Highway, and Safety Funds - Funding - Bicycle and Pedestrian Program - Environment - FHWA,” 2022.

[134] FHWA, “Moving to a Complete Streets Design Model: A Report to Congress on

Opportunities and Challenges," 2022.

Appendix

Appendix A: Louisiana Complete Streets Policy

This appendix contains the Complete Streets Policy Louisiana adopted in 2010 and revised in 2016.

Figure 6. A scanned copy of the Complete Streets Policy (2010)

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT COMPLETE STREETS POLICY

This policy will create a comprehensive, integrated, connected transportation network for Louisiana that balances access, mobility, health and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities, which includes users of wheelchairs and mobility aids. It ensures a fully integrated transportation system, by planning, funding, designing, constructing, managing, and maintaining a complete and multi-modal network that achieves and sustains mobility, while encouraging and safely accommodating pedestrians, bicyclists, and transit users.

The Louisiana Department of Transportation and Development (DOTD) will provide the leadership to implement this policy on all transportation projects that involve federal or state funding or approval. DOTD recognizes the need for interdisciplinary coordination to effectively develop, operate, and maintain bicycle and pedestrian networks. DOTD will work with Metropolitan Planning Organizations (MPOs), transit agencies, parishes, municipalities and other stakeholders to do the same. This includes early coordination to identify whether a reconstruction or new construction project will impact a route identified on a local plan. DOTD will offer internal and external training opportunities and other resource tools in the following areas: engineering, education, enforcement, encouragement, and evaluation.

Provisions for all users will be integrated into the project development process for the entirety of all projects through design features, using Context Sensitive Solutions (CSS).

- On all new and reconstruction roadway projects that serve adjacent areas with existing or reasonably foreseeable future development or transit service, DOTD will plan, fund, and design sidewalks and other pedestrian facilities. The appropriate facility type will be determined by the context of the roadway.

- On all new and reconstruction roadway projects, DOTD will provide bicycle accommodations appropriate to the context of the roadway - in urban and suburban areas, bicycle lanes are the preferred bikeway facility type on arterials and collectors. The provision of a paved shoulder of sufficient width, a shared use trail, or a marked shared lane may also suffice, depending on context.

All projects shall consider the impact that improvements will have on safety for all users and make all reasonable attempts to mitigate negative impacts on non-motorized modes. Restricting non-motorized access should not be considered as an appropriate strategy with the exception of those limited access facilities where pedestrians and bicyclists are prohibited. DOTD will strive to ensure projects do not become barriers to pedestrians, bicyclists, and transit users by providing appropriate safe crossings, providing corridor continuity, and ensuring transportation projects comply with the current accessibility guidelines.

There are conditions where it is generally inappropriate to provide bicycle and pedestrian facilities. These instances include:

1. Facilities, such as Interstates, where bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the same transportation corridor.

2. The cost of providing bicycle and pedestrian facilities would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent (20%) of the cost of the project.

3. Other factors where there is a demonstrated absence of need or prudence. For example, in rural areas or undeveloped areas where future development is not anticipated, sidewalks and designated bikeways will generally not be provided.

4. On projects that are preservation only, DOTD will only consider improvements that do not require right-of-way acquisition, utility relocation, or major construction to provide bicycle or pedestrian accommodations, such as relocating or enclosing roadside drainage. Retrofits such as narrowing lanes, restriping and other means of providing improved bicycle and pedestrian access shall be considered on preservation projects. When an identified need or candidate requires right-of-way acquisition, utility relocation, or major construction, DOTD will work with local government to identify funding for the identified need as a separate project.

5. Maintenance for sidewalks and bicycle paths outside the limits of the curb or shoulder will be the responsibility of the local jurisdiction. Maintenance agreements will be required as a provision of the entire project.

Exceptions for not accommodating bicyclists, pedestrians and transit users in accordance with this policy will require the approval of the DOTD Chief Engineer. For exceptions on Federal-aid highway projects, concurrence from the Federal Highway Administration (FHWA) must also be obtained. For exceptions in an urbanized area, concurrence from the MPO must also be obtained.

When an MPO or local jurisdiction is not in agreement with DOTD's accommodation for bicyclists or pedestrians, they can introduce a formal appeal by means of a resolution adopted by the local governing body or board. The resolution must be submitted to the Chief Engineer for review and consideration prior to the final design approval.

Facilities will be designed and constructed in accordance with current applicable laws and regulations, using best practices and guidance from the following, but not limited to: DOTD guidelines and manuals, American Association of State Highway and Transportation Officials (AASHTO) publications, the Manual on Uniform Traffic Control Devices (MUTCD), the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Public Rights-of-Ways Accessibility Guidelines (PROWAG).

DOTD recognizes that a well-planned and designed transportation system that is responsive to its context and meets the needs of its users is the result of thoughtful planning and engineering. DOTD further recognizes the need to provide a framework for evaluation and a targeted strategy for the implementation steps identified. To this end, DOTD will work with a diverse group of stakeholders, including transportation professionals, advocates, and others, as appropriate, to continue to support and steer the implementation efforts both internal and external to DOTD.

Sherri H. LeBas

Date: 7/18/2010

Sherri H. LeBas, P.E.
Secretary
Department of Transportation and Development
State of Louisiana

Figure 7. A scanned copy of Complete Streets Policy (2016)

DOTD
LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Office of the Secretary
PO Box 94245 | Baton Rouge, LA 70804-9245
ph: 225-379-1200 | fx: 225-379-1851

John Bel Edwards, Governor
Shawn D. Wilson, Ph.D., Secretary

Louisiana Department of Transportation and Development
Complete Streets Policy
Revised

The intent of this policy is to create a comprehensive, integrated, connected transportation network for Louisiana that balances access, mobility and safety needs of motorists, transit users, bicyclists, and pedestrians of all ages and abilities, which includes users of wheelchairs and mobility aids. It ensures a fully integrated transportation system, by planning, funding, designing, constructing, managing, and maintaining a complete and multi-modal network that achieves and sustains mobility, while safely accommodating pedestrians, bicyclists, and transit users.

The Louisiana Department of Transportation and Development (DOTD) will provide the leadership to implement this policy on all transportation projects that involve federal or state funding or approval. DOTD recognizes the need for interdisciplinary coordination to effectively develop, operate, and maintain bicycle and pedestrian networks. DOTD will work with Metropolitan Planning Organizations (MPOs), transit agencies, parishes, municipalities and other stakeholders to do the same. This includes early coordination to identify whether a reconstruction or new construction project will impact a route identified on a local Complete Street plan as defined in the Complete Streets EDSM. DOTD will offer internal and external training opportunities and other resource tools in the following areas: engineering, education, planning, and evaluation. Maintenance for sidewalks and bicycle facilities outside the limits of the curb, shoulder, or barrier will be the responsibility of the local jurisdiction. Maintenance agreements will be required as a provision of the entire project.

Provisions for all users will be integrated into the project development process for the entirety of all projects through design features, using Context Sensitive Solutions (CSS).

- On all new and reconstruction roadway projects that serve adjacent areas with existing or reasonably foreseeable future development or transit service, DOTD should plan, fund, and design sidewalks and other pedestrian facilities. The appropriate facility type will be determined by the context of the roadway with local government involvement.

- On all new and reconstruction roadway projects, DOTD should provide bicycle accommodations appropriate to the context of the roadway. The provision of a paved shoulder of sufficient width, bicycle lane, a shared use path, or a marked shared lane may also suffice, depending on context with local government involvement.

All projects shall consider the impact that improvements will have on safety for all users and make all reasonable attempts to mitigate negative impacts on non-motorized modes. Restricting non-motorized access should not be considered as an appropriate strategy with the exception of those limited access facilities where pedestrians and bicyclists are prohibited. DOTD will strive to ensure projects do not become barriers to pedestrians, bicyclists, and transit users by providing appropriate safe crossings, providing corridor continuity, and ensuring transportation projects comply with the current accessibility guidelines.

There are conditions where it is generally inappropriate to provide bicycle and pedestrian facilities. These instances include:

1. Facilities, such as Interstates, where bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be necessary to accommodate bicyclists and pedestrians elsewhere within the same transportation corridor.

2. The cost of providing bicycle and pedestrian facilities would be excessively disproportionate to the need or probable use. Excessively disproportionate will be defined in the Complete Streets EDSM.

3. Other factors where there is a demonstrated absence of need or prudence. For example, in rural areas or undeveloped areas where future development is not anticipated, sidewalks and designated bikeways will generally not be provided.

4. On projects that are preservation/operations/rehabilitation/replacement only, DOTD will only consider improvements that do not require right-of-way acquisition, utility relocation, relocating or enclosing roadside drainage or major construction to provide bicycle, pedestrian or transit accommodations. These improvements may include narrowing lanes, restriping, road reconfiguration and other means of providing improved bicycle and pedestrian access according to the local complete street plan. When an identified need or candidate requires right-of-way acquisition, utility relocation, or major construction, DOTD will work with local government to identify funding for the identified need as a separate project.

Exceptions for not accommodating bicyclists, pedestrians and transit users in accordance with this policy will require the approval of the DOTD Chief Engineer.

When an MPO or local jurisdiction is not in agreement with DOTD's accommodation for bicyclists or pedestrians, they can introduce a formal appeal by means of a resolution adopted by the local governing body or board. The resolution must be submitted to the Chief Engineer for review and consideration prior to the final design approval.

Facilities will be designed and constructed in accordance with current applicable laws and regulations, using best practices and guidance from the following, but not limited to: DOTD guidelines and manuals, American Association of State Highway and Transportation Officials (AASHTO) publications, the Manual on Uniform Traffic Control Devices (MUTCD), and the Public Rights-of-Ways Accessibility Guidelines (PROWAG).

DOTD recognizes that a well-planned and designed transportation system that is responsive to its context and meets the needs of its users is the result of thoughtful planning and engineering. DOTD further recognizes the need to provide a framework for evaluation and a targeted strategy for the implementation steps identified. To this end, DOTD will work with a diverse group of stakeholders, including transportation professionals, local governing agencies, advocates, and others, as appropriate, to continue to support and steer the implementation efforts both internal and external to DOTD.

Date: 4/19/16

Shawn D. Wilson, Ph.D.
Secretary
Department of Transportation and Development
State of Louisiana

Appendix B: Document Review Supplemental Summary Tables

2010 Complete Streets Work Group Final Report Recommendations

Table 9. 2010 Complete Streets work group final report recommendations review of progress

No.		2022 Status	Notes
Administrative Implementation Strategies			
Restructure Procedures			
1	Include consideration of appropriate pedestrian and bicycle accommodations during project scoping	Substantively Complete	Addition of CS language in Stage 0 Checklists requiring consideration or explanation of exemption
2	In reconstruction projects, upgrade existing sidewalks and ramps, and include crossing improvements as appropriate.	Substantively Complete	EDSM and Design Guide updates, Stage 0 Checklists
3	In preservation projects, upgrade ramps and include crossing treatments, as appropriate	In progress or partially fulfilled	Some evidence of effort to incorporate low-cost active transportation elements in preservation projects; additional guidance needed
4	Develop a program to upgrade pedestrian infrastructure on transit routes to include accessible sidewalks and crossing treatments.	No Action Taken	No systematic assessment of transit routes to facilitate implementation identified ADA Transition plan claims that "all linkages to transit statewide are compliant," though this is unsubstantiated.
5	Fund the analysis, planning and design of infrastructure improvements to address problem areas and reduce crashes and injuries.	In progress or partially fulfilled	Systemic Safety Analysis completed; unclear whether ongoing funding for systematically prioritizing and addressing problem areas exists
6	Adopt Bicycle, Transit, and Pedestrian Checklist for use during appropriate project development stages.	Substantively Complete	Addition of CS language to Stage 0 Checklists, Design Reports
7	Work with partner agencies to develop and implement targeted encouragement and education programs that seek to increase levels of walking and bicycling. Encourage the participation of non-governmental organizations in areas including health care, health insurance providers, and economic development.	In progress or partially fulfilled	Funding for education focused on safety through HSIP/regional safety coalitions (e.g., Bike Easy); However, DOTD has stated that encouraging walking and bicycling is outside their mission.
8	Ensure all new pedestrian facilities installed by the Department will comply with the Americans with Disabilities Act Accessibility Guidelines, specifically the Public Rights-of-Way Accessibility Guidelines issued in 2005.	Substantively Complete	ADA Transition Plan completed 2018; database of deficiencies developed.

No.		2022 Status	Notes
9	Existing pedestrian facilities on roadways will be brought into ADA compliance during preservation and reconstruction projects.	Substantively Complete	ADA Transition Plan completed 2018; database of deficiencies developed.
10	Develop and implement consistent policies for marking crosswalks and providing pedestrian signals.	Substantively Complete	New EDSM II.2.1.14 (Complete Streets); Road Design Manual Chapter 5 Cross Section Elements updated; Traffic Signal Manual updated
11	Develop Formal Procedure for Exceptions being approved by DOTD Chief Engineer.	Substantively Complete	EDSM II.2.1.14 defines ability to request waiver from Chief Engineer "with the proper documentation." Design Exception and Design Waiver Request forms updated; Design Exception form explicitly identifies Complete Streets Minimum Design Guideline as an eligible criterion
12	Coordinate with Local Government and MPO for consistency with local planning efforts.	In progress or partially fulfilled	Routine coordination occurs; additional effort and specific protocols to ensure consistency statewide may improve outcomes
13	Annually identify corridors and intersections with disproportionate number of pedestrian & bicycle crashes and injuries.	In progress or partially fulfilled	Annual crash data analysis occurs; additional investigation of current practice for routine reporting and classifying "disproportionate" is recommended
14	Solicit the views of pedestrian and bicycle groups as part of Solicitation of Views during environmental processes.	In progress or partially fulfilled	For projects requiring EIS or EA, coordination plans outline procedures for stakeholder participation in Stage 1. The Stage 1 manual was updated in 2022 to explicitly reference complete streets. However, no clearly identified process for CE projects.
15	Utilize bicycle level-of-service analysis techniques to determine the appropriate level of bicycle accommodation on a roadway.	Substantively Complete	Statewide Bicycle Planning Tool identifies priority routes; based partially on BLOS analysis; Complete Streets EDSM defines accommodation types
16	Provide a pedestrian phase at all signalized intersections with high pedestrian volumes. Provide push button activation at all other signals.	In progress or partially fulfilled	Traffic Signal Manual updated to define warrants for Pedestrian Push Button, Countdown Signal Head, RRFB, and Pedestrian Hybrid Beacons. Accessible pedestrian signals (APS) called for wherever push button activation is used, in accordance with contemporary guidance.
17	Stage 0 and Environmental Checklists to refer to pedestrian and bicycle accommodation checklist.	Substantively Complete	Bike/ped checklist integrated into Stage 0, Environmental checklists updated

No.		2022 Status	Notes
18	Include LDOTD Bicycle and Pedestrian coordinator in project initiation meeting and build staff accordingly. This includes having road design staff at headquarters and at every district office with an expertise in designing on-road bicycle facilities.	In progress or partially fulfilled	DOTD Bike/Ped design specialist hired (2021), not all district offices have bike facility design expertise
19	On a project specific basis, when improvements are being considered to intersections or corridors, include bicycle and pedestrian counting as part of traffic counting requirements.	In progress or partially fulfilled	Peds and Bikes Count project advanced methods; bike/ped counts not yet routinely required in project scoping (pilot effort at regional level)
20	When developing project alternatives, include conceptual development of walking, transit, and biking accommodations.	In progress or partially fulfilled	Stage 0 Checklist updated to prompt identification of active transportation alternatives and Planning/Environmental manual of standard practice updated April 2022 to reference Complete Streets Policy and EDSM: bike/ped/transit are explicitly called out as part of preliminary alternatives analysis discussion. Additional guidance and refinements needed to ensure thorough and appropriate consideration of context sensitive design
21	Monitor maintenance needs and program repairs on an annual basis.	No Action Taken	Maintenance needs are complaint-based and handled at the district level; there is no centralized mechanism for monitoring statewide complete streets maintenance (e.g., striping) needs
22	Incorporate bicycle and pedestrian safety considerations into other safety projects and ensure that safety projects improve safety for all modes.	In progress or partially fulfilled	This project investigated the extent of integration of bike/ped safety into all safety projects, finding that rate of inclusion of Complete Streets elements is high within safety projects.
23	Upgrade existing pedestrian and bicycle facilities to meet current standards as part of all reconstruction transportation projects.	In progress or partially fulfilled	Projects may be expected to be upgraded to meet current EDSM
24	Design standards of bikeways and bicycle accommodations will be based on the most current available national guidelines and best practices.	In progress or partially fulfilled	Design standards based on current AASHTO guidance, but not fully aligned with national best practices. Updated design guidance is in development
25	Design standards of sidewalks and pedestrian accommodations will be based on the most current available national guidelines and best practices.	In progress or partially fulfilled	Design standards based on current AASHTO guidance, but not fully aligned with national best practices. Updated design guidance is in development
26	Require the collection and analysis of pedestrian and bicycle related data as a part of the Traffic Impact Analysis requirement in the LDOTD driveway	In progress or partially fulfilled	2020 update to EDSM VI.1.1.2 (Intersection Control Evaluation) directs consideration and evaluation of the needs

No.		2022 Status	Notes
	permitting and access management program. Require the provision of appropriate pedestrian bicycle facilities as a condition of approval.		of pedestrians and bicyclists, and "at a minimum" expected increase or reduction in delay and collisions. Additional research needed to determine specific data requirements.
Rewrite the Manuals			
27	New bridges and bridge reconstruction projects shall accommodate bicycles and pedestrians where walking and bicycling is not specifically prohibited.	Substantively Complete	Bridge Stage 0 checklist updated; Bridge design manual updated
28	Reduce travel speeds on urban and suburban collectors and select arterials that serve pedestrians and bicyclists through setting of appropriate design speed which take into account the needs of all users. Geometric design will be the primary tool to set appropriate speeds.	In progress or partially fulfilled	External research and internal work currently underway to develop updated design guidance pertaining to speed management
29	Provide bike lanes or paved shoulders where adequate space exists, as they are the preferred facilities on major roadways. Bike lanes are preferred on urban and suburban roadways, and paved shoulders are preferred on rural roadways.	Substantively Complete	Complete streets EDSM and design manual updated
30	Determine appropriate facilities for context (Rural, Suburban, Urban).	In progress or partially fulfilled	Complete Streets Minimum Design Guidelines define Rural and Urban accommodations only
31	Provide staggered continental marked crosswalks at all four legs of signalized intersections	In progress or partially fulfilled	Crosswalks installed with pedestrian warrant (20 pedestrian crossings in a 2-hour period) at any controlled intersection; high-visibility crosswalk markings only indicated at non-signalized intersections; no requirement for striping on all legs of intersection identified
32	Provide appropriate crossings at uncontrolled locations that utilize design measures to improve pedestrian safety, particularly those on roadways with three or more travel lanes.	In progress or partially fulfilled	Traffic Signal Manual updated to identify crossings and design measures
33	Provide bicycle detection at actuated traffic signals, where appropriate	No Action Taken	No known instances of implementation
34	Plans shall include provisions for the protection and maintenance of pedestrian and bicycle traffic during construction.	In progress or partially fulfilled	Temporary Traffic Control guidance updated 2018; includes new guidance for pedestrian accommodation, but no guidance for accommodation of on-street bicyclists. Additional guidance and outreach needed for contractors and consultants to articulate Policy compliance during construction

No.		2022 Status	Notes
35	Avoid using rumble strips on shoulders used by bicyclists unless there is a minimum clear path of 4 feet from the rumble strip to the outside edge of the paved shoulder, or 5 feet to the adjacent guardrail, curb or other obstacle. Gaps (12-foot gap every 40 to 60 feet) in the rumble strip should be provided to accommodate left turn and merging movements, and to enable bicyclists to avoid debris in the shoulder and to pass other bicyclists.	Substantively Complete	Rumble strip policy updated (by 2013)
36	Avoid chip-sealed surfaces where possible on roadways that are either designated as bicycle routes or are frequently used by bicyclists.	Additional research required	No evidence of change; not identified by stakeholders as a present issue
37	At T-intersections where a bypass lane is provided to facilitate left turns, provide a minimum 5- foot shoulder in order to facilitate safe bicycle passage.	Additional research required	No evidence of change; not identified by stakeholders as a present issue
38	Provide appropriate pedestrian accommodations on all projects whether or not sidewalks are provided.	In progress or partially fulfilled	Pedestrian accommodation must be considered regardless of existing infrastructure
39	Work with partner agencies to include the appropriate laws and principles for safely sharing the road with pedestrians and bicyclists as a part of driver education manuals, classes and license testing procedures.	In progress or partially fulfilled	DOTD participates in regional education/enforcement efforts; Some updates to driver education and testing have occurred
40	Require the provision of appropriate pedestrian bicycle facilities as a condition of approval.	Substantively Complete	Chief Engineer must approve any exceptions to CS policy
41	Update the Road Design Manual and Design Standards to reflect current national guidelines and best practices and provide appropriate guidance to staff.	In progress or partially fulfilled	Design standards based on current AASHTO guidance, but not fully aligned with national best practices. Updated design guidance is in development
42	Provide countdown pedestrian signal heads at signalized intersections. The minimum width of sidewalks installed by the Department is to be 5'. Wider sidewalks may be appropriate in areas with higher pedestrian volumes. The assumption is that a minimum of a 5' grass buffer will be provided between the sidewalk and the adjacent roadway, however a wider buffer will be provided where possible on higher speed roadways such as urban arterials.	In progress or partially fulfilled	Traffic Signal Manual updated to define warrants for Pedestrian Push Button, Countdown Signal Head, RRFB, and Pedestrian Hybrid Beacons. Accessible pedestrian signals (APS) called for wherever push button activation is used, in accordance with contemporary guidance. Complete Streets Minimum Design Guidelines stipulate sidewalk and buffer widths. Additional guidance needed to provide contextually warranted "preferred" values or configurations based on demand.
43	Allow greater flexibility to design projects that better meet the needs of all travelers.	In progress or partially fulfilled	Complete Streets EDSM and Minimum Design Guidelines provide (limited) flexibility for design, e.g., protected

No.		2022 Status	Notes
			bikeways; local agencies must take responsibility for "extra" elements
44	Use the following methods to retrofit bike lanes (or paved shoulders) on urban and suburban roadways (road diet techniques): 1. Reducing travel lane widths – lane widths may be reduced per the flexibility defined in AASHTO's Policy on the Geometric Design of Highways and Streets and based on engineering judgment. 2 Reducing the number of travel lanes – a traffic analysis may be done on roadways with excess capacity to determine if they are candidates for this treatment. 3 Reconfiguring or reducing on-street parking – this method is a last resort, as changes to parking are often opposed by adjacent landowners	In progress or partially fulfilled	Complete Streets Minimum Design Guidelines begin to address these considerations; additional guidance needed for road diet and lane width reduction analysis and to codify expectations
45	Provide appropriate bicycle compatible features (i.e., bicycle safe drainage grates, placement of rumble strips, type of expansion joints, etc.) on all projects whether or not officially designated as bikeways.	In progress or partially fulfilled	Rumble strip policy updated (by 2013); Hydraulics manual includes consideration of pedestrian and bicycle traffic in grate/catch basin selection but does not articulate orientation; Bridge design manual does not explicitly consider bicyclists in design of expansion joints
46	Ensure crosswalks that are marked at uncontrolled locations be staggered continental crosswalk markings.	Substantively Complete	High-visibility crosswalk markings indicated at non-signalized intersections in standard details
Retrain the Planners and Engineers			
47	Assign a pedestrian and bicycle liaison at each district office to help ensure that the recommendations of this plan are fully implemented in each district	No Action Taken	No liaison formally assigned at district level
48	Train staff and consultants to plan and design for walking and bicycling.	In progress or partially fulfilled	All DOTD staff required to attend training; no consistent requirement for consultants
49	Require training in Complete Streets as pre-requisite or requirement of design contracts.	No Action Taken	Training for external contractors not currently required; regular training opportunities must be offered in order to consider such a requirement
50	Provide training opportunities to MPO staff, parishes and municipalities in Complete Streets	In progress or partially fulfilled	Training opportunities provided on ongoing basis
Retool Measures to Track Outcomes			
51	Monitor pedestrian and bicycle crash data on an annual basis.	Substantively Complete	Overall trends reported annually

No.		2022 Status	Notes
52	Annually identify the following measures during routine inventory process: 1. Portion of streets dedicated to non-motorized traffic, 2. Road crossing width 3. Functional width of sidewalk 4. Distance between travel lane and sidewalk	In progress or partially fulfilled	Highway inventory collects limited data about non-motorized traffic; additional data collection recommended
53	The Department's bicycle and pedestrian coordinator will collect and disseminate an annual report of bicycle and pedestrian activities, including activities of the Department's District Offices and addressing progress toward the goals of this plan.	Substantively Complete	DOTD CS Legislative Report provided annually
54	Require the collection and analysis of pedestrian and bicycle related data as a part of the Traffic Impact Analysis (TIA) requirement in the LDOTD driveway permitting and access management program. Require the provision of appropriate pedestrian bicycle facilities as a condition of approval.	In progress or partially fulfilled	2020 update to EDSM VI.1.1.2 (Intersection Control Evaluation) directs consideration and evaluation of the needs of pedestrians and bicyclists, and "at a minimum" expected increase or reduction in delay and collisions. Additional research needed to determine specific data requirements.
55	Develop an action plan to that identifies deficiencies in current pedestrian and bicycle facilities and programs improvements.	In progress or partially fulfilled	Action plan developed but incomplete, not formally adopted
56	Annually report on the data to measure progress towards achieving the goals of the Complete Streets Policy. Note: Data should include walking and bicycling mode splits and crash and injury rates.	Substantively Complete	DOTD CS Legislative Report provided annually. Note: Modal splits not reported
57	Confirm evidence of Complete Streets application in all state and federally funded projects included in MPO TIPS and Plans for urbanized areas.	Substantively Complete	Additional investigation needed to evaluate MPO TIPs and LRTPs; outside of scope
58	Monitor the frequency and quality of non-motorized education and training programs	Additional research required	Additional investigation needed to determine evaluation process; outside of scope
59	Include identification of walking and bicycling needs when developing statement of Purpose and Need.	Substantively Complete	Stage 0 Checklist updated
Other Tools for Advancing Complete Streets in Louisiana			
Legislative Strategies			
60	Cease the requirement for the DOTD to "find and declare construction is necessary in the public interest and will contribute to the safety of bicyclists and the motoring public" before constructing a bicycle path by revising Louisiana revised statute (RS) 48:21.	Substantively Complete	Language revised
61	Add a penalty for improper opening or leaving open of vehicle door that can interfere with other roadway users.	Substantively Complete	La. Rev. Stat. Ann. §32:283.

No.		2022 Status	Notes
62	Require lighting devices for mobility aids after dark rather than banning their use after dark by revising RS 32:197.	Substantively Complete	LA Rev Stat § 32:329.1
63	Require questions about sharing the road with all modes of transportation, including transit and non-motorized modes (pedestrians and bicycles), on the driver's exam by revising RS 17:270.	Substantively Complete	Questions added by 2013
Partnerships, Coordination and Resources for Local Governments			
64	Promote Complete Streets Program as a means of helping MPOs meet regional Air Quality Conformity Objectives by allowing CMAQ funds to be used to fund non-motorized transportation projects	Substantively Complete	CMAQ funds (where applicable) have been used to fund non-motorized transportation project in alignment with federal guidance
65	Work with legislature to create funding stream for local Complete Streets Policy/Plan development.	In progress or partially fulfilled	IIJA legislation indicates set-asides for planning; competitive federal grant programs available for Complete Streets. No state-level dedicated funding stream identified for planning
66	Work with partner agencies and jurisdictions to actively promote land use and development principles that contribute to a safe and comfortable walking and bicycling environment.	In progress or partially fulfilled	Previous LTRC research focused on growth management, access management. Additional guidance needed to advance local planning and policy changes to promote multimodal communities
67	Work with Legislature to remove any language from state statutes that conflict with Complete Streets, and to develop language that is more supportive of Complete Streets.	Substantively Complete	Numerous updates to statutes to improve clarity around bicycles and pedestrians
68	Work with Legislature to establish formal state bicycle and pedestrian advisory committee	Substantively Complete	CSAC established
69	Identify organization to develop comprehensive effort to fund and administer public education programs. Examples: Donation on state tax form Share the Road License Plate	Additional research required	Share the Road license plate established; tax for donation status requires additional research
70	Secure and program safety spending for pedestrians and bicyclists at a level recognizing the high percentage of fatalities and serious injuries that these modes comprise.	In progress or partially fulfilled	Suggested action: Document % of safety spending on bikes/peds to quantify progress and results
71	Work with local governments and private developers to ensure that sidewalk and pedestrian accommodations are provided.	In progress or partially fulfilled	Some evidence of coordination with local agencies; additional outreach and guidance needed
72	Where appropriate, work with local governments to ensure future maintenance of sidewalk network.	In progress or partially fulfilled	Some evidence of coordination with local agencies; additional outreach and guidance needed

No.		2022 Status	Notes
73	Encourage local and partner agencies and jurisdictions to use or adopt Complete Streets Policies.	In progress or partially fulfilled	Some evidence of coordination with local agencies; additional outreach and guidance needed
74	Work with partner agencies, including MPOs and local governments to support the use of innovative and state of the art bicycle facilities when appropriate.	In progress or partially fulfilled	Some evidence of coordination with local agencies to implement innovative bikeways
75	Identify Complete Streets Liaisons to walk projects through project development as examples while comprehensive training program commences.	In progress or partially fulfilled	1 DOTD bike/ped design specialist hired (2021)
76	Work with Department of Public Safety and legislature to mandate vehicular responsibilities pertaining to interactions with bicyclists and pedestrians in Drivers Education and Driver's License training.	In progress or partially fulfilled	Handbook revised 2016; includes interactions with bicyclists and pedestrians. Additional outreach needed to ensure full integration in training courses
77	Work with partners to identify common behavioral and environmental factors that contribute to crashes and injuries and educate the public on increasing bicycling and pedestrian safety.	In progress or partially fulfilled	Numerous research activities documenting contributing factors; additional outreach and education needed
78	Develop comprehensive publicity campaign to heighten awareness of Complete Streets efforts by Department, both internally and externally. Examples of publicity strategies include: Website overhaul, Distribution of documents, Reports on progress.	In progress or partially fulfilled	Annual reports published, CS webpage established, but no comprehensive publicity campaign
79	Convene a statewide pedestrian and bicycle advisory committee to provide advice and recommendations on an ongoing basis. Note: The committee should include individuals and/or organizations representing public health, persons with disabilities, transit providers and riders, children, senior citizens, parks and recreation, schools, the environment, tourism, and the business community.	Substantively Complete	CSAC established and maintained
80	Identify key transit locations which would benefit from Complete Streets improvements. Work with MPOs, transit agencies and local governments to develop and identify funding sources for the projects.	No Action Taken	No systematic assessment of transit routes to facilitate implementation identified

Louisiana Complete Streets Advisory Council Proposed Performance Measurement Matrix

Table 10. Louisiana Complete Streets Advisory Council proposed performance measurement matrix—2016 draft benchmarking report

No.	Text	Category	Process/ Outcome	Baseline	Target	Target year	Annual benchmark
1	Safely accommodate people walking and biking throughout Louisiana	Goal	Outcome				
1.1	By 2030, reduce pedestrian and bicycle injuries and fatalities by 50%	Objective	Outcome				
1.1.a	Number of pedestrian injuries	Performance Measure	Outcome	1033	516	2030	32-33
1.1.b	Number of pedestrian fatalities	Performance Measure	Outcome	107	53	2030	3-4
1.1.c	Number of bicycle injuries	Performance Measure	Outcome	554	277	2030	17-18
1.1.d	Number of bicycle fatalities	Performance Measure	Outcome	18	9	2030	0.5 per year
2	Create a network that balances access and mobility	Goal	Outcome				
2.1	Increase the network of bicycle facilities on urban state roads to 400 miles by 2040	Objective	Outcome				
2.1.a	Bi-directional miles of bicycle lanes (protected, buffered, standard), marked shared roads, and side paths on the state highway network within urbanized and urban areas	Performance Measure	Outcome	12.5/ 2,950	400	2040	15.5
2.1.b	Miles of roads with sidewalks on both sides on the state highway network within urbanized and urban areas	Performance Measure	Outcome				
2.2	Increase the number of miles of rural roads with “paved shoulders at least 4 ft. in width” to 3000 miles by 2040	Objective	Outcome				
2.2.a	Bi-directional miles of paved shoulders at least four feet wide outside of urbanized and urban areas	Performance Measure	Outcome	2,700/ 12620	3000	2040	12
2.3	All projects safely accommodate walking and bicycling trips by including context appropriate facilities	Objective	Outcome				

No.	Text	Category	Process/ Outcome	Baseline	Target	Target year	Annual benchmark
2.3.a	Projects that include bicycle lanes (protected, buffered, standard), marked shared roads, and sidepaths included in construction letting section of highway priority program for a given year	Performance Measure	Outcome		10%	(*)	
2.3.b	Projects that include shoulders included in construction letting section of highway priority program for a given year	Performance Measure	Outcome				
2.3.c	Projects that include sidewalks on both sides in construction letting section of highway priority program for a given year	Performance Measure	Outcome				
3	Encourage Pedestrian, Bicycle, and Transit Use	Goal	Outcome				
3.1	Double the percentage of bicycle and walking trips by 2040	Objective	Outcome				
3.1.a	Number of bicyclists observed at specific count locations	Performance Measure	Outcome	0	TBD	(**)	TBD
3.1.b	Number of pedestrians observed at specific count locations	Performance Measure	Outcome	0	TBD	(**)	TBD
Strategy A	Make our everyday approach to doing business a multi-modal approach						
A.3	Develop and implement a programmatic approach to target needed transit stop infrastructure and crossing improvements on transit routes	Objective	Process				
A.3.1	Number of projects in highway priority program that focus on transit stop improvements/crossing infrastructure at transit stops with identified problems	Performance Measure	Process	0	5	(*)	5
A.1	By 2017, update the highway priority program project selection and reporting process to identify projects that accomplish the goals set forth in HB no 742 of the 2015 LA Legislative session, specifically to track projects that do the following: (2) improve safety for motorized and non-motorized highway users and communities, (4) increases accessibility for people, goods, and services, (6) fosters multimodalism, promotes a variety of transportation and travel options, and encourages intermodal connectivity, and (8) protects the environment, reduces emissions, and improves public health and quality of life	Objective	Process				

No.	Text	Category	Process/ Outcome	Baseline	Target	Target year	Annual benchmark
A.1.1	Number of projects in highway priority program that focus on goals 2, 4, 6, and 8	Performance Measure	Outcome	About 350 projects to be let	10% annual primary goal	(*)	35 projects
A.1.2	Percent of funding of highway priority program that focuses on goals 2, 4, 6, and 8	Performance Measure	Outcome	About 350 projects to be let	5% Annually		33.75 Million
A.2	Develop and implement a programmatic approach to reduce bicycle and pedestrian crashes both on and off the state highway network and to provide educational and enforcement programming	Objective	Process				
A.2.1	Number of regional safety coalitions with vulnerable user emphasis area	Performance Measure	Process	4 of 9	9	2017	2 to 3
A.2.2	Number of regional safety coalitions with a regional safety action plan that includes a) countermeasure projects and b) education and enforcement programming	Performance Measure	Process	4 of 9	9	2017	2 to 3
A.4	By 2020, update all program manuals, design manuals, EDSMs and associated forms and checklists to be consistent with the CS policy	Objective	Process				
A.4.1 – 16	Update....various documents, see list	Performance Measure	Process				
A.4.1	Update project delivery manual to include CS process information, including providing detailed information about the responsibilities at various project stage	Performance Measure	Process				
A.4.4	Adopt Bicycle and Pedestrian Checklist and incorporate into project delivery process	Performance Measure	Process				
B	Research, educate, train, and empower DOTD staff and those engaged in project delivery how to plan and design for all users of the transportation system	Strategy	Process				
b.1	Utilize Louisiana transportation research center research opportunities to ensure the best available information is available to DOTD personnel as regards active transportation issues	Objective					

No.	Text	Category	Process/ Outcome	Baseline	Target	Target year	Annual benchmark
b.1.1	# Of bicycle, pedestrian, transit related research topics funded/performed annually	Performance Measure	Process	0	1	(*)	at least 1 per year
b.2	Annually track and report on progress towards implementation of CS policy	Objective	Process				
b.2.1	Develop a checklist/reporting system for tracking completeness of process-oriented measures and progress on outcome measures	Performance Measure	Process		develop mechanism	2016	100% complete by end of 2016
b.3	By 2016, implement 3-day cs training requirement for all consultants on non-interstate planning and design projects	Objective	Process				
b.3.1	Completeness of initiation tasks: 1. Develop requirement language and get approvals, 3. Contract with training providers, 4. Begin to provide course	Performance Measure	Process	0% complete	100% complete	2016	100% complete by end of 2016
b.3.2	Percent of planning and engineering contracts awarded annually with training requirement included	Performance Measure	Process	0%	100%	2018	
b.4	By 2020, train all relevant planning and engineering staff in complete streets	Objective	Process				
b.4.1	# of staff completed basic CS (4 hour) training	Performance Measure	Process	80			80
b.4.2	# of staff completed intensive CS (3-day) training	Performance Measure	Process	47			20
b.4.3	# Of training opportunities provided	Performance Measure	Process	30 over 10 years	4/year	(*)	4
b.5	By 2016, assign complete streets liaisons at district level	Objective	Process				
b.5.1	# Of districts with a complete streets liaison (who has attended training)	Performance Measure	Process				
C	Be an exceptional partner to local and regional agencies, non-profit organizations, advocacy groups and constituents/customers/individuals	Goal	Process				
c.1	Convene complete streets advisory council to provide recommendations and feedback on an ongoing basis	Objective	Process				
c.1.1	# of CSAC meetings held and annual reports to state legislature	Performance Measure	Process	0	4	(*)	4

No.	Text	Category	Process/ Outcome	Baseline	Target	Target year	Annual benchmark
c.2	Annually identify and actively support partner organizations and their complete streets efforts to 1. Encourage bicycling and walking, 2. Provide education on walking and bicycling safety (and driver responsibilities) 3., promote benefits of walking and bicycling to health, environment, older Americans' quality of life, and land use principles that contribute to a safe and comfortable walking and bicycling environment, and 4. Partnerships with law enforcement to ensure that traffic laws are being obeyed	Objective	Process				
c.2.1	# of programs funded to address education, encouragement, enforcement (including those funding through regional safety coalitions, statewide safety coalition, SRTS, TAP, and other means). Note: dividing this up by region or district could actually prove quite interesting	Performance Measure	Process				
c.2.2	# of CS policies adopted after funding for training provided	Performance Measure	Process				

(Note: (*) means "annual measure." (**) means "establish program by 2018.")

Adopted DOTD Complete Streets Goals, Objective, and Performance Measurements

Table 11. Adopted DOTD Complete Streets goals, objective, and performance measurements, 2017-2021

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
1	Safely and efficiently accommodate all road users (motorists and non-motorists such as, but not limited to, pedestrians, transit users, and bicyclists of all ages and abilities)	Goal						
1.1	Increase the integration of the Complete Streets Policy that is included in DOTD's EDSM into applicable documents and training by Dec 31, 2020	Objective						
1.1.1	# and type of documents where policy was implemented	Performance Measure	count and ID documents	3 forms, 3 manuals, 2 standard plan/guidelines	3 deleted EDSMs	7	2 – TAP Application, Traffic signal Manual	2 – SRTPPP Application and Manual
1.1.2	# and type of trainings conducted on Complete Streets Policy	Performance Measure	Count and characterize training	FHWA ADA Training, TDG ADA Training, TDG Ped/Bike/Ada Training (BR), TDG Ped/Bike/ADA training (NO),	4 – LTC 2018, GICD Summit, Board of Regents, DOTD Standardized computer-based training for new and existing employees	4 – Board of Regents DOTD Standardized Computer Based Training, Plan Quality Unit	6 – DOTD Standardized Computer Based Training, LTC 2020 Context Session, LTC 2020 Bike/Ped Safety	5 – DOTD Standardized Computer Based Training; 2021 Safety Summit Bike/Ped Session; LPA Core Program Training; ATSSA Pedestrian Workzone Training; NHI

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
				Hammond CS workshop (2), Ponchatoula CS workshop (2)		Training, LAP Core Program Training	Session, LPA Core Program training, FHWA pedestrian Safety Summit, ATSSA Pedestrian Workzone Training	Designing for Pedestrian Safety Course
1.1.3	# of DOTD staff trained on implementation of CS policy	Performance Measure	count	44	1289	371	435	359
1.1.4	# of consultants trained on implementation of CS policy	Performance Measure	count	31	21	7	57	39
1.2	Reduce non-motorized user facilities and serious injuries by 50% by 2030 from 2011 levels (based on 2011 SHSP)	Objective						
1.2.1	# of pedestrian fatalities	Performance Measure	count, previous year data	127	115	164	122	146
1.2.2	# of pedestrian serious injuries	Performance Measure	count, previous year data	154	160	176	179	176
1.2.3	# of bicyclist fatalities	Performance Measure	count, previous year data	21	24	31	22	34
1.2.4	# of bicyclist serious injuries	Performance Measure	count, previous year data	46	46	47	50	52
1.3	Accommodate bicyclists on Priority 1 routes as identified in the statewide bicycle planning	Objective						

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
	tool through standalone or current programmed projects on an annual basis as available financial resources permit							
1.3.1	# and type of routes where improvements are made	Performance Measure	count, projects let	1 urban collector, 1 urban principal arterial, 1 intersection	1 urban minor arterial (adjacent levee top path)	0	1 Urban Principal Arterial	1 Urban Principal Arterial
1.3.2	# and type of improvements that are implemented	Performance Measure	count, projects let	6.12 miles on-road bike lane, 6.68 miles adjacent, separated bike lane, 178 bicycle pavement symbols	1.59 miles multi use path	0	3.1 Miles of Bike Lane (Replacement with improvements)	.62 Miles of multi-use path
1.3.3	# of DOTD staff trained on Statewide Bicycle Planning Tool	Performance Measure	count	82	113	71	0	110
1.3.4	# of consultants trained on Statewide Bicycle Planning Tool	Performance Measure	count	48	50	38	0	22
1.4	Implement DOTD's ADA transition plan based on the projects identified in DOTD's priority program	Objective						
1.4.1	# of routes where ADA transition plan is implemented	Performance Measure	count, projects let in previous	23	17	24	29	25

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
			year with improvements listed on transition plan					
1.4.2	# of problems/deficiencies in design corrected	Performance Measure	count, of project let in previous year	2887	2550	2383	4057	1770
2	Create a network that balances integration of context sensitivity, access, and mobility for all road users	Goal						
2.1	Annually reduce the state highway mileage that does not meet CS criteria located in areas with existing or reasonably foreseeable future development or transit service	Objective						
2.1.1	# and type of improvements implemented	Performance Measure	Count and characterize, projects let in previous year (inc. local roads)	1005 handicapped curb ramps, 7.4 miles of bike lanes, 14.5 miles of sidewalk, 17.5 miles of multi-use path, 222 bicycle pavement symbols, 67 pedestrian push	934 handicapped curb ramps, 4.7 miles bike lanes, 21.4 miles sidewalk, 16.3 miles multi-use path, 151 bicycle pavement symbols, 44 pedestrian push buttons, 44 led pedestrian countdown	833 curb ramps, 2.3 miles of bike lane/cycle track, 15.9 miles of sidewalk, 1/6 miles of multi-use pat, 16 flashing beacons, 23 detectable	1446 curb ramps, 3.1 miles of bike lane, .6 miles of multi-use path, 5.9 miles of sidewalk, 15 flashing beacons, 12 detectable warning system retrofits for	691 Curb Ramps, 5.0 Miles of Bike Lane, 1.4 Miles of Multi-Use Path, 14.0 Miles of Sidewalk, 3 Pedestal Mounted Flashing Beacons, 23 Detectable Warning Systems, 150 Bicycle Pavement Symbols, 587 Pedestrian Push Buttons, 748 Shared Lane Pavement

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
				buttons, 70 LED pedestrian countdown signal heads, 58 detectable warning system retrofits for curb ramps	signal heads, 10 solar powered school zone beacons, 14 detectable warning system retrofits for curb ramps, 15 truncated dome systems	warning system retrofits for curb ramps, 91 bicycle pavement symbols, 12 pedestrian crosswalks, 62 pedestrian push buttons	curb ramps, 120 bicycle pavement symbols, 2 pedestrian crosswalks, 154 pedestrian push buttons, 3 shared lane pavement markings	Markers, 2 Pedestrian Bridges, 20 RRFB Assembly Pairs
2.1.2	# and type of roadways where improvements are made	Performance Measure	count and characterize	40 local roads, 16 urban principal arterials, 11 urban minor arterials, 7 urban local, 11 urban collector, 4 rural minor arterial, 8 rural major collector	5 rural collector, 3 rural minor arterial, 1 rural principal arterial, 3 urban collectors, 1 urban local, 12 urban minor arterial, 19 urban principal arterial, 45 local roads	4 rural minor arterials, 6 rural major collectors, 14 urban principal arterials, 16 urban minor arterials, 11 urban collectors, 47 local roads	1 rural principal arterial, 5 rural minor arterial, 2 rural major collector, 1 urban interstate, 30 urban principal arterial, 15 urban minor arterial, 4 urban collector, 39 local roads	6 Rural Major Collector, 1 Rural Minor Collector, 2 Rural Local, 6 Urban Interstate (Interchange/Frontage), 1 Urban Freeway, 17 Urban Principal Arterial, 21 Urban Minor Arterial, 11 Urban Collector, 126 Local Roads
2.1.3	# of miles of state highway system that do not meet complete streets criteria	Performance Measure	Total state highway system miles minus	9305	9118	8324	8249	6.973 (note methodological change

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
			interstates and freeways, low volume (<1000) and streets with bike, pedestrian, and transit accommodations					in calculation; reduced 2020 VMT
2.2	increase compliance with CS policies and procedures on all new, reconstruction, and preservation highway projects that serve adjacent areas with existing or reasonably foreseeable future development or transit service	Objective						
2.2.1	# of new or reconstruction projects that incorporate complete streets components	Performance Measure	count (inc. local roads)	48	64	57	38	52
3	Provide leadership and establish exceptional partnerships with local public agencies on implementation of Louisiana's Complete Streets Policy	Goal						
3.1	On a continual basis, increase the # of CS policies and/or plans in local jurisdictions (urban areas with pop > 5000) & MPOs to increase, improve, and connect the network	Objective						

No.	Text	Category	Measure type	2017/Baseline	2018	2019	2020	2021
3.1.1	# of local jurisdictions with a CS policy and/or plan	Performance Measure	count of jurisdictions	11	15	16	16	16
3.1.2	# of MPOs with a CS policy and/or plan	Performance Measure	count of MPOs	4	7	7	8	6
3.2	increase training and technical assistance for MPOs and local jurisdictions on how to develop and implement CS policies and plans	Objective						
3.2.1	# of MPOs and local jurisdictions that participate in training	Performance Measure	count	115	69 (45 – board of regents, 5 LTC 2018, 7 – walk/bike/places, 12-GICD summit)	57	50	65
3.2.2	# of presentations made on developing and implementing a Complete Streets Policy or plan	Performance Measure	count	0	4 (CS session at LTC 2018, CS presentation at board of regents, governor's institute on community design, walk bike places conference)	3	5	4

Draft Complete Streets Steering Group Action Plan

Table 12. Draft Complete Streets Steering Group action plan 2018-2021 status review

No.	Action Step	Goal/ Objective	Division	Action Description	Target Completion Date	2022 Status Check	Notes
Data and Performance Measures							
1	Annual Report	All	CS steering group	Produce an annual progress report to be submitted to the House and Senate Joint Transportation Committee in conjunction with the Highway Priority Program and in accordance with Revised Statute 48:22.1	Annual – 1st day of spring legislative session (April)	Substantively Complete	Completed annually
2	Annual non-motorized user safety report	1.2	Office of planning, highway safety	Produce an annual report of non-motorized user fatalities and serious injuries that identifies the risk factors that may be addressed through the SRTPP, including whether or not they are occurring at uncontrolled crossing location	Annual – end of each year	No Action Taken	No routine annual reporting specific to spatial distribution and risk factors for non-motorized users
3	Pedestrians and Bicyclists Count!	1.2	Office of planning, data collection and LTRC	Develop new pedestrian and bicyclist count and observation procedures along with policies for using the information. Explore opportunities for encouraging local agencies to complete more pedestrian and bicyclist counts and share the data		In progress or partially fulfilled	Peds and Bikes Count – In Progress
4	Complete streets network inventory	2.1	Office of planning, data collection and highway safety	Establish a baseline and number and type of complete streets components (including but not limited to sidewalks, marked crosswalks, bike lanes, transit stops) existing on the state network		In progress or partially fulfilled	LTRC Evaluate CS Implementation project – In progress
5	Evaluate and modify performance measures	n/a	CS steering group/CS advisory council	Evaluate existing performance measures for applicability and validity. Revise and add performance measures as determined by DOTD and the CSAC	4/1/2020	In progress or partially fulfilled	LTRC Evaluate CS Implementation project – In progress

No.	Action Step	Goal/ Objective	Division	Action Description	Target Completion Date	2022 Status Check	Notes
Guidance, Manuals, and Policies							
1	Comprehensive list of DOTD documents	1.1	CS steering group	Review the list of documents to determine the need to be updated to integrate the CS policy. Prioritize the schedule of updates.	12/1/2018	In progress or partially fulfilled	List of documents developed; further information needed on schedule of updates for those not yet completed
2	Low-cost CS countermeasures	2.1	CS steering group, LTAP	Develop list of potential low-cost complete streets countermeasures for easy incorporation to projects with restricted funding		In progress or partially fulfilled	LTRC Evaluate CS Implementation project – In progress
Training and Education							
1	Agency-wide policy-level training	1.1	Office of Planning, highway safety	Develop and deliver statewide training for the CS policy and related legislation. It is envisioned that this course be a web-based introduction and a prerequisite to planning and design training		Substantively Complete	DOTD BP Complete Streets Part 1 complete and distributed – required for all DOTD staff
2	Pedestrian/Bicycle/Transit design training	1.1, 3.2	Office of Engineering	Develop pedestrian/bicycle/transit design training for designers, project managers, and consultants (target audience TBD) upon completion of manual and guidance updates		In progress or partially fulfilled	Basic complete streets training required, and some design training opportunities provided; additional more detailed training on design for DOTD staff and consultants needed
3	Review recent national publications	n/a	Complete streets steering group	Review recent publications, including but not limited to FHWA guide for improving pedestrian safety at uncontrolled locations (2017), AASHTO Guides for the development of bicycle/pedestrian/transit facilities, for recent research to determine which DOTD policies/guidance/manuals need to be updated for consideration of best practices.		In progress or partially fulfilled	Steering group currently dormant; update of Design Guidelines currently underway in accordance with current FHWA/AASHTO guidance (Traffic Engineering section leading)
4	Request technical assistance	1.1	CSSG	Request technical assistance/training (EG NCHRP 803 ActiveTrans Tool) for enhanced knowledge of pedestrian/bicycle/transit design considerations		Substantively Complete	Current goal includes at least one FHWA technical

No.	Action Step	Goal/ Objective	Division	Action Description	Target Completion Date	2022 Status Check	Notes
							assistance training held annually (topics vary)
5	Consultant minimum personnel requirements	n/a	Office of engineering, consultant contracts services	Develop minimum personnel requirements that include pedestrian/bicycle/transit expertise for future advertisements		No Action Taken	Training for external contractors not currently required; regular training opportunities must be offered in order to consider such a requirement
Planning Tools and Resources							
1	Bicycle planning tool	1.3	Office of planning, highway safety	Provide information/training on the use of the bicycle planning tool at professional development activities, like the statewide traffic engineers meeting, road design squad meetings, etc.		In progress or partially fulfilled	Outreach opportunities delivered on ongoing basis (see legislative reports for examples)
2	ADA transition plan	1.4	Office of engineering, compliance	Provide information/training on the use of the ADA compliance map at professional development activities, like the statewide traffic engineers meeting, road design squad meetings, etc.		In progress or partially fulfilled	Informational/educational sessions offered; ongoing
3	SHSP & SRTPPP	n/a	Office of planning, highway safety	Provide information on Louisiana's strategic highway safety plan and the Safe Routes to Public Places Program at professional development activities		In progress or partially fulfilled	Informational/educational sessions offered; ongoing
4	Project/plan database/portal	2.2	Office of planning, data collection	Develop a public portal with maps of plans and planned and/or proposed projects		No Action Taken	Not yet initiated
5	policy and planning guide	3.1	Office of planning, LPA Programs, LTAP, LPC	Develop guidance for local jurisdictions and MPOs on implementing a Complete Streets policy and/or plan to improve connectivity		In progress or partially fulfilled	Some outreach provided; DOTD Rural Transportation Plan Pilot program underway; additional outreach needed

No.	Action Step	Goal/ Objective	Division	Action Description	Target Completion Date	2022 Status Check	Notes
Infrastructure, operations, and project selection							
no content provided						No Action Taken	No action taken
Coordination and Outreach							
1	Complete streets advisory council meetings	n/a	Office of planning, highway safety	Hold quarterly coordination meetings with the CSAC, in accordance with Revised Statute 48:22.1	Quarterly	Substantively Complete	CSAC quarterly meetings held
2	website	3.2	Office of planning, highway safety	Update the complete streets webpage with current information. This will also be where the CS implementation plan will be posted.	12/1/2018	In progress or partially fulfilled	page maintained; implementation plan not posted
3	Local public agency outreach	3.2	LTAP	Develop a one-page informational flyer to direct local public agencies to appropriate policy, planning, and design manuals, and relevant guidance documents for implementation of CS policy		Substantively Complete	Flyer developed in 2018 but limited distribution; provides links to Complete Streets Toolkit,
4	LMA, LPESA, PJAL	3.2	LTAP, LPA programs	Provide information at LMA/LPESA/PJAL meetings on CS policy and updated guidance		In progress or partially fulfilled	Some outreach provided; additional guidance needed
5	LMA, LPESA, PJAL	3.2	LMA, LTAP	Investigate the creation of a transportation committee that would strengthen the relationship between LADOTD and LMA		No Action Taken	No evidence of activity
6	Project planning and scoping	3.1	Office of Planning	Investigate the current project selection and development process (including PRR projects) to determine how to ensure early stakeholder coordination and collaboration	on-going	In progress or partially fulfilled	LTRC Evaluate CS Implementation project – In progress, providing initial recommendations

No.	Action Step	Goal/ Objective	Division	Action Description	Target Completion Date	2022 Status Check	Notes
7	Project coordination	3.1	Office of Planning	Create guidance/flow chart/consultation process for stakeholders to establish consistent communication between agencies regarding all projects and implementation of the CS policy		Additional Research Needed	Investigate – this may have been developed but is not publicly available

Summary of DOTD Documents

Table 13. Summary of DOTD documents reviewed

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
LPA Manual	Manual	LPA Program Director	Secretary's Office	2017	Yes	Updated to directly reference CS Policy
Project Manager's Manual	Manual	Project Management Director	Project Management	2017	N/A	Document unavailable
SRTPP Program Guidelines	Manual	Highway Safety Administrator	Highway Safety	2021	Yes	Updated to include Complete Streets EDSM
Stage 0 Manual	Manual	Transportation Planning Administrator	Transportation Planning	2021	No	To be reviewed for Complete Streets, per 2018 Legislative Report
Stage 1 Environmental Manual	Manual	Environmental Engineer Administrator	Environmental	2022	Yes	Updated in 2022 with direct references to CS policy and EDSM
Stage 3 Road Design Manual	Manual	Road Design Engineer Administrator	Road Design	2019	Yes	Updated to include reference to CS policy, EDSM, Minimum Design Guidelines
TAP Application Guide	Manual	TAP Program Manager	Project Management	2020	Yes	Updated; does not explicitly reference CS Policy but most program activities support policy goals
DOTD Traffic Signal Manual	Manual	Traffic Engineering Division Administrator	Traffic Engineering Development	2020	No	Updated, does not reference CS policy or provide guidance on use of bicycle signal heads
Bridge design and evaluation manual (BDEM)	Manual	Bridge Design Engineer Administrator	Bridge Design	2019	Yes	Updated to reference Complete Streets program but needs further updates to align with revised EDSMs and Minimum design guidelines.

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
HSIP Project Selection Guide	Manual	Highway Safety Administrator	Highway Safety	2017	Yes	Updated; does not explicitly reference Complete Streets Policy but eligible program activities support policy goals
Construction Contract Administration Manual	Manual	Chief Construction Division Engineer	Construction	2017	Yes	Updated to reference Complete Streets Policy
Traffic Engineering Manual	Manual	Traffic Engineering Division Administrator	Traffic Engineering Management	2015	No	Updated, does not reference Complete Streets Policy
LRSP Program Guidelines and Policies/Project Selection manual and application	Manual	LRSP Program Manager	LTAP	2022	Yes	Program documents (internal) recently updated. Pre-application solicits information about local plans; application and assessment worksheets ask about safety risks to pedestrians and bicyclists, existing facilities (including condition and accessibility), and bike/ped crashes. Evaluation materials include local plan support, overrepresented crash categories, and use of FHWA proven countermeasures
Project Delivery Manual	Manual	Project Management Director	Project Management	2013	Yes	Updated to reference Complete Streets Policy
TAP “I’ve got a project, now what?” Manual	Manual	TAP Program Manager	Project Management	2011	Yes	If still in use, needs to be updated to align with CS EDSM/MDG
Pavement preservation manual	Manual	Pavement Preservation Program Manager	Road Design	2010	No	Does not reference CS Policy; update to clarify how/when CS to be implemented in major and minor rehabilitation projects
DOTD Hydraulics Manual	Manual	Hydraulics Engineer Administrator	Resources	2011	Yes	Does not reference CS policy; consider updating

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
DOTD Sign Manual	Manual			2020	No	Not Applicable to non-interstate routes: Investigate whether alternative policy document exists?
Plan-in-Hand Checklist (Road)	Form	Road Design Engineer Administrator	Road Design		Yes	Not publicly available; provided via email. Revision date unknown. Asks "will sidewalks, lighting, or bike paths be required? If yes, has a maintenance/liability agreement been started?"
Pre-Design Conference Form	Form	Road Design Engineer Administrator	Road Design	2021	Yes	Complete Streets reference as item on form (along with access management, access control)
TAP Application	Form	TAP Program Manager	Project Management	2020	Yes	Updated to include Complete Streets section
SRTPP Application	Form	Highway Safety Administrator	Highway Safety	2021	Yes	Updated to include Complete Streets section
Design Exception Form	Form	Road Design Engineer Administrator	Road Design	2018	Yes	Updated to include Complete Streets item
Road Design 100% Preliminary Plans QA/QC	Form	Road Design Engineer Administrator	Road Design	2013	No	Does not reference CS policy; consider updating
Road Design Final Plans QA/QC	Form	Road Design Engineer Administrator	Road Design	2019	No	Updated, with some reference to pedestrian and bicycle accommodation but no explicit policy compliance function
Stage 0 Checklist	Form	Transportation Planning Administrator	Transportation Planning	2012	Yes	Updated to include Complete Streets section
Stage 0 Environmental Checklist	Form	Environmental Engineer Administrator	Environmental	2011	No	Does not reference CS policy but has implications for bike/ped design, consider updating

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
Plan Constructability Review Form	Form	Road Design Engineer Administrator	Road Design	2016	Yes	Updated, with some reference to pedestrian and bicycle accommodation
Plan-in-Hand Checklist (Bridge)	Form	Bridge Design Engineer Administrator	Bridge Design	2001	No	No reference to pedestrians or bicyclists
Design Report Form	Form	Road Design Engineer Administrator	Road Design	2021	Yes	Updated to include distinction of exempt projects; Includes reference to Complete Streets Policy and elements.
Traffic Engineering Process and Report	Form	Traffic Engineering Division Administrator	Traffic Engineering Management		No	Suite of documents and guidelines pertaining to traffic analysis; no reference to Complete Streets Policy or pedestrian/bicycle volumes; consider updating
EDSM II.2.1.14 Complete Streets	EDSM	Chief Engineer	Management	2016	Yes	Reflects Complete Streets Policy
EDSM IV.1.1.6 Maintenance Agreements with Municipalities	EDSM	Chief Engineer	Contract Services	N/A	N/A	Deleted in 2019
EDSM VI.1.1.5 Roundabout	EDSM	Chief Engineer	Traffic Engineering Management	N/A	N/A	Deleted in 2019
Rumble Strip EDSM	EDSM			N/A	N/A	Proposed – no EDSM identified (addressed via standard plans)
EDSM II.3.1.3 Guard Rail	EDSM	Chief Engineer	Bridge Design	2018	Yes	To be reviewed for Complete Streets, per 2018 Legislative Report
EDSM II.3.1.4 Guardrail, Other Bridge Rail End Treatment, Curbs and Sidewalks on Urban Bridges	EDSM	Chief Engineer	Bridge Design	2018	Yes	To be reviewed for Complete Streets, per 2018 Legislative Report

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
EDSM II.2.1.7 – Curb Policy	EDSM	Chief Engineer	Road Design	N/A	Yes	This EDSM was deleted. The information is now found in the Road Design Manual in Chapter 5 Cross Section Elements.
EDSM II.2.1.10 – Requirements for Construction of Pedestrian Facilities	EDSM	Chief Engineer	Road Design	N/A	Yes	This EDSM was deleted. The information is now found in the Road Design Manual in Chapter 5 Cross Section Elements
EDSM VI.3.1.2 Flashing beacons and LED flashing signs	EDSM	Chief Engineer		2016	No	Recently added; does not directly reference complete streets or related considerations
EDSM VI.1.1.1 Establishment of Speed Zones	EDSM	Chief Engineer	Traffic Engineering Management	2014	No	No reference to complete streets considerations, consider updating
EDSM IV.2.1.4 Multi-lane Roadways and Median Openings	EDSM	Chief Engineer	Traffic Engineering Management	2014	Yes	No reference to complete streets considerations, consider updating
EDSM 1.1.1.11 Data for design of pavement rehabilitation/replacement projects	EDSM	Chief Engineer	Road Design	2013	Yes	No reference to complete streets considerations, consider updating. Potential use as a means to improve data quality and availability
EDSM vi.1.1.8 Transportation Management Plans (TMP)	EDSM	Chief Engineer	Transportation Planning	2012	No	No reference to complete streets considerations, consider updating
EDSM IV.3.1.3 Sidewalks in Highway ROW by Permit	EDSM	Chief Engineer	Road Design	1992	No	Contains language constraining sidewalk construction in direct conflict with CS policy
EDSM III.1.1.23 Development of a Traffic Control Plan	EDSM	Chief Engineer	Traffic Engineering Management	1990	No	No reference to complete streets considerations, consider updating
EDSM II.2.1.12 – Pavement Structure Design	EDSM	Chief Engineer	Road Design	1983	No	No reference to complete streets considerations, consider updating. Could be inappropriately applied to bike/ped projects, increasing cost and reducing efficiency

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
EDSM 11.2.1.2 Construction of At-Grade Railroad-Highway Crossings	EDSM	Chief Engineer	Road Design	1979	No	No reference to complete streets considerations, consider updating
EDSM II.2.1.9 Lighting of Roadway & Structures and Decorative Lighting of State Bridges	EDSM	Chief Engineer		2019	No	Further review of design guide referenced is needed
EDSM I.3.1.2 Review of Bids received for Construction Projects	EDSM	Chief Engineer		2017	No	No reference to complete streets considerations, consider updating to promote contractor training/capacity building
EDSM IV.1.1.9. ACCESS MANAGEMENT AND PUBLIC INVOLVEMENT	EDSM	Chief Engineer		2015	No	No reference to complete streets considerations, consider reviewing to evaluate complete streets implications
Signal standard plans (TSD-00 through TSD – 13)	Plans & Specs	Traffic Controls Engineer Manager	Development	2017		Updated; includes guidance for pedestrian countdown signals and push buttons but no reference to bicycle counts, detection, or signals
Driveway standard plans (DW-01, DW-02)	Plans & Specs	Road Design Engineer Administrator	Road Design	2017	No	No explicit reference to Complete Streets Policy or elements
Pavement marking plans (PM-01 – PM08)	Plans & Specs	Road Design Engineer Administrator	Road Design	2019	Yes	Updated, includes bike symbol markings, crosswalk and bike marking guidance
Standard plans for Temporary Traffic control (TTC-00 – TTC-19)	Plans & Specs	Road Design Engineer Administrator		2018	Yes	Updated; includes new guidance for pedestrian accommodation, but no guidance for accommodation of on-street bicyclists
PED-01	Plans & Specs	Road Design Engineer Administrator	Road Design	2019	Yes	Updated; Includes reference to Complete Streets Policy and elements
Rumble Strip Standard Plans	Plans & Specs			2017	Yes	Updated; provides guidance for minimizing bicyclist impacts

Name	Type	Owner	Section	Year updated	Complete Streets Policy Alignment	Notes
DOTD Road Design Guidelines (i.e., Minimum Design Guidelines)	Plans & Specs	Traffic Engineering Division Administrator	Traffic Engineering Management	2017	Yes	Updated to align with CS EDSM; Includes reference to Complete Streets Policy and elements. Does not provide facility selection guidance based on functional class/ADT/Speed as per national best practice; limited differentiation between acceptable and preferred values
Standard Specifications for Roads and Bridges (LSSRB Purple Book)	Plans & Specs	Specifications and Standards Engineer	Systems	2016	Yes	Unclear if this is redundant with standard plans as website appears to only include out-of-date version?

Appendix C: Stakeholder Survey Results

Respondents

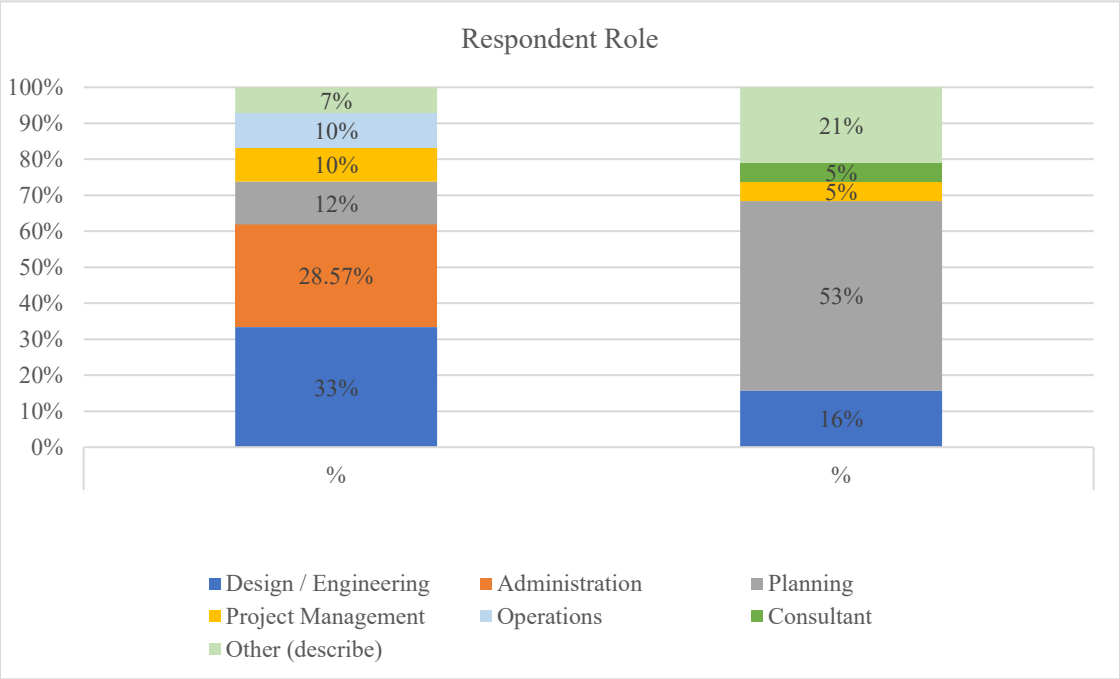
A total of 60 individuals substantively completed this survey, including 40 DOTD (i.e., "internal") personnel and 20 non-DOTD (i.e., "external") personnel. The majority of DOTD responses came from the Office of Engineering and District administrators and relatively few responses resulted from the Office of Planning (including one response from the Safety Section and four responses from Transportation Planning). No responses were received from DOTD Districts 04 or 61. Non-DOTD responses were dominated by CSAC members representing a variety of organizations, working in or directly with local or state governments. Table 14 indicates the overall distribution of internal and external survey respondents, including the proportional share of DOTD respondents by section.

Table 14. Organizational affiliation of respondents

Affiliation	No. of respondents	Percentage of respondents
DOTD	**40**	
Office of Planning	5	13%
Office of Engineering	19	48%
Office of Operations (DOTD HQ)	2	5%
District Offices	14	35%
Other	2	5%
Non-DOTD	**20**	
Other State Agency (specify)	3	15%
FHWA	1	5%
MPO or other Regional entity	3	15%
Parish or Municipal Government	2	10%
Non-governmental stakeholder: Consultant/Private Sector	7	35%
Non-governmental stakeholder: Advocate/Non-Profit Organization	2	10%
Other (specify)	1	5%

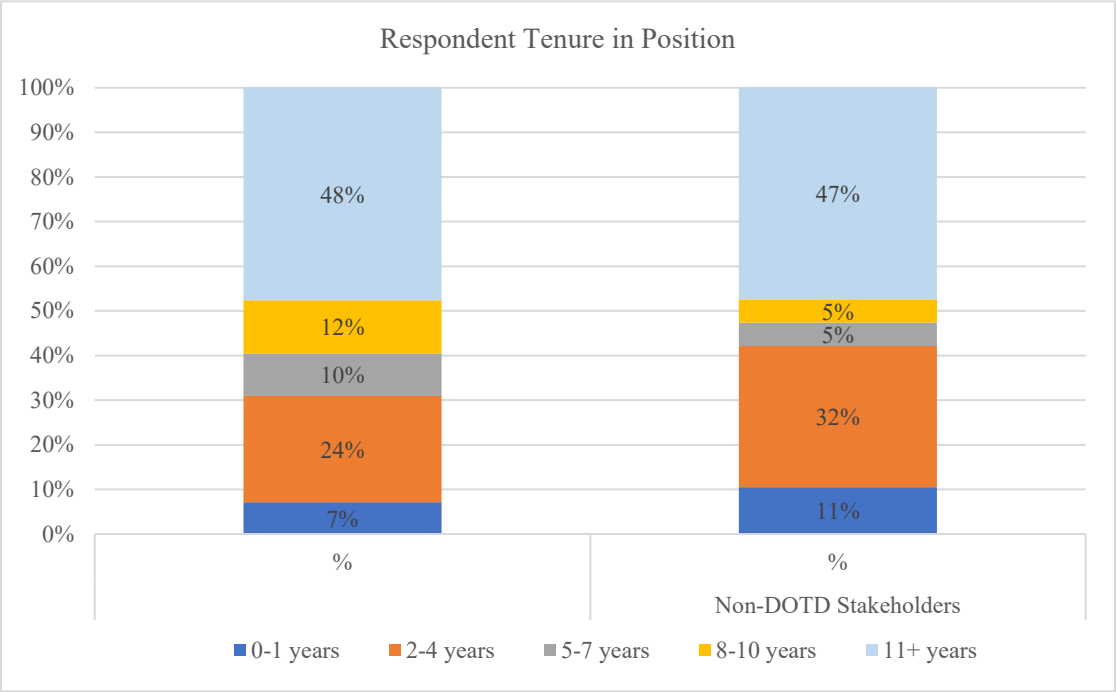
Regarding job responsibility, DOTD respondents primarily consisted of designers, engineers, or administrators, while the largest share of non-DOTD respondents identified as planners (Figure 8).

Figure 8. Respondent role



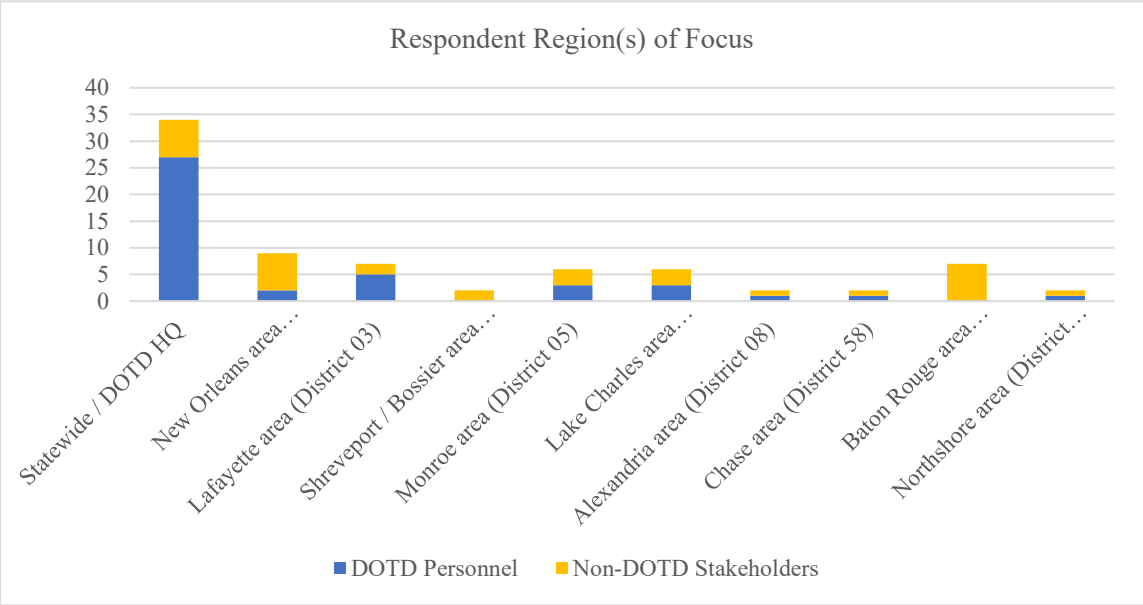
Long tenures in current or similar positions among DOTD personnel were reported (Figure 9). This likely reflects that the survey was distributed directly to department leads and indicates that it may not have been broadly shared among junior staff. Additional research is recommended to identify the extent to which Complete Streets-related training is integrated into engineering curriculums and whether incoming DOTD staff are arriving at DOTD with relevant expertise in pedestrian, bicycle, and transit planning and design.

Figure 9. Respondent tenure in position



Most areas of the state were at least nominally represented among survey respondents, and the bulk of DOTD respondents work at the Baton Rouge headquarters and manage projects across the state (Figure 10). Additional outreach is needed for District offices in the future, especially northwest Louisiana in particular, to better understand the specific barriers and opportunities for policy implementation by region. Non-DOTD stakeholder respondents were clustered in New Orleans and Baton Rouge, but several of them report that they work in multiple areas of the state.

Figure 10. Respondent region(s) of focus



Complete Streets Policy Familiarity and Comprehension

The survey included a series of questions to gauge the familiarity of non-DOTD and DOTD stakeholders with the Policy overall, its specific objectives and exemptions, and perceived or observed implementation actions taken by DOTD over the last 10 years.

Overall, over half of DOTD personnel reported being either “extremely” or “very” familiar with the Policy, with a small minority reporting an overall lack of familiarity (Table 15). Self-reported familiarity is strongest within the Office of Engineering, suggesting confidence among respondents (with an average familiarity score of 4.1 – Very Familiar). The extent to which this confidence is demonstrably reflected in how Complete Streets design concepts have been integrated into routine business at this level requires further investigation. Among the (relatively few) respondents from the Planning section, a relative lack of familiarity is noted (average familiarity score of 3.6). Although drawn from a small sample which may not be representative of the section overall, this result may cause a concern as this section’s work is fundamental to successfully planning and scoping projects which meet the needs of all road users, indicating an area of opportunity for future training and outreach. Similarly, responses were mixed among respondents from the Office of Operations and among District offices, with one respondent indicating a complete lack of familiarity with the Policy. Among non-DOTD stakeholders, policy familiarity was much stronger with all but one respondent indicating they are “extremely” or “very” familiar with the Policy and an average familiarity score of 4.6. This is unsurprising given

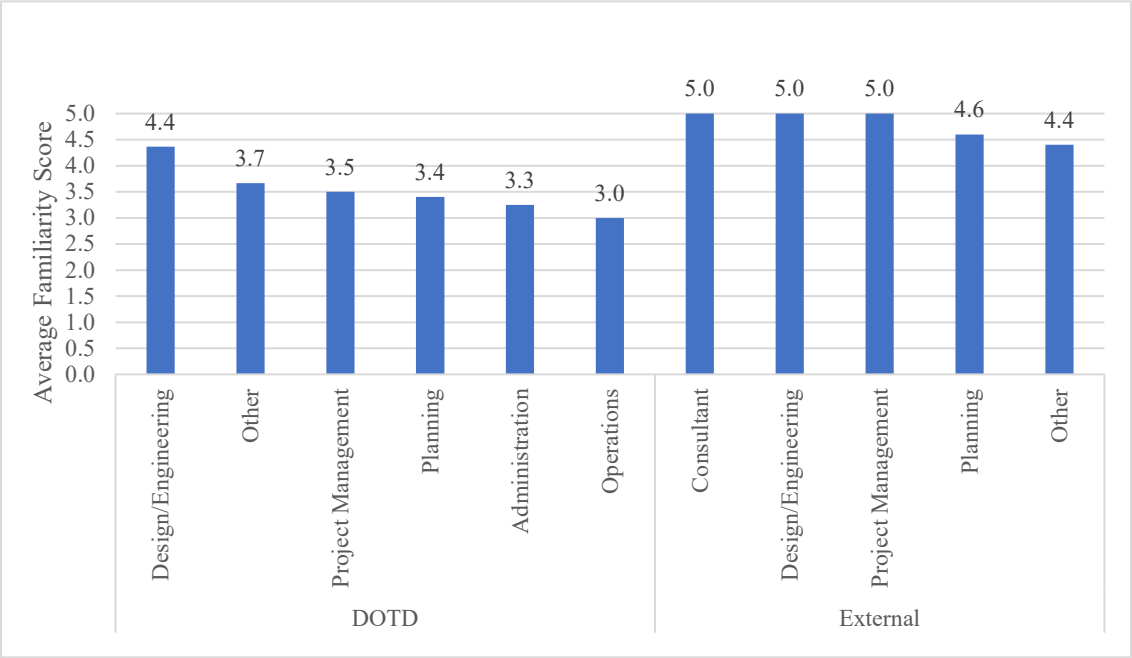
that most respondents are members of the Complete Streets Advisory Council, who are active in this topic. Their perspectives were solicited not to gauge policy comprehension but to provide insight into experiences working with DOTD from their respective roles.

Table 15. Complete Streets Policy familiarity by organizational affiliation

	Extremely familiar (5)		Very familiar (4)		Moderately familiar (3)		Slightly familiar (2)		Not familiar at all (1)		*Average Familiarity Score*
	#		#		#		#		#		
DOTD	**9**	**23%**	**13**	**33%**	**12**	**30%**	**5**	**13%**	**1**	**3%**	***3.6***
Office of Planning	0	0%	3	60%	2	40%	0	0%	0	0%	*3.6*
Office of Engineering	6	33%	8	44%	4	22%	0	0%	0	0%	*4.1*
Office of Operations (DOTD HQ)	0	0%	1	33%	1	33%	1	33%		0%	*3.0*
District Offices	3	23%	0	0%	5	38%	4	31%	1	8%	*3.0*
Other	0	0%	1	100%	0	0%	0	0%	0	0%	*4.0*
Non-DOTD Stakeholders	**14**	**70%**	**4**	**20%**	**2**	**10%**	**0**	**0%**	**0**	**0%**	***4.6***

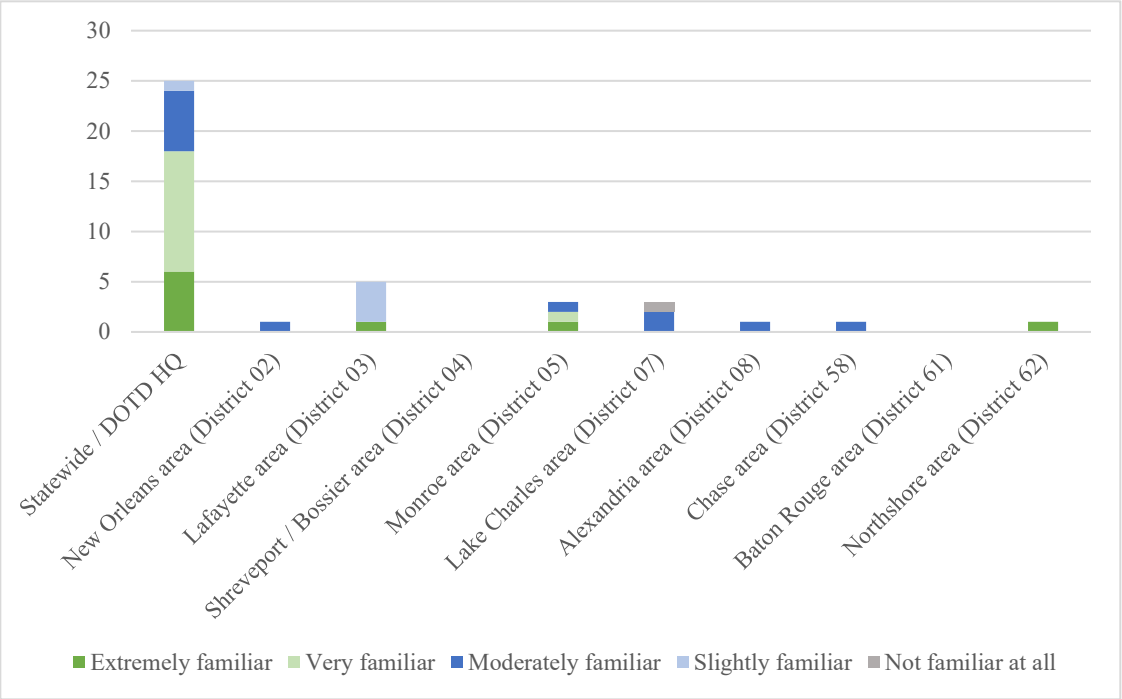
Surprisingly, DOTD personnel who describe their professional role as planning reported being less likely to be familiar with policy than several other roles (average familiarity score of 3.4). Administrators are generally very or moderately familiar with the Policy (average familiarity score 3.3). DOTD staff in a design or engineering role report the highest familiarity, with an average score of 4.4 (Figure 11). The results suggest that designers/engineers who opted to take this survey are confident in their understanding of the Policy. However, it is important to note that this survey sample is limited and self-selected. Lower levels of self-reported familiarity with the Policy in other sections indicate opportunities for further outreach and inquiry to identify where future policy training efforts will be most impactful.

Figure 11. Familiarity with Complete Streets Policy by professional role



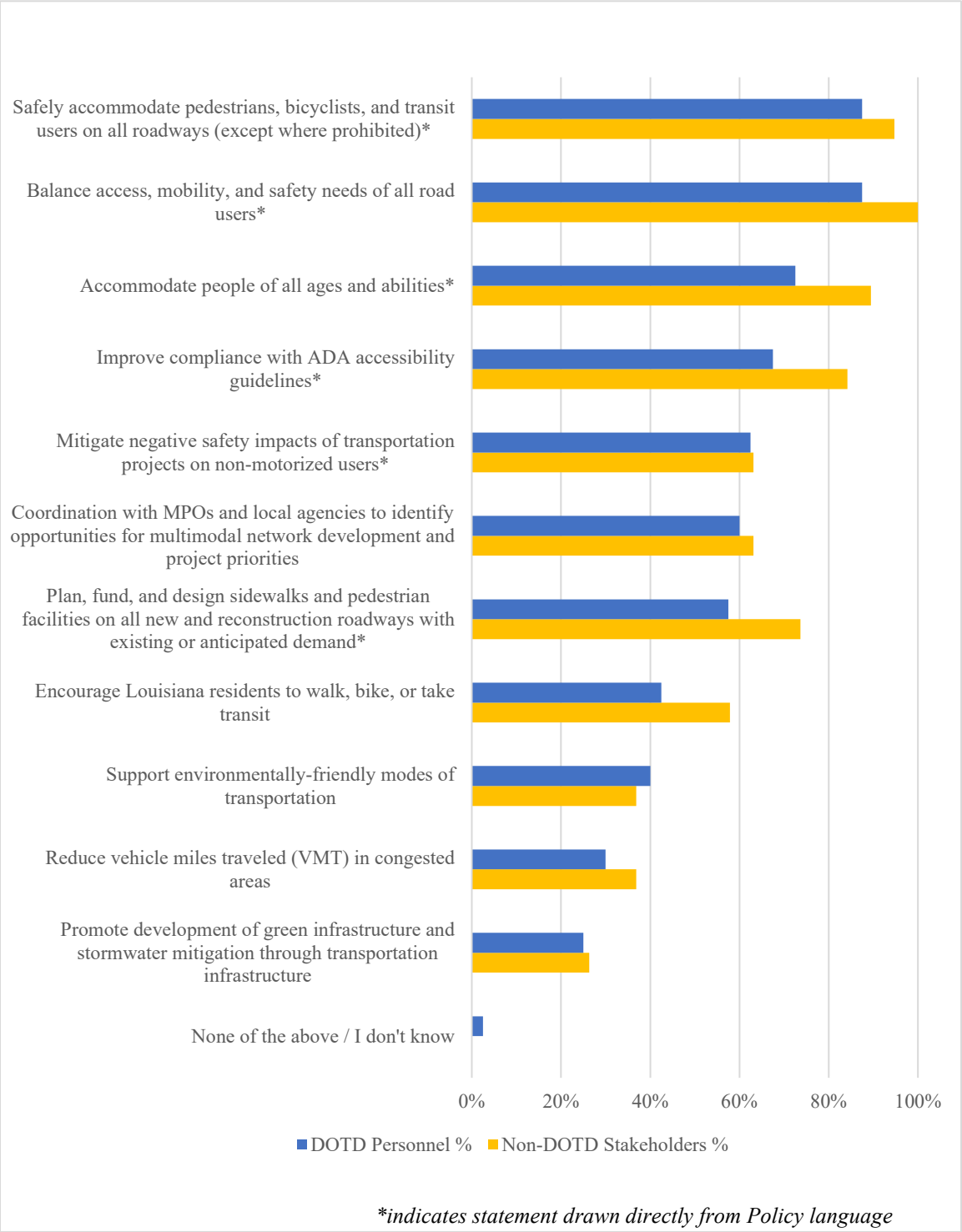
Among DOTD respondents, limited results inhibit clear conclusions about the degree to which policy familiarity varies across regions of the state, but overall a need for additional District outreach is suggested, particularly to regions where few survey responses were submitted. Limited responses were received from New Orleans and Baton Rouge, the state's largest urban areas which arguably have the broadest experience directly implementing Complete Streets. A high degree of familiarity was indicated in the Monroe area; additional research is recommended to understand what has led to enhanced policy diffusion in this region (Figure 12). Non-DOTD stakeholders were excluded from this analysis since policy familiarity reported is relatively uniform, not all regions are directly represented, and many respondents reported work in multiple regions or statewide.

Figure 12. Familiarity with Complete Streets Policy by primary region of activity



Respondents were also asked, "In your understanding, what are the objectives of DOTD's Complete Streets Policy?" in order to understand the extent to which the language of the Policy is reflective of personnel's perceptions of its scope and applicability. Most respondents correctly identified six statements which were directly drawn from policy language. Notably, some DOTD personnel also understand the Policy's intent to include encouraging active transportation, promoting environmental goals, and/or reducing statewide VMT despite the fact that none of these are present in Policy language. Coordination with MPOs and local agencies is implied, but not explicitly stated in the Policy (Figure 13). Although DOTD's policy goals as-written are constrained to specific language around safety, mobility, and access, other jurisdictions in and outside Louisiana have linked additional objectives to Complete Streets, such as goals for increased use of active modes of transportation and decreased congestion (both of which were more likely to be identified by non-DOTD survey respondents as a policy objective than by DOTD staff).

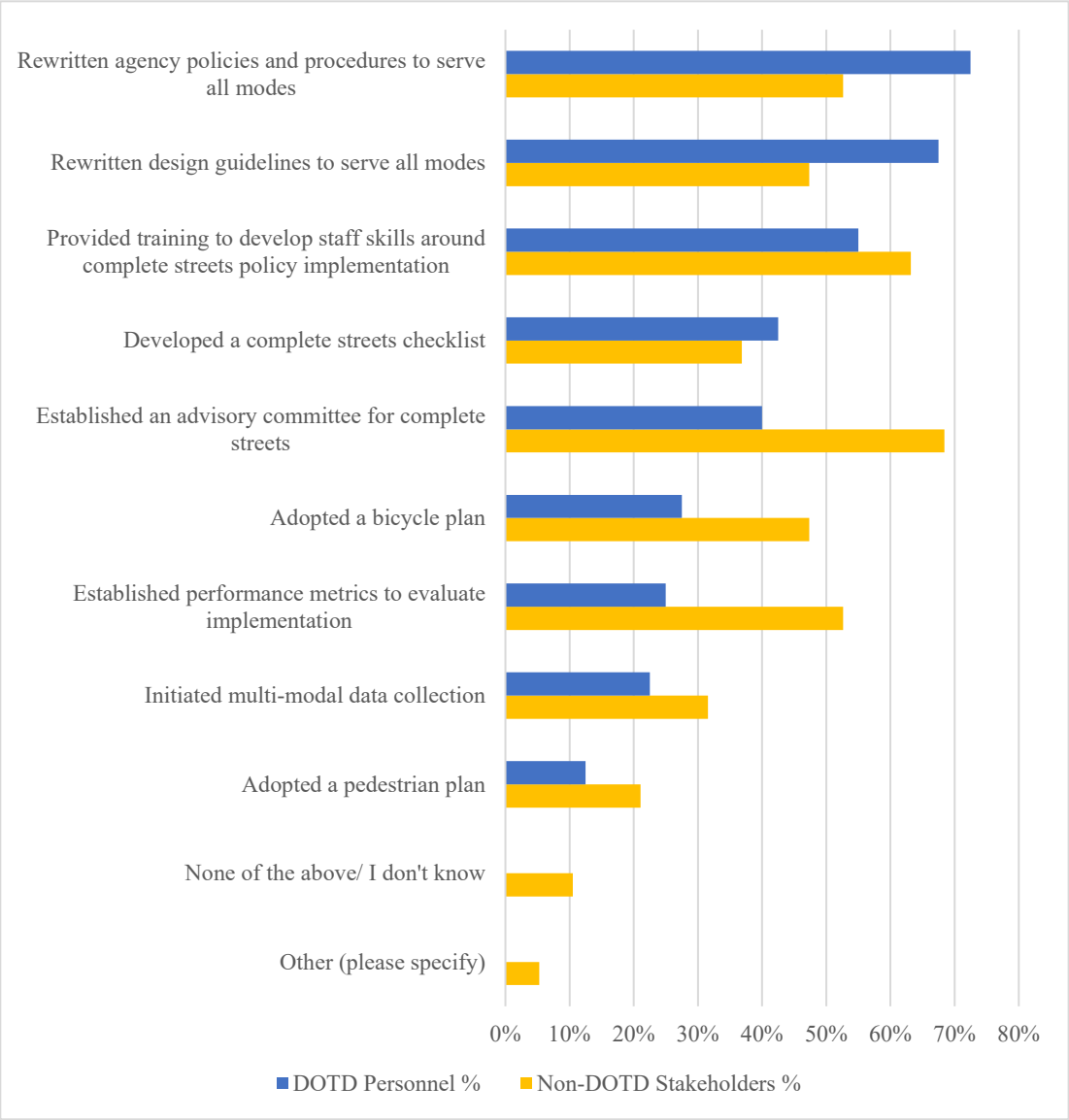
Figure 13. Perceived DOTD Complete Streets Policy objectives



**indicates statement drawn directly from Policy language*

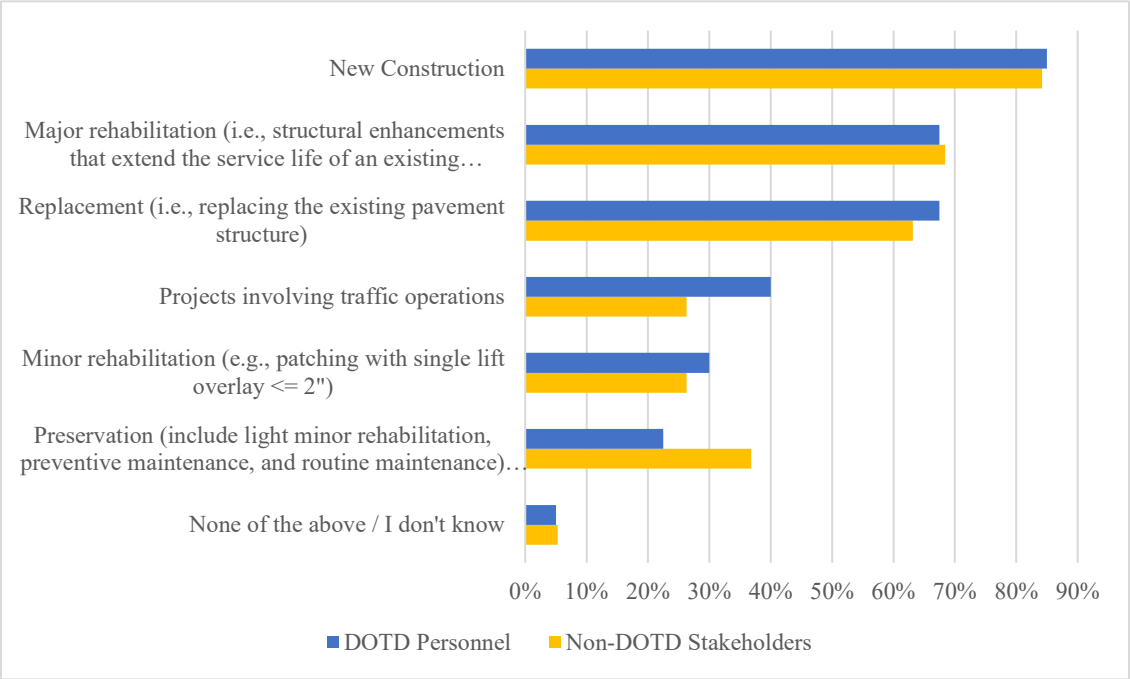
Respondents were also asked to report “What measures has Louisiana DOTD taken that you are aware of in support of Complete Streets or policies that support multi-modal transportation? (Select all that apply).” More than half of DOTD respondents indicated knowledge of rewritten agency policies and procedures, design guidelines, and training. Fewer were aware of checklists, the existence of an advisory committee, or any plans, performance metrics, or data collection activities related to Policy implementation (all of which have been initiated or implemented in recent years) indicating that the results of the Policy are not broadly promoted agency-wide (Figure 14). Among non-DOTD stakeholders (many of whom have been directly involved in these activities through CSAC), awareness of public-facing documents (such as the Statewide Bicycle and Pedestrian Plan and annual Complete Streets Legislative Report) and projects is strong with slightly less understanding of the extent of DOTD internal document revisions.

Figure 14. DOTD Complete Streets implementation actions observed



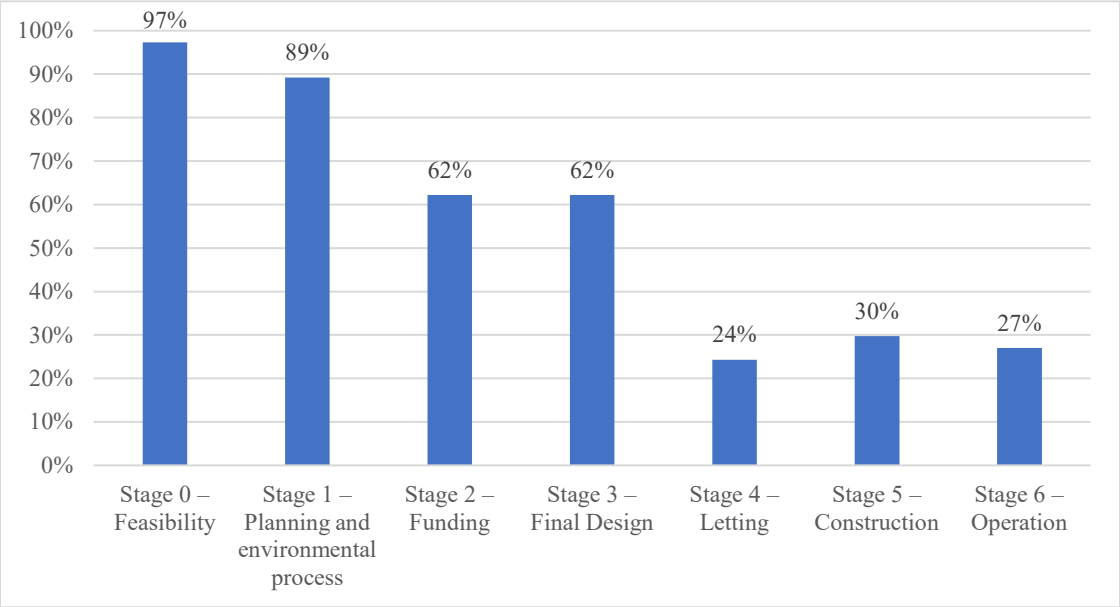
The Complete Streets policy approach is generally intended to apply to all project categories. However, a majority of both DOTD and non-DOTD stakeholders reflect knowledge of the Policy's applicability ("In your understanding, to which of the following does DOTD's Complete Streets policy generally apply?") only to new construction, major rehabilitation, and replacement projects, with less consensus around the applicability of Complete Streets to operations, preservation, and minor rehabilitation projects (Figure 15).

Figure 15. Perceived DOTD Complete Streets Policy applicability: project types



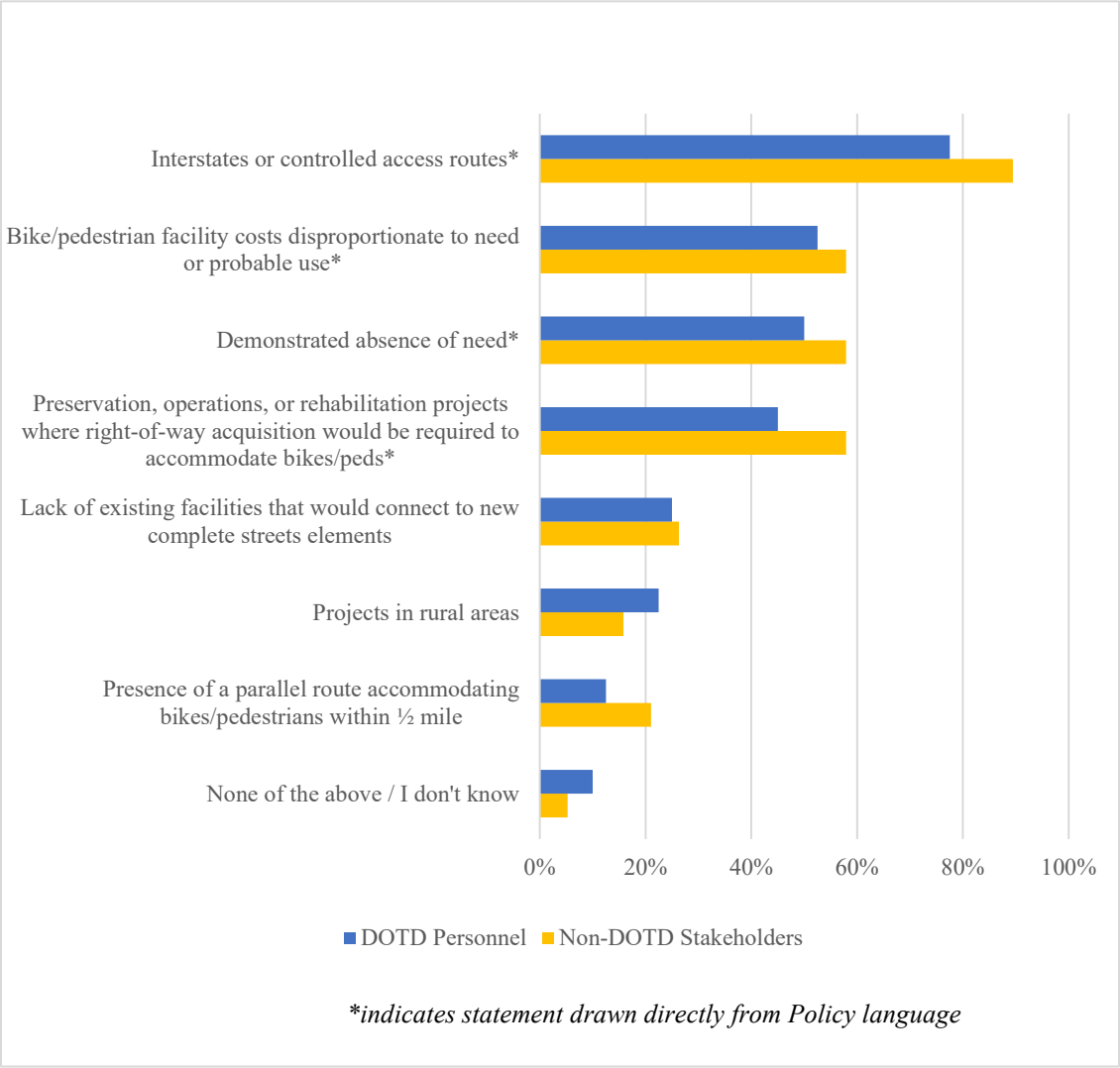
Similarly, the Policy is intended to apply to all stages of project delivery. DOTD personnel report strong awareness of Policy applicability to Stage 0—Feasibility and Stage 1—Planning and Environmental processes, and a majority perceive it to apply to Stage 2—Funding and Stage 3—Final design but fewer recognize Complete Streets applicability to later project stages (letting, construction, operation) possibly indicating a need to provide resources explaining why and how the Policy applies at each stage of project development (Figure 16). For instance, application of Complete Streets policy to project letting typically centers ensuring that contractors awarded work are adequately trained to successfully implement elements of design that accommodate people walking and bicycling. In construction, Policy application may refer to maintaining safe accommodations for people walking and bicycling through or around the construction site. Several of respondents at both the District level and DOTD HQ (accurately) indicated policy applicability to all stages. The commonality among most of these respondents was relatively long tenures and moderate to high familiarity with the policy, suggesting a need for enhanced policy education among newer staff in particular. A few respondents indicated that they understood Complete Streets to be applicable to construction or operation, but not letting. Provision of guidance to clarify the role and obligations of contractors in Policy implementation to ensure that requisite experience and expertise to successfully deliver projects accommodating all modes is recommended.

Figure 16. Perceived DOTD Complete Streets Policy applicability: project stages (Among DOTD staff)



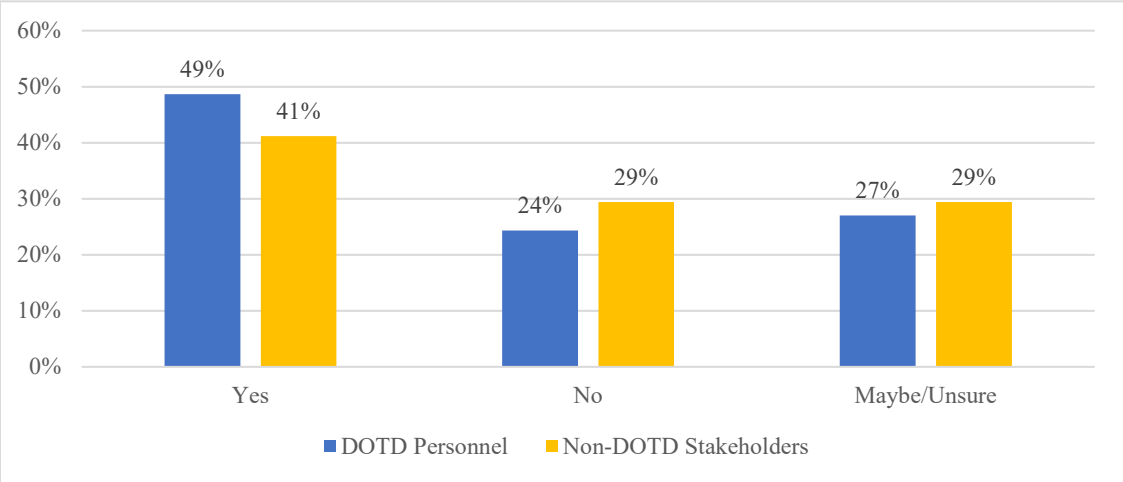
Responses generally indicate alignment with policy language as pertains to policy exemptions although only interstates were indicated a clear majority of respondents as categorical exemptions with less clarity around the role of costs, need, and right-of-way acquisition (Figure 17). Notably, a substantial minority (15-25%) of DOTD respondents indicated a perception that lack of connecting facilities, rural context, or presence of alternative routes constitute valid policy exemptions, indicating a need for additional training and communication to clarify that these factors do not necessarily and in isolation indicate an absence of need.

Figure 17. Perceived DOTD Complete Streets Policy exemptions



Finally, respondents were asked to indicate whether they could identify a primary contact for Complete Streets implementation in their work. Approximately half of DOTD respondents and 40% of non-DOTD respondents indicated in the affirmative with the correct contact name (Figure 18). Fewer respondents indicated familiarity with the "State Pedestrian, Bicycle, and Transit Design Expert" role established in 2020. Most respondents from District offices marked "no" or "unsure" for this question, suggesting an opportunity for outreach to ensure administrators around the state know how to reach support for related questions. Lack of clarity around appropriate DOTD contacts among non-DOTD stakeholders is also an opportunity for increasing awareness.

Figure 18. Primary contact for Complete Streets Policy implementation identified



Complete Streets Support and Implementation

Respondents were asked to score the level of support of various stakeholder groups, with 10 being very strong support and 1 indicating no support at all, in order to identify potential barriers and allies to support policy implementation (Figure 19). DOTD personnel identified elected officials and local elected officials as key gaps in Complete Streets support, whereas non-DOTD stakeholders see DOTD, state officials, and local government departments as primary barriers. Both groups identify advocates and MPOs as strong supporters of the Policy, while non-DOTD stakeholders also link public health organizations to policy support.

A majority of non-DOTD respondents but only about 35% of DOTD respondents indicate that the general public in their region or jurisdiction supports Complete Streets policy and implementation (Figure 20).

Figure 19. Perceived level of support for Complete Streets

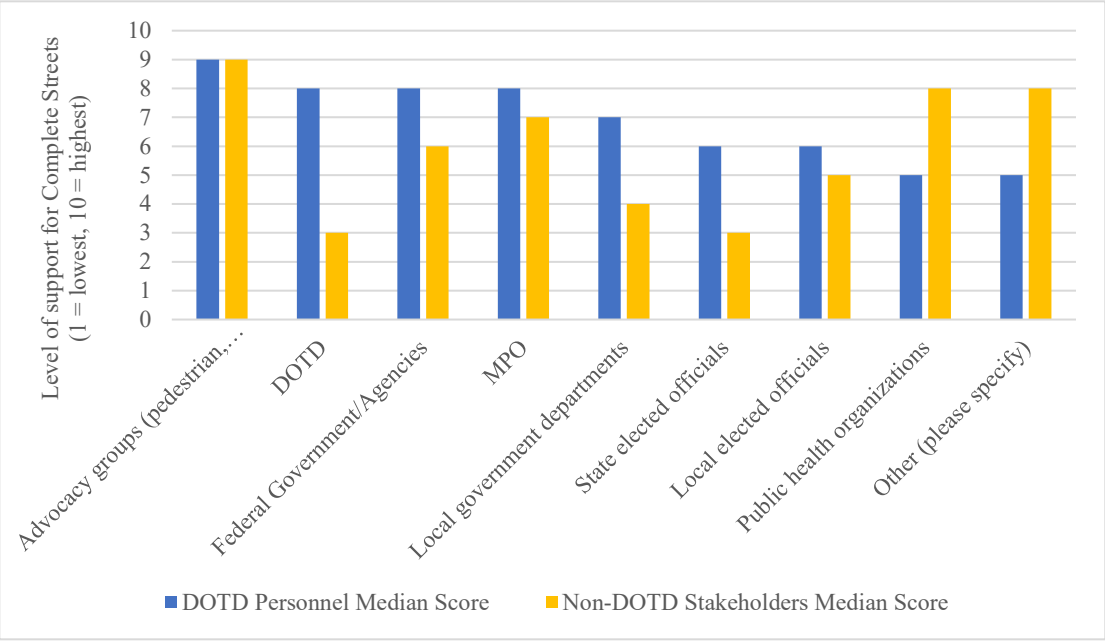
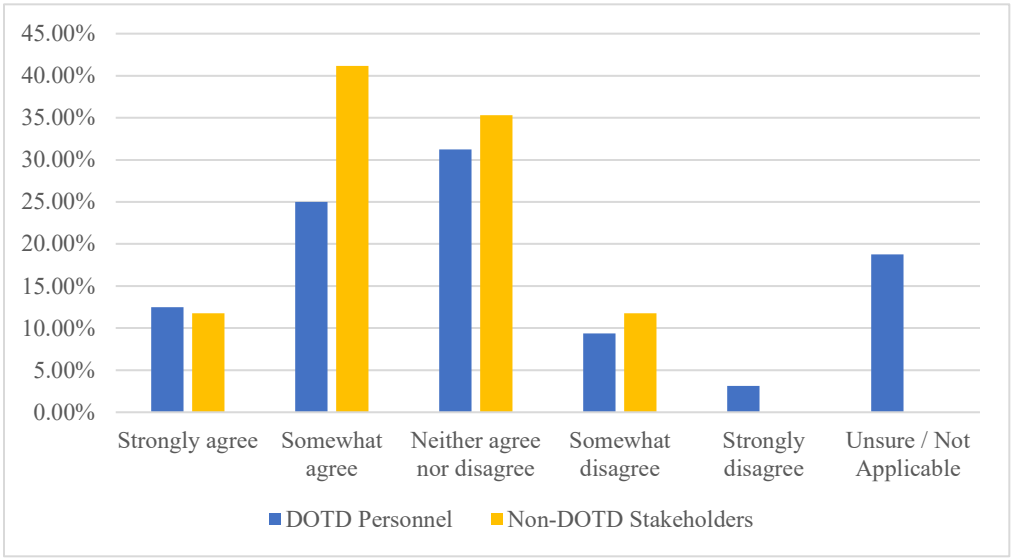
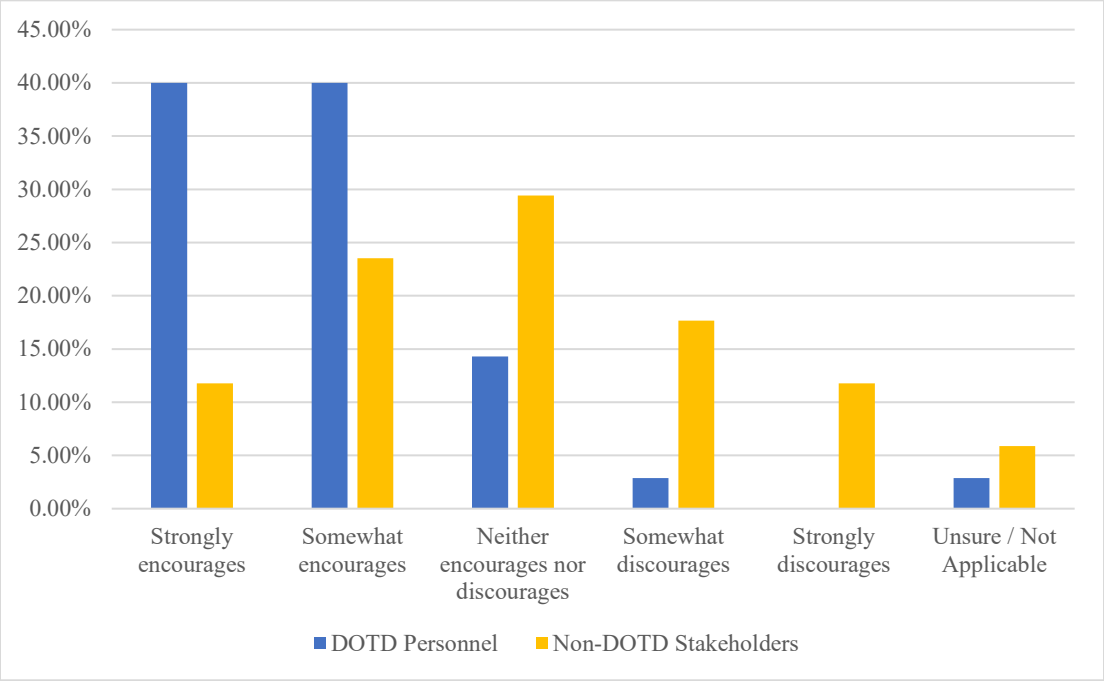


Figure 20. Public support for Complete Streets Policy



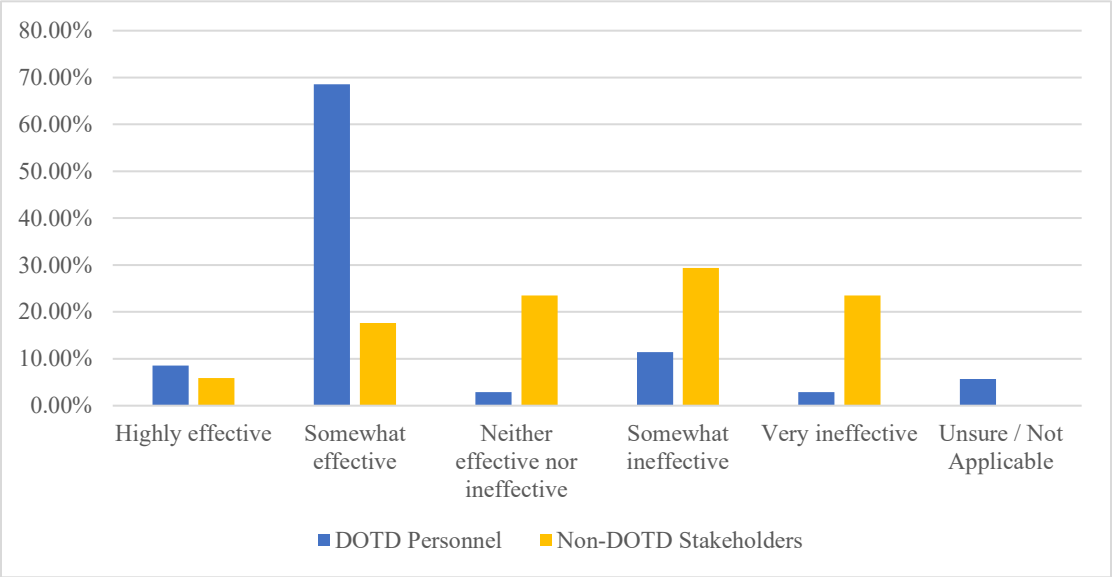
DOTD staff generally sees the agency as very encouraging of Complete Streets overall in terms of project selection and competitive funding award processes, while non-DOTD stakeholders are more critical (Figure 21).

Figure 21. Extent to which DOTD encourages Complete Streets in project selection and competitive funding



Relatedly, both DOTD and non-DOTD stakeholders report that more could be done to solicit local input in project selection and prioritization (with non-DOTD respondents again more likely to be critical) (Figure 22). This finding likely impacts the extent to which local governments are perceived to support Complete Streets and indicates an area of opportunity for future outreach.

Figure 22. Efficacy at soliciting local input in project selection and prioritization



We also sought to understand the extent to which existing planning tools and resources are being utilized as resources to guide Policy implementation. No DOTD personnel reported being more than "moderately" familiar with the DOTD Bicycle and Pedestrian Master Plan, with over 25% not familiar with this resource at all (Figure 23). Relatedly, few report using the plan in their work (Figure 24). This is true even among the small number of respondents in the Planning section. Non-DOTD stakeholders appear to utilize this document more than DOTD staff. This is understandable given that a large share of these respondents are professional planners; whereas, few DOTD respondents reported planning as their primary responsibility. Nonetheless, future plan updates should include development of mechanisms by which to better integrate its output into staff workflows to ensure that a broad base of agency staff is aware of the Plan as a key reference document for Policy implementation.

Figure 23. Familiarity with DOTD Bicycle and Pedestrian Master Plan (2009)

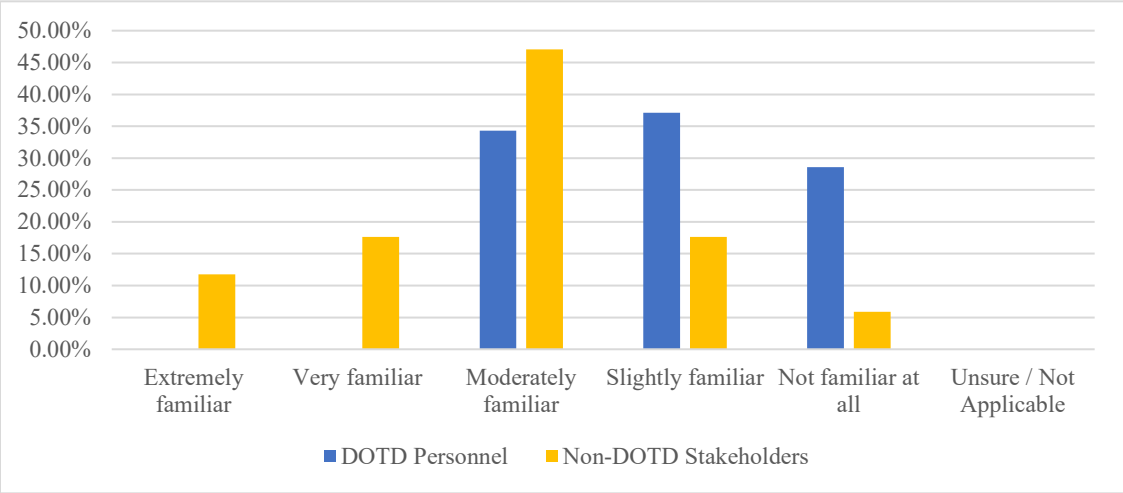
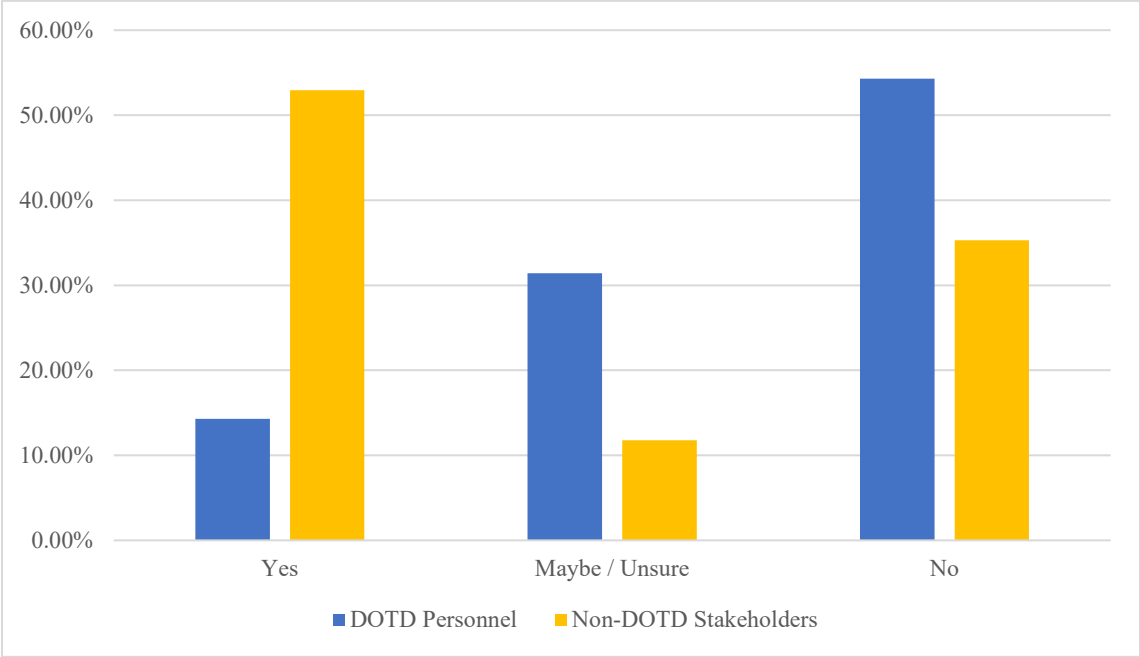


Figure 24. Usage of DOTD Bicycle and Pedestrian Master Plan directly in respondent work



Similarly, despite it being for internal use only, non-DOTD stakeholders report being slightly more aware of the existence of the state's Bicycle Planning Tool than DOTD staff, most of whom are entirely unfamiliar with this tool (Figure 25), and do not use it in their daily work (Figure 26). Future updates to this resource should also include development of guidance and protocols to encourage and facilitate its use, including training on how to use the tool—training on how to design context-sensitive bicycle facilities linked to tool outputs and guidance on how

to use the tool to support project plans or proposals (Figure 27). DOTD respondents also noted that incorporating a Bicycle/Pedestrian Level of Service (LOS) component into project development processes would be useful for ensuring that tool outputs are applied.

Figure 25. Familiarity with DOTD Bicycle Planning Tool

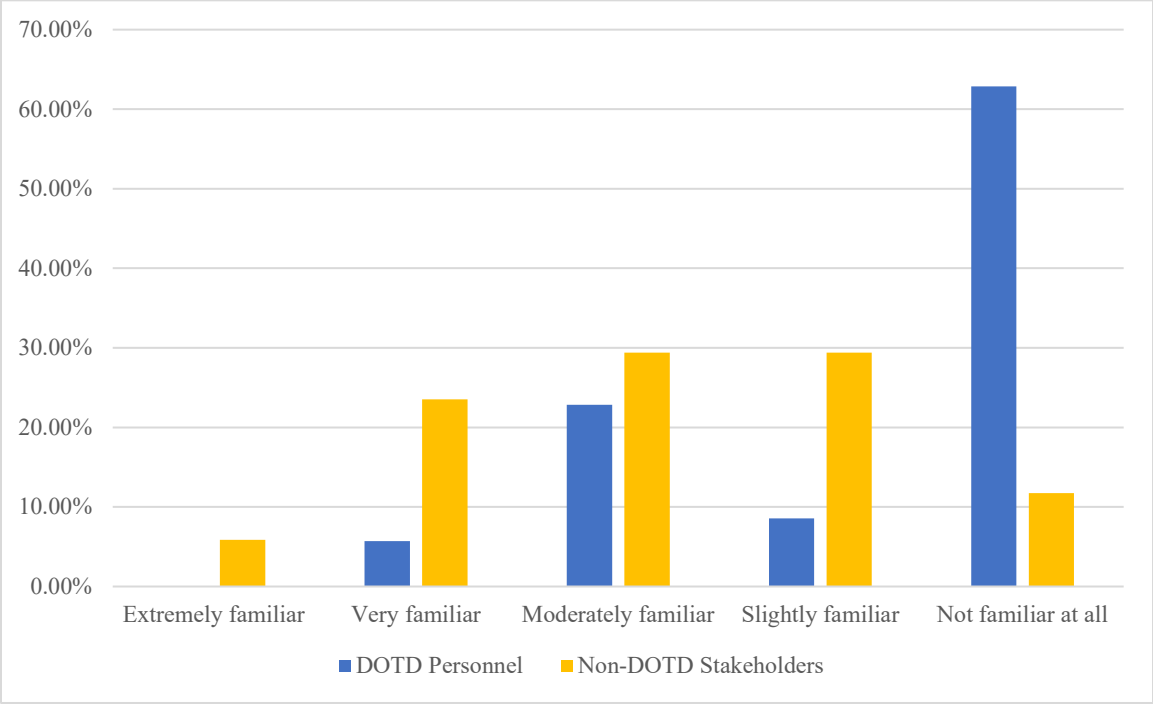


Figure 26. DOTD Bicycle Planning Tool usage in work

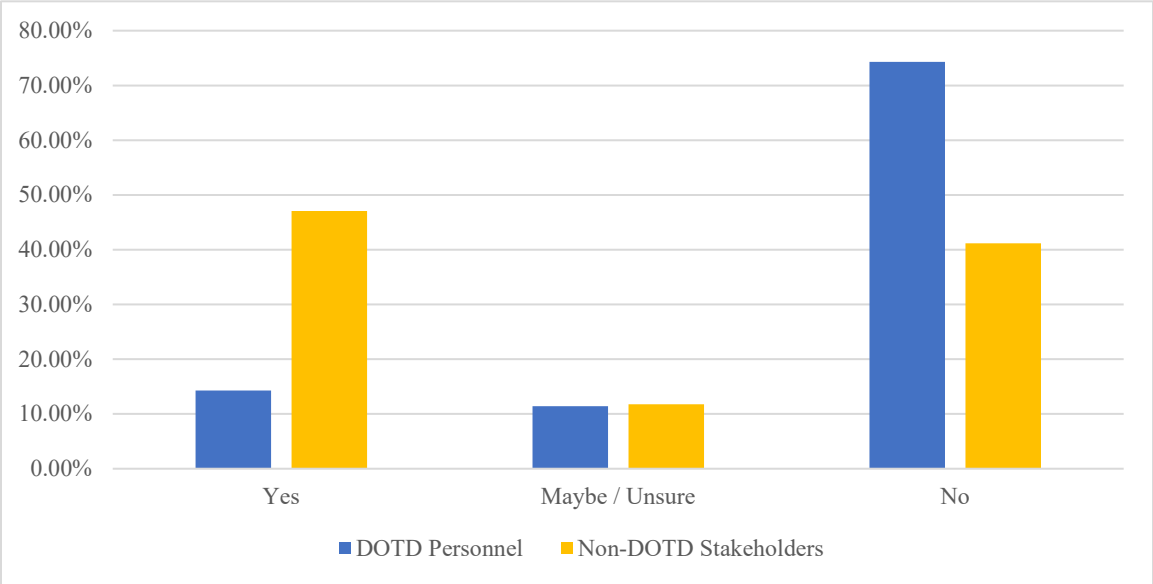
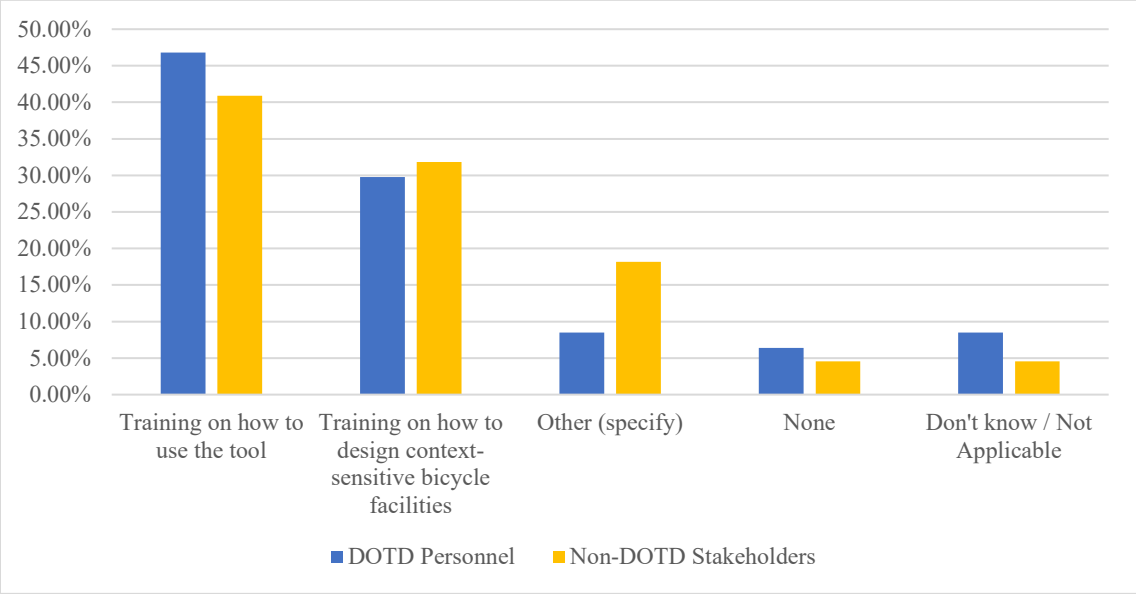
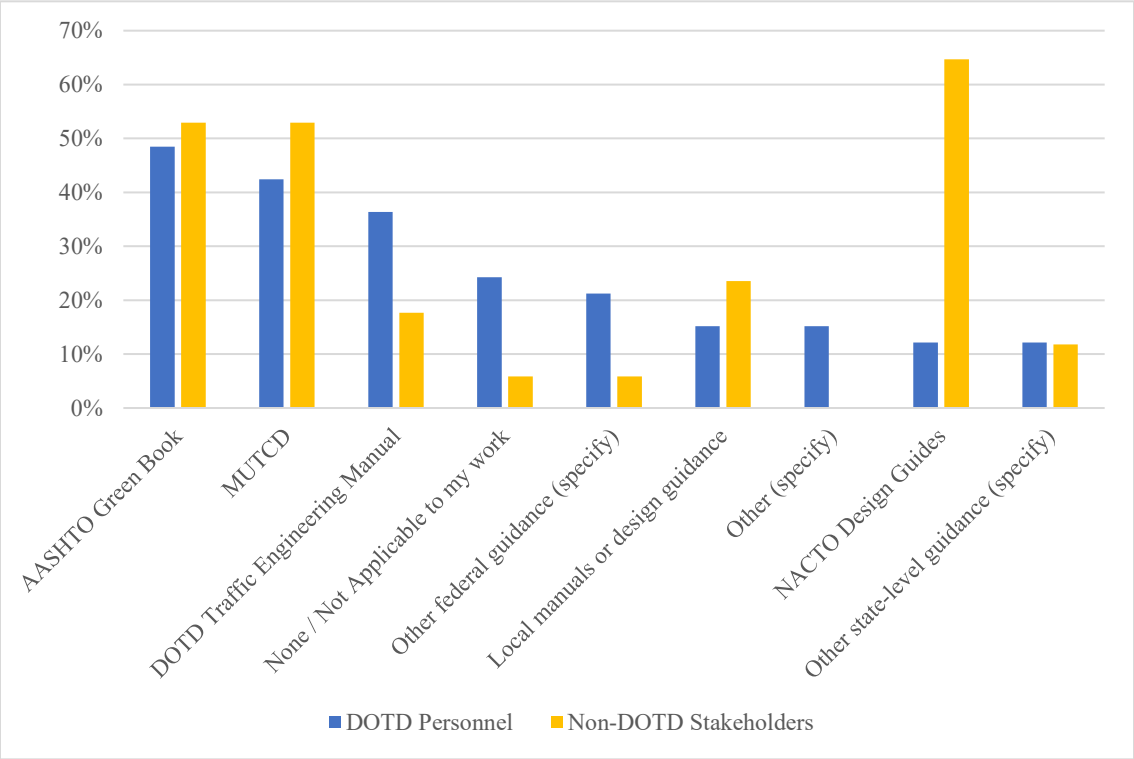


Figure 27. Recommended actions to encourage tool use



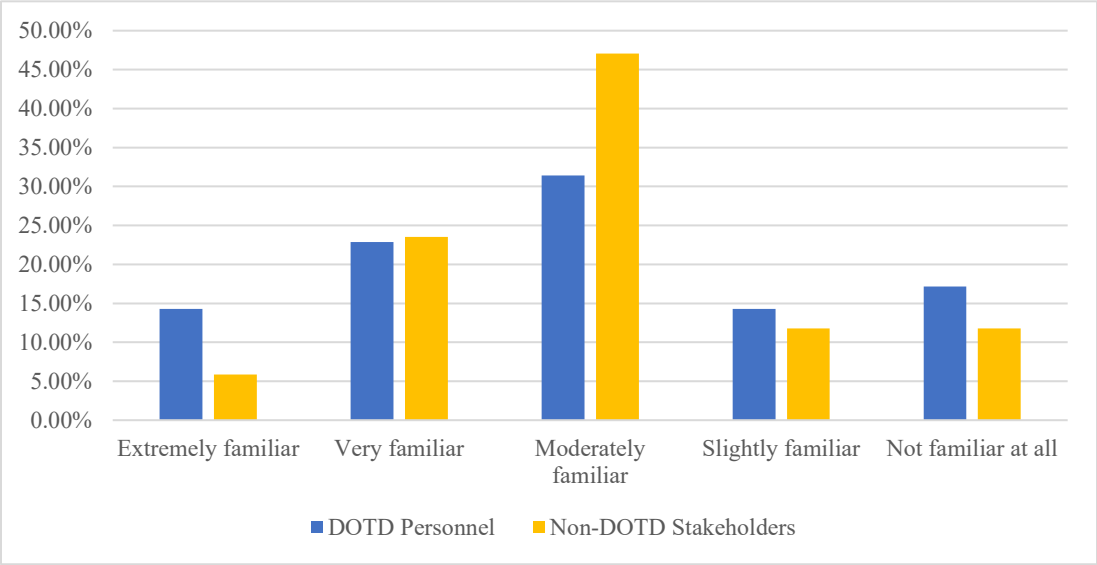
DOTD personnel report that AASHTO and MUTCD manuals are the most critical to Complete Streets work (along with DOTD's Traffic Engineering Manual), while non-DOTD stakeholders reference NACTO (endorsed for use in context-sensitive design by FHWA but not by DOTD) as a leading resource (Figure 28).

Figure 28. Manuals used in Complete Streets work



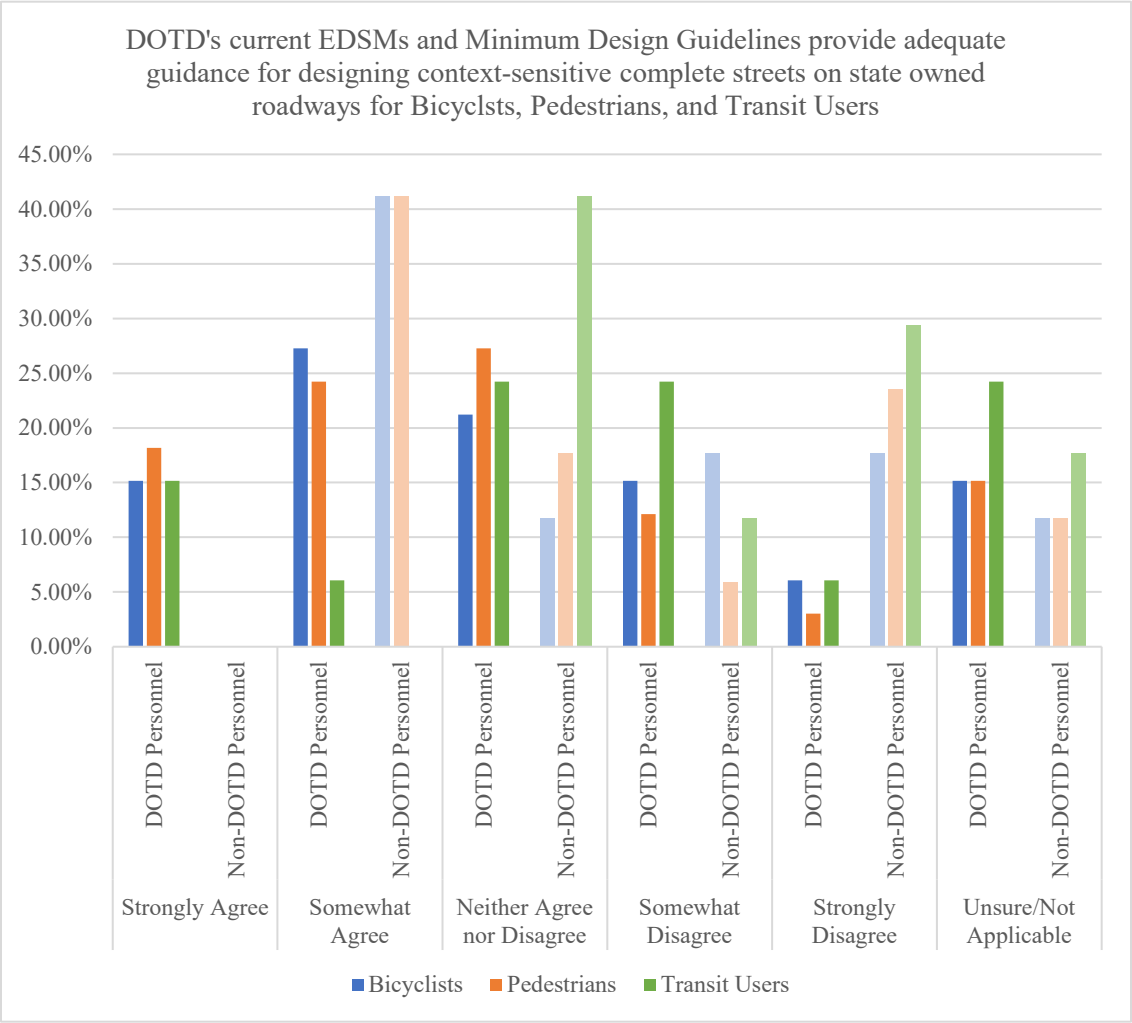
Agency staff awareness of DOTD's Complete Streets EDSM and Minimum Design Guidelines is stronger although a substantial share of DOTD respondents still indicate only limited or no familiarity with these documents, which may relate to the roles of those responding to the survey (e.g., more administrators than designers likely to use these documents in day-to-day work) (Figure 29). This suggests a continued need for broader training for both DOTD and non-DOTD partners about when and how these documents are used and how they pertain to Complete Streets implementation.

Figure 29. Familiarity with DOTD Complete Streets EDSM and Minimum Design Guidelines



Most DOTD respondents indicate that current guidelines are adequate in providing guidance for designing context-sensitive Complete Streets on state-owned roadways for pedestrians and bicyclists. Non-DOTD respondents are more critical overall, with none "strongly agreeing" that current guidelines are sufficient in guiding implementation. Both DOTD and non-DOTD respondents indicate a gap in explicit content pertaining to transit accommodation, with over 30% of DOTD respondents disagreeing that current guidelines adequately address the needs of transit users (Figure 30). More DOTD personnel feel that bicycle accommodations are an issue (21% disagree or strongly disagree that current guidance is adequate) than pedestrian accommodation (15%).

Figure 30. Adequacy of guidance for designing context-sensitive Complete Streets on state owned roadways for bicyclists, pedestrians, and transit users



Both DOTD and non-DOTD respondents indicate a need for more nuanced and flexible guidance for various contexts, as well as more guidance for how to integrate Complete Streets into preservation projects, which constitute a large proportion of DOTD's work (Figure 31). Staff involved in operations or "other" roles in particular indicate a need for guidance on preservation, while planners and project managers prioritize a need for flexibility (Figure 32). Relatively little internal interest is indicated for guidance based on functional class, despite documented safety disparities for people walking and bicycling that are associated with the variables which determine roadway class (i.e., volume and speed). Thus, the utility of using functional class as an input for bikeway selection, in particular [74], and recent national guidance outlining a more nuanced approach to functional classification-based design to better support context-sensitive design [75]. Staff involved in operations indicate an interest in guidance for additional right-of-

way uses, while designers and engineers indicate a priority for guidance based on land use and for additional facility types and roadway geometries. Administrative personnel were most likely to indicate "I Don't Know/Not Applicable" to this question. Non-DOTD stakeholders also indicated a desire for adjustments to current design guidance, such as to facilitate additional types of on-street bikeway protection, to guide lane width reductions where appropriate, to consider existing land use and existing facility context, and, broadly, to more closely align with NACTO guidance (whose *Urban Street Design Guide* and *Urban Bikeway Design Guide* have been officially endorsed by several states[1], including Tennessee, Georgia, Utah, and Virginia), especially in urbanized areas.

[1] https://nacto.org/publication/urban-bikeway-design-guide/endorsement-campaign/

Figure 31. Recommended changes to DOTD design guidance or EDSMs

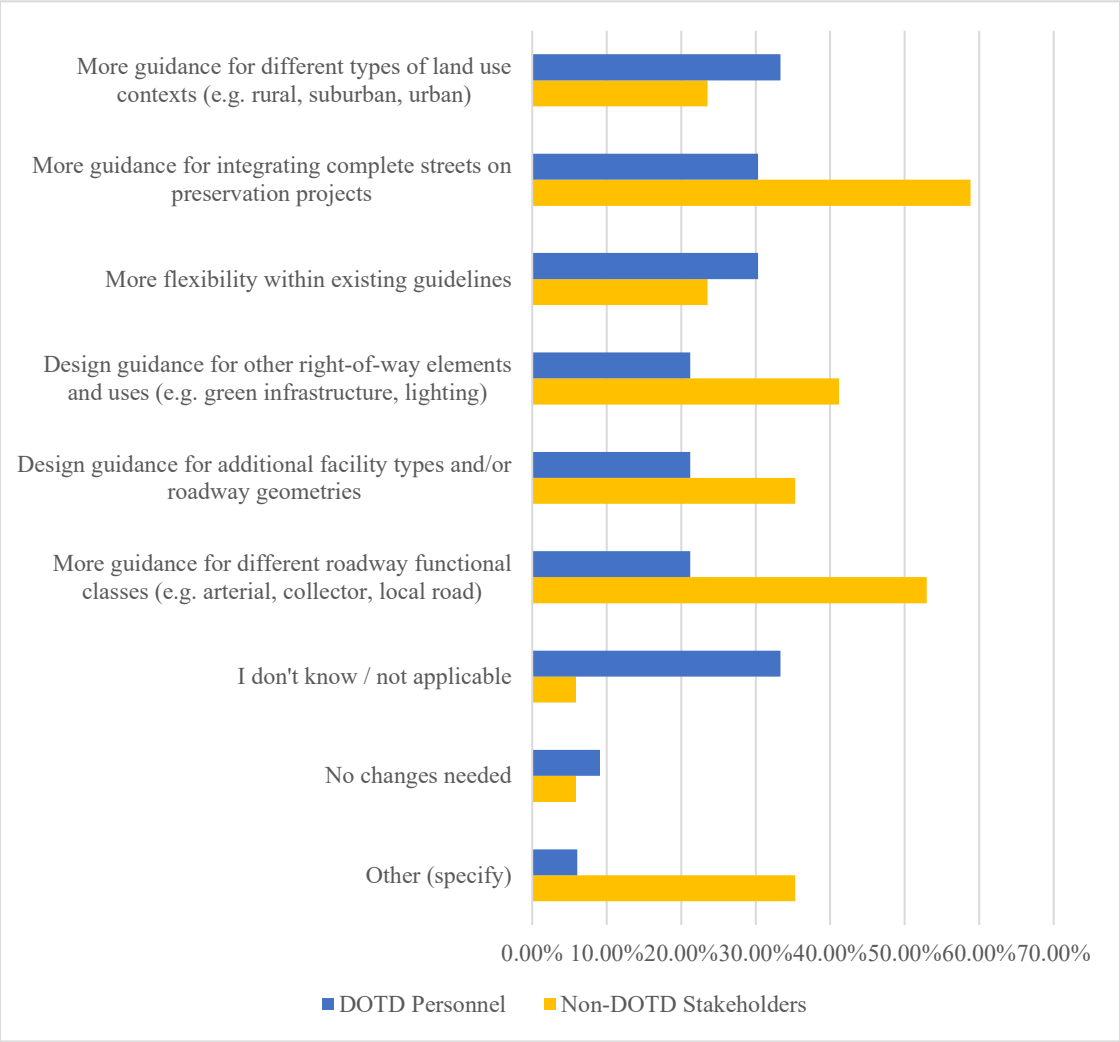
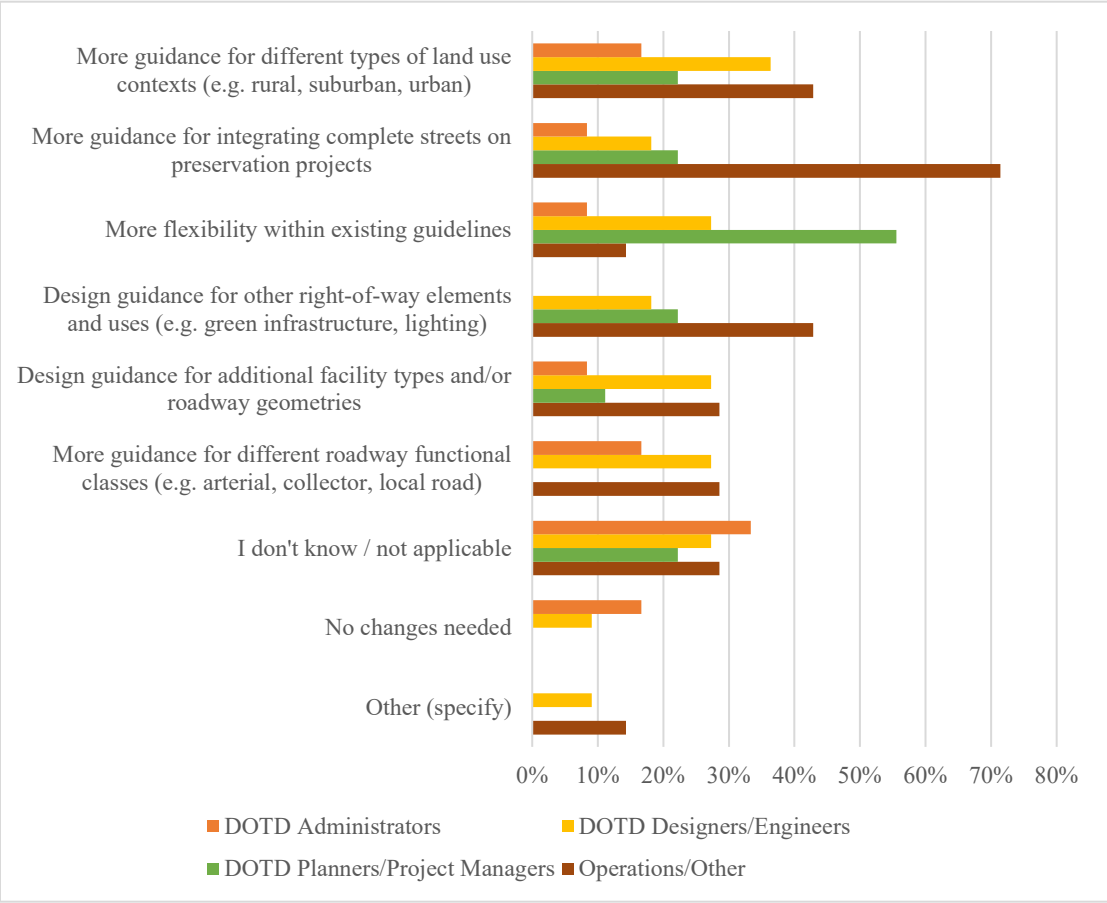


Figure 32. Recommended changes to DOTD design guidance or EDSMs by professional role – DOTD personnel



The majority of respondents indicate some degree of familiarity with the DOTD Complete Streets Implementation Plan (which was circulated in draft form but never finalized) and associated performance metrics (Figure 33), but not strong familiarity. Consequently, few report strong opinions about the extent to which these documents effectively guide implementation and evaluate progress (Figure 34). DOTD personnel noted that they would like to also see tracking of facility development among non-DOTD entities (MPOs, local governments, etc.) and information about spatial distribution (i.e., maps) of facilities each year. Others indicated a need for more detailed crash analysis (e.g., crash types and relationship to various facility types) and benefit-cost analysis of investments that account for facility usage. Non-DOTD respondents called for an analysis of potential ROW available for non-motorized use (including utility corridors), more detailed breakdowns of improvements by project/element type, tracking of local Complete Streets policies and design manuals, reporting analysis of policy exemptions, and revisions to traffic engineering manuals to reflect Policy goals.

Figure 33. Familiarity with DOTD Complete Streets implementation plan and performance measurement

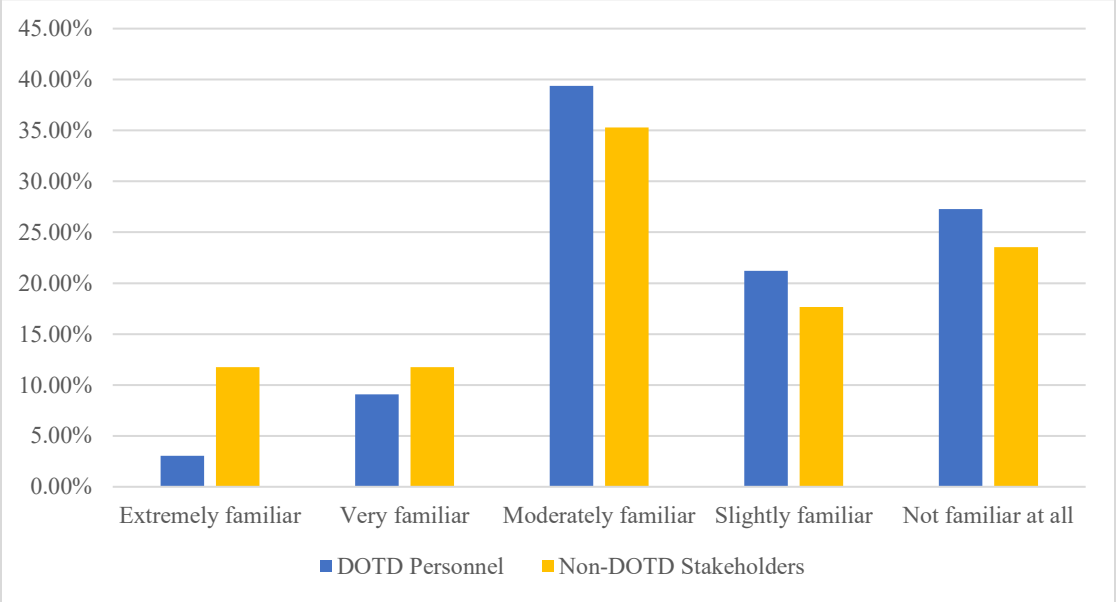
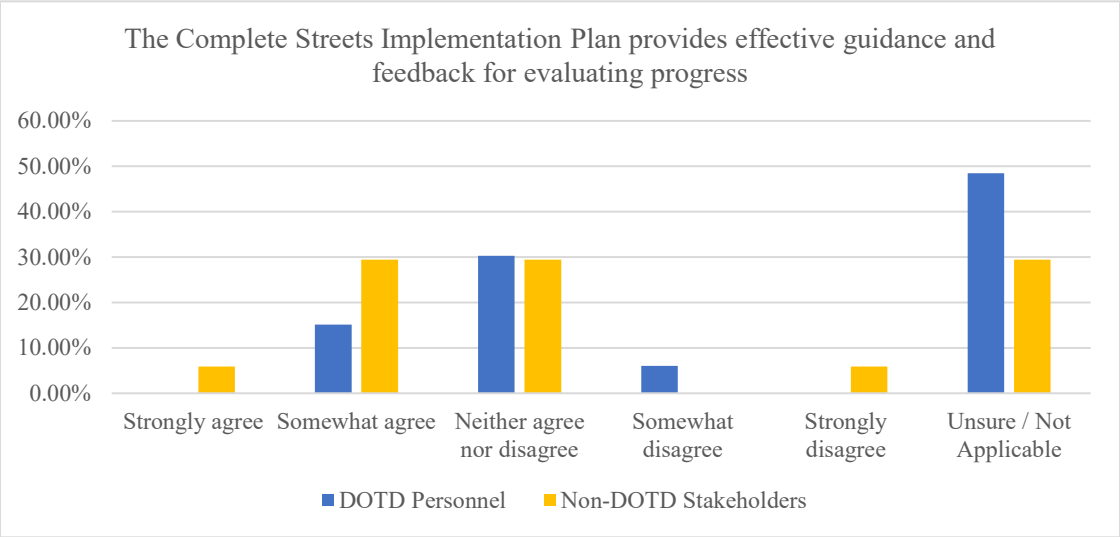
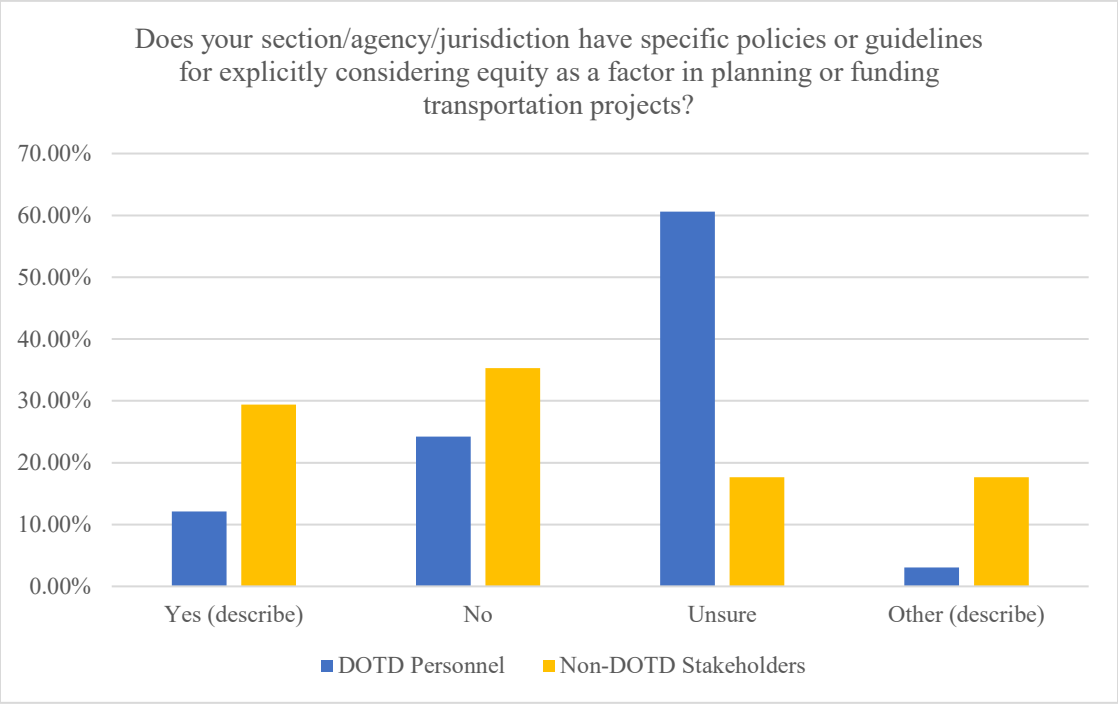


Figure 34. Efficacy of Complete Streets implementation plan guidance and feedback for evaluating progress



Although there is limited policy or discussion related to equity at DOTD other than following Title VI requirements (Figure 35), this is an emerging area of interest among non-DOTD stakeholders, which may indicate a gap to be addressed in future Policy implementation activities.

Figure 35. Equity as a factor in project planning or funding



Fewer than half of DOTD respondents affirm that they have completed the required Complete Streets Training Module (Figure 36), and among those who have taken it, few think it was particularly effective, indicating a clear opportunity for improvement (Figure 37).

Figure 36. Complete Streets training module completion

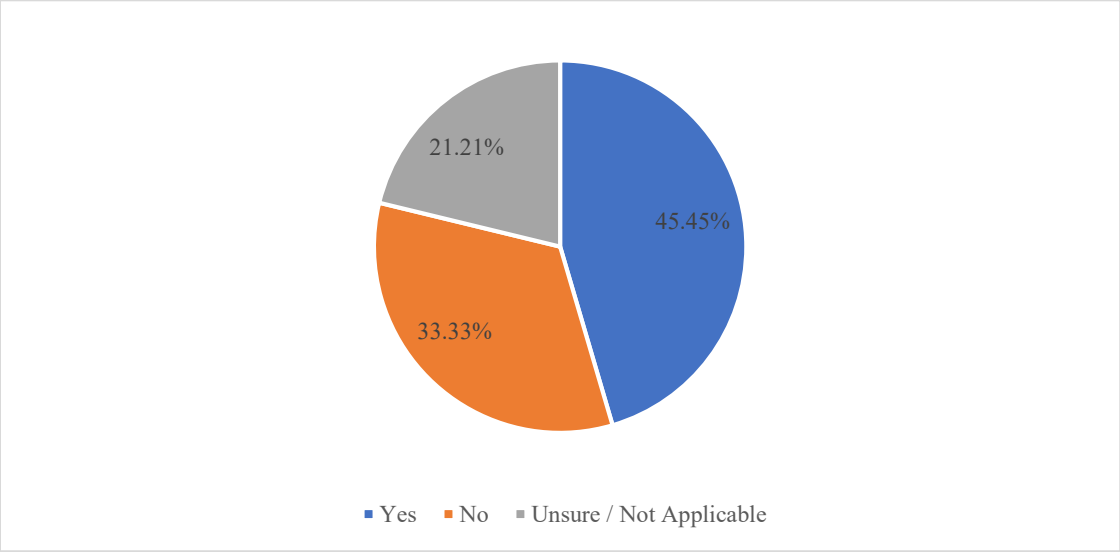
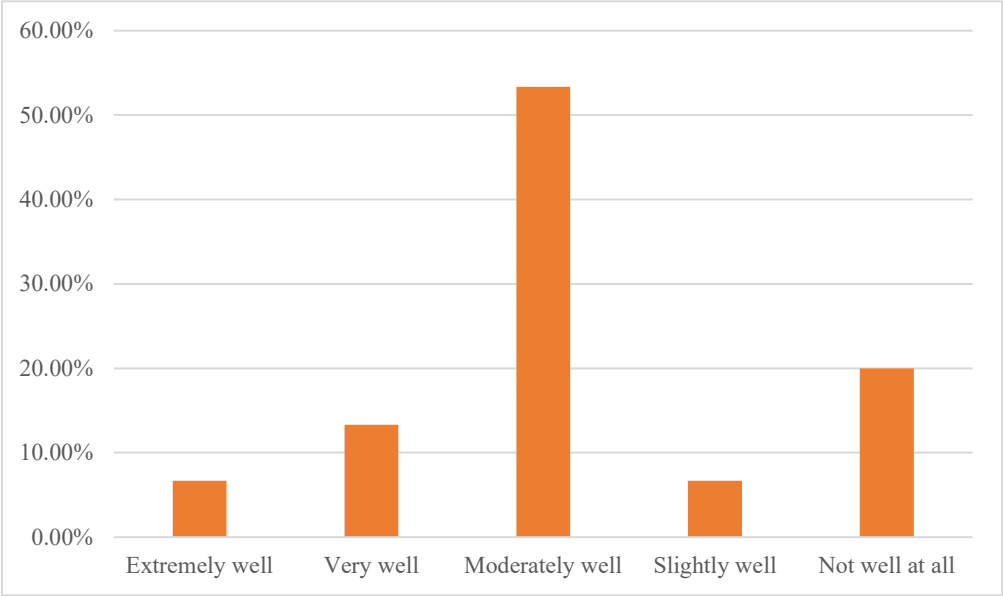
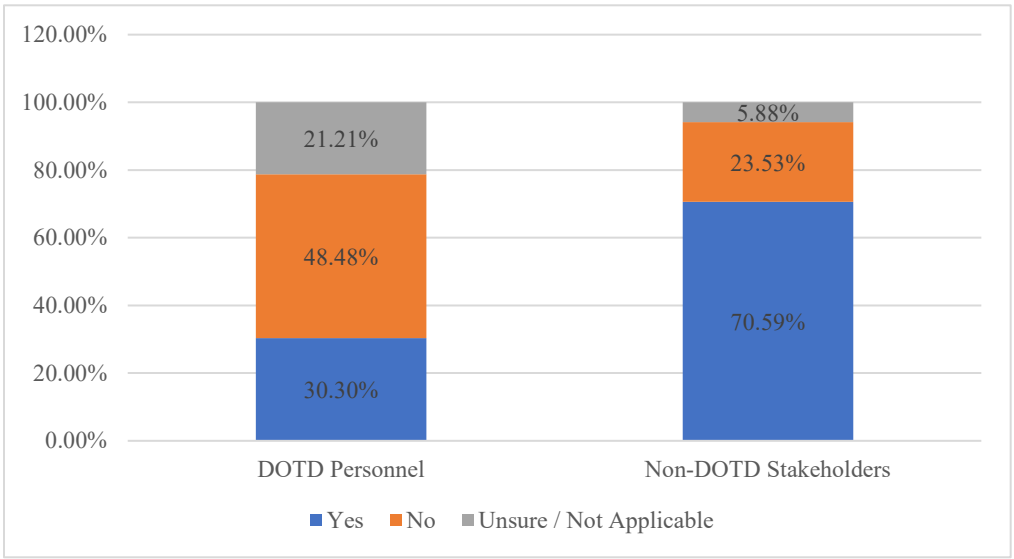


Figure 37. Complete Streets training module efficacy: degree to which understanding enhanced



Non-DOTD stakeholders report having been more closely engaged in training opportunities; whereas, DOTD staff are less likely to have sought these out (Figure 38). This suggests that additional workshops, trainings, and showcases centering Complete Streets policy implementation may be beneficial.

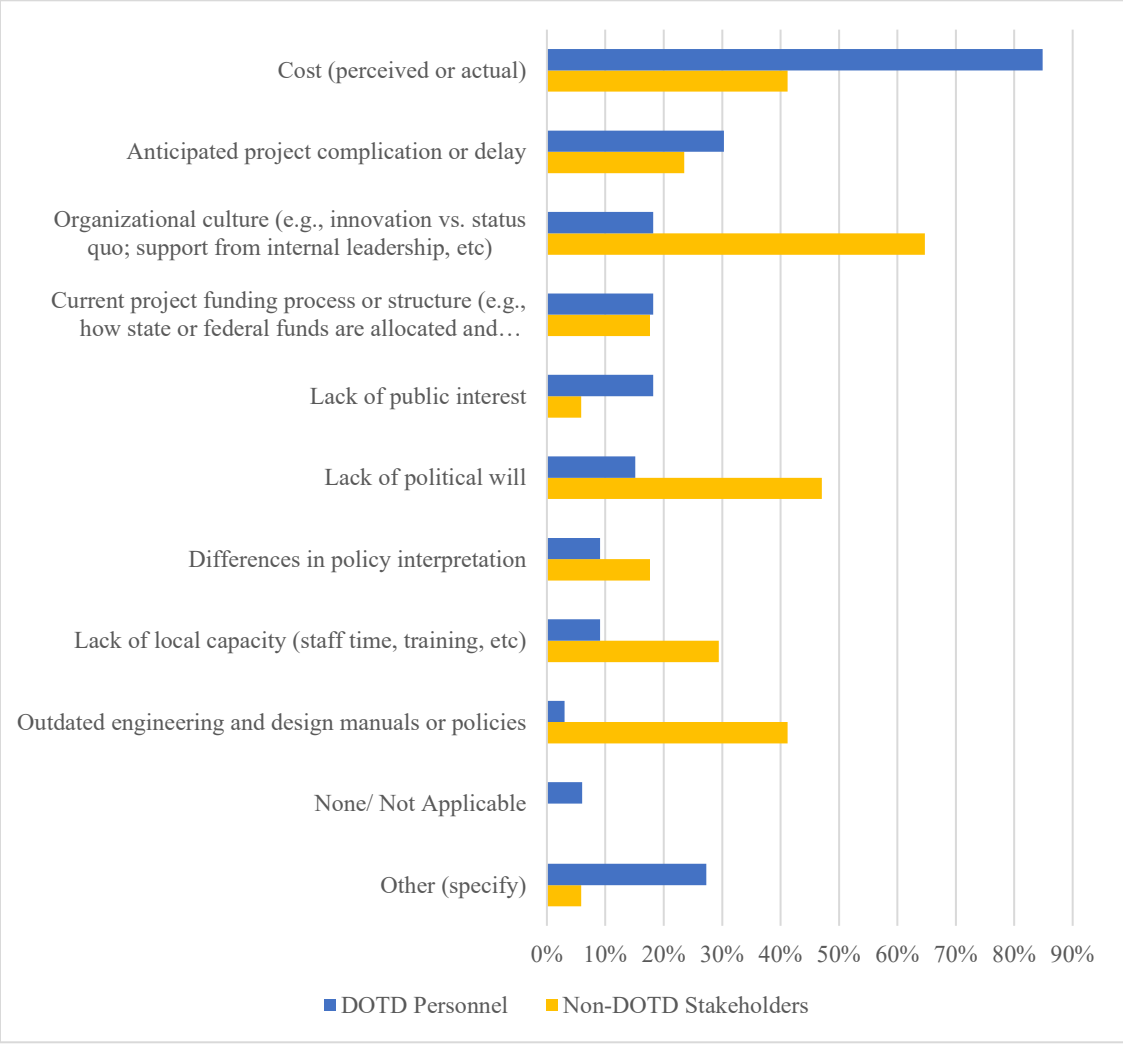
Figure 38. Other Complete Streets training participation



Barriers, Opportunities, and Next Steps

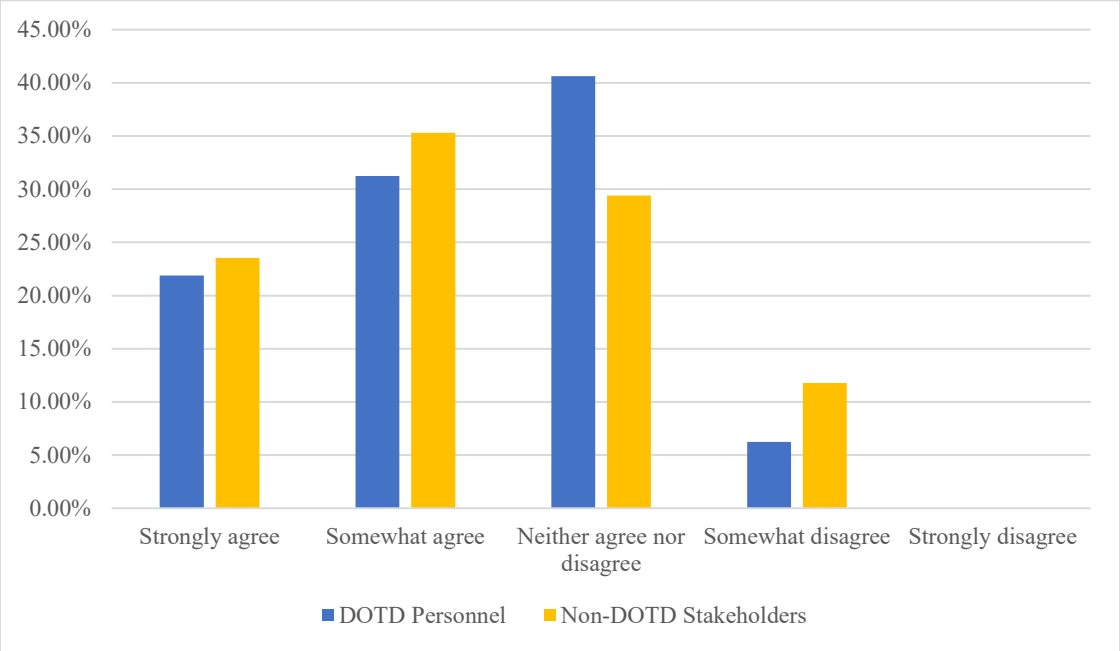
The primary barriers to Complete Streets implementation identified by DOTD personnel are cost and anticipated project complication or delay (such as some interviewed stakeholders reported—delays related to requests that pedestrian and/or bicycle facilities be added to projects already in advanced stages of development—rather than integrated from initial project scoping). Among non-DOTD partners, the biggest issues identified are organizational culture and lack of political will. Among those responding to the "other" category, lack of available (or acquirable) right-of-way is the top-noted barrier along with maintenance and liability (Figure 39).

Figure 39. Top barriers to Complete Streets implementation



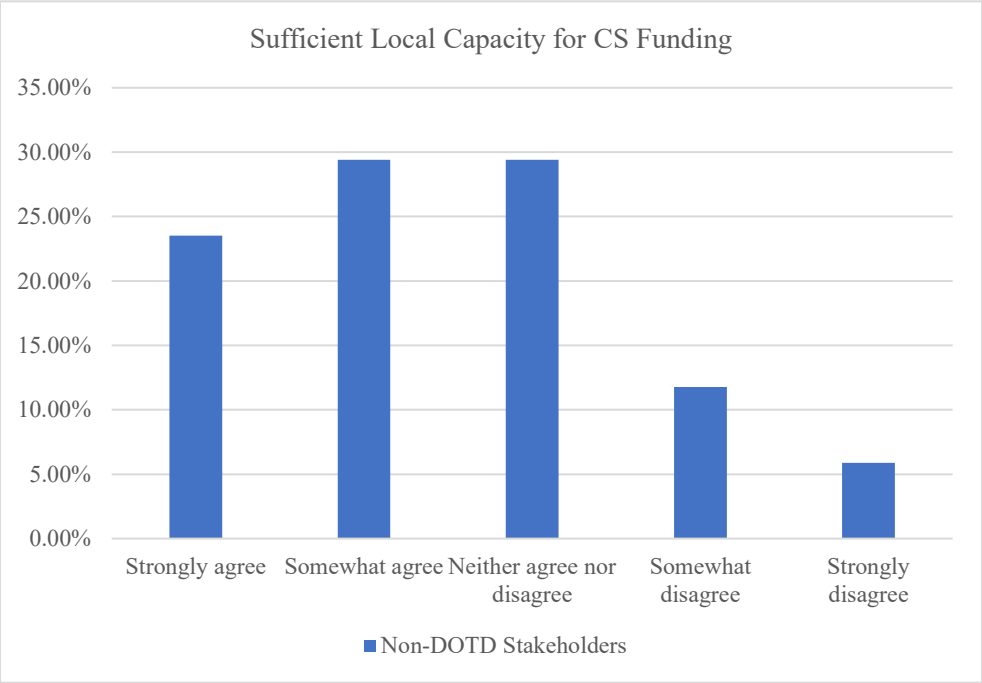
To some degree, local cost share is perceived as a barrier, although this appears to be less of a concern among non-DOTD stakeholders (noting that local government personnel are not broadly represented) (Figure 40).

Figure 40. Extent to which local cost share is a barrier to Complete Streets development



Similarly, most non-DOTD respondents indicate comfort with the capacity of local agencies; however, the sample over-represents the relatively large and well-resourced New Orleans and Baton Rouge metropolitan areas (Figure 41).

Figure 41. Sufficiency of local capacity for Complete Streets funding



Overall, non-DOTD stakeholders are more likely to report being either very satisfied or very unsatisfied with the current Complete Streets Policy, with DOTD personnel more likely to report more moderate views (Figure 42). Regarding the extent to which the policy is being thoroughly and effectively implemented, there is a clear mismatch between DOTD and non-DOTD opinions with most DOTD personnel reflecting a positive view and most non-DOTD respondents skewing negative (Figure 43).

Figure 42. Level of satisfaction with current Complete Streets Policy

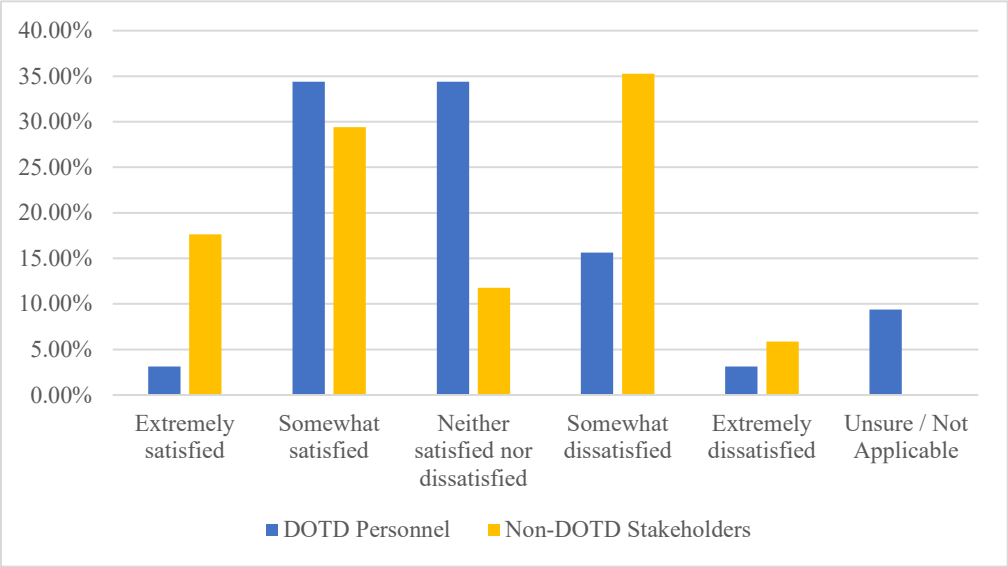
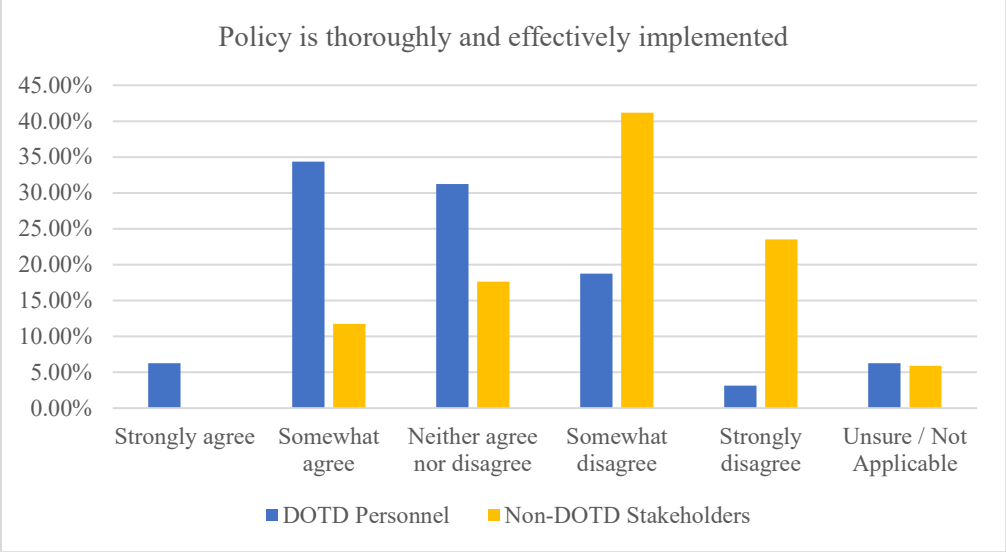


Figure 43. Perception that Policy is thoroughly and effectively implemented



Finally, all respondents were asked to reflect on policy successes and "wins" of the last 10 years of Policy implementation and to identify desirable next steps to continue to advance toward Policy goals (Table 16). Respondents identified 20 items as key successes. The number of stakeholders stated each item as a success is recorded in the table.

Table 16. Complete Streets Policy successes, 2010-2020

Complete Streets Policy Successes, 2010-2020	No. of DOTD personnel stated	No. of Non-DOTD personnel stated
Policy adoption/renewal	5	2
Minimum Design Guideline revision and/or EDSM	2	2
Specific projects completed-Government Street	2	1
Specific projects completed-Other	1	3
General increase in pedestrian facilities/networks	1	1
General increase in bicycle facilities/networks	0	2
Integration of policy into design process	1	0
More/more consistent implementation of ADA improvements	2	0
Incorporation of bike/ped elements in preservation projects	1	0
Culture change and awareness	1	1
More funding for safety improvements	1	0
More local and MPO bike/ped plans developed or adopted	1	1
Clear design exception process for exemptions	1	0
Establishment of internal and external committees to guide implementation	1	1
More local Complete Streets policies adopted	0	2
DOTD Bicycle Planning Tool	0	2
Improved quality and availability of crash data	0	1
DOTD Pedestrian and Bicycle Master Plan	0	1
Outreach or training on Complete Streets topics	0	2
Related research/studies	0	1

Responses regarding desired next steps centered on continued and enhanced outreach to local agencies, providing additional guidance on policy implementation within DOTD for various project categories and contexts and enhancing training opportunities to continue to increase both DOTD and non-DOTD capacity for Policy implementation (Table 17).

Table 17. Future actions to advance Policy goals

Future Actions to advance policy goals	No. of DOTD personnel stated	No. of Non-DOTD personnel stated
Outreach to local agencies: funding, maintenance, liability, etc.	6	1
Improve integration of policy into Preservation Projects	4	1
Additional training for DOTD staff/continued shift in culture	3	4
Develop dedicated funding sources for active transportation facility development and/or maintenance	3	2
Revise design guidance to address identified needs or gaps	2	4
Develop guidance/outreach on lane/capacity reductions	2	0

Future Actions to advance policy goals	No. of DOTD personnel stated	No. of Non-DOTD personnel stated
Outreach to local agencies: design, operations, etc.	2	0
Assign DOTD liaison to work with local governments/enhance local outreach and partnership, generally	1	2
Prioritize funding for projects that support Complete Streets	1	1
Support enhancements to lighting, signals, etc.	1	1
Develop guidance for traffic calming, speed management	1	0
Enhance guidance for context-sensitive planning and design and/or specific situations	1	1
Continue to encourage local/regional complete streets planning	1	3
Evaluate past projects and share best practices	1	0
Develop guidance on bike/ped accommodation during construction	1	0
Increase bikeway network, generally	1	0
Outreach to the public regarding safety, complete streets, etc.	1	1
Proactively evaluate opportunities for future bike/ped network development	(na)	1
Develop guidance on transit facilities	0	2
Improve accountability around policy exemptions/design exceptions	(na)	1
Address Complete Streets needs in Statewide Transportation Plan	(na)	1
Increase involvement of DOTD planning section in Policy implementation	(na)	1
Publish additional Complete Streets data online: Implementation Plan, outcome dashboard, etc.	(na)	2

Appendix D: Stakeholder Interview Results

This section synthesizes and summarizes major findings across all interviews. Perspectives and assertions that were articulated by multiple interviewees are emphasized although minority views are highlighted where relevant. These findings should be interpreted as a broad overview of the discussion themes based on the experiences of individual professionals and not representative of the official views of any agency involved.

Raw transcript text (interviewee responses only) was visualized as a word cloud for illustrative purposes to highlight specific words and topics that were discussed extensively or frequently among both DOTD and non-DOTD stakeholders (Figure 44 and Figure 45). Of note among both groups, the word "people" emerges as an unexpectedly high-use term, underscoring that Complete Streets policy, ultimately, is about more than just infrastructure and the built environment. It is about supporting quality of life and access to opportunity for Louisianans.

Figure 44. DOTD stakeholders interview response word cloud

Figure 45. Non-DOTD stakeholder interview response word cloud

The first suite of questions centered on the roles of various stakeholders in policy implementation; actions taken by DOTD since 2010 to advance the Policy which have made an impact; and how the Policy has (or has not) impacted project scoping and development processes, program delivery, design and engineering practice, and agency evaluation practices.

Stakeholder Roles

Key themes: Compliance, Culture Change, Encouragement

Stakeholders emphasized the role of specific individuals in advancing policy implementation. Several highlighted the need and potential of the recently created Pedestrian, Bicycle, and Transit Design Expert position to lead the agency forward and act as a "gatekeeper" ensuring policy accountability as well as an agent of culture change within the Department. This position is expected to serve as a liaison to other sections, coordinate training opportunities, and lead the

annual Complete Streets legislative report. Importantly, interviewees observed that this position needs to have clear authority to make recommendations across divisions and at all stages of project delivery in order to be effective. Others noted the work of the internal Complete Streets Steering Committee, which is no longer active, but may be revived (in whole or in part as an ad-hoc body to support continued implementation within DOTD).

The Traffic Section was identified, more generally, as a critical junction in project delivery with a clear and specific role to play in ensuring policy compliance, reviewing project plans, and providing feedback and recommendations. This section also plays a key role in maintaining the agency's design guidelines and ensuring ongoing alignment with national standards and federal guidelines.

The Office of Planning is also identified as a key part of current and future implementation, both in terms of long-range planning activities as well as in the development of Stage 0 studies for specific projects. Several interviewees identified planning as an underutilized asset in supporting Complete Streets (discussed below).

Safety programs, including those specifically focused on pedestrian and bicycle accommodation, were also widely identified as serving an important role in policy implementation, representing an outsize share of funding allocated directly to Complete Streets-focused projects in response to data illustrating the disproportionate share of injuries and fatalities involving people walking and bicycling. This section (housed within the Office of Planning) has also directly led policy implementation and evaluation efforts in recent years and was identified as a key champion. However, several stakeholders noted that in order to be successful, broader diffusion of Policy concepts and expertise across the agency is needed, particularly to other areas within the Office of Planning in order to be more proactive in addressing Complete Streets through long-range planning efforts.

Outside DOTD, key stakeholders include FHWA, MPOs, local government agencies, and advocates. FHWA ensures that federal funds are in compliance with regulations (including federal law stipulating that pedestrians and bicyclists must be considered) and also encourages adoption of best practices. Several stakeholders noted the important role that FHWA representatives who provide guidance to DOTD have played in stewarding changes in practice over time and in promoting the role of Complete Streets for both safety and mobility. FHWA has been engaged at all stages of policy adoption and implementation.

MPOs, local government agencies, and advocates in turn have all played important roles in supporting DOTD's Complete Streets Policy, whether through direct participation in CSAC or

by ensuring alignment of locally-initiated projects with policy goals and guidelines. DOTD stakeholders interviewed affirmed the importance of broad awareness of the policy among local stakeholders as key to ensuring consistent and high-quality projects that align with the Policy, while non-DOTD stakeholders note the value of having local input and feedback to ensure that state-led projects align with local context (both urban and rural), design standards, and needs.

Finally, as interviewed stakeholders asserted, leadership matters. Directives for innovation and shifts in the status quo, such as implementation of a Complete Streets approach, must have the full buy-in of senior leadership from the very top. Formal policy adoption is but one facet of this leadership. Creating high-level accountability for implementation (such as a process by which design exceptions require signature from the Chief Engineer) was identified by DOTD staff as another important step forward. However, ongoing and consistent support is needed to ensure consistent messaging across the agency and among non-DOTD partners in order to achieve desired results.

Key Document Updates

Key themes: foundational documents, checkpoints, inconsistency, ad-hoc implementation

Stakeholders were asked to reflect on the most impactful actions taken and processes of change advanced since the adoption of the Complete Streets Policy in 2010. Collectively, stakeholders directly involved in policy implementation agree that the policy itself, as well as the revised policy adopted by the current administration, was a "good start" and that, most importantly, it has spurred an ongoing dialogue within the agency. A broad range of staff from designers to administrators are talking and thinking about pedestrian and bicycle accommodation in a way they would not have been otherwise. However, discussions with personnel less directly involved revealed that diffusion of policy awareness has been uneven, with some sections having awareness and interest in Complete Streets conceptually, but little to no knowledge of the specifics of the Policy itself or the language or goals articulated therein. In other sections, it was confirmed that the Policy "is being talked about" regularly, but that it's less clear to what extent it's being acted upon, and interviewees reported having limited understanding of what other sections or programs may be doing. Some DOTD stakeholders identified inconsistencies between the policy language and subsequent documents (e.g., the EDSM), and/or a need for further guidance to reflect the needs of specific programs or areas of practice.

In recognition of the fact that "the Policy alone doesn't do the job," the second key action identified broadly by stakeholders as impacting practice across the agency is the adoption of the

Complete Streets EDSM, which provides language and definitions around operationalizing the Policy. Stakeholders call this a "huge shift" and the "primary tool" for institutionalizing the Policy into practice. However, opinions among interviewees differ over the specific language of the EDSM, with some articulating that there are inconsistencies that should be addressed or broader input is needed to make sure the guidance is practicable across programs, while others see it as "not an ambiguous document" and sufficient in guiding practice.

Corresponding to the EDSM is a third key product of policy implementation—the revised Minimum Design Guidelines (MDG), which "build out the toolbox" by indicating agency design preferences for sidewalks and bike facilities. This document update was broadly identified as a critical tool, albeit one for which several years of practice have now informed critiques and opportunities for further refinement. Some DOTD stakeholders identify the MDG as "pretty vague" and reflect a limited grasp of the relationships between policy, EDSM, and MDG. Others identified a need to balance better flexibility with specificity, with more options available to designers, but also enhanced guidance for how to decide among these. Several stakeholders noted that further update of this document is linked to the publication of new AASHTO guidance, while also reinforcing the fact that this document is intended to provide *minimum* design standards, which should not prohibit designers in going beyond these minimums where feasible and appropriate. Although, non-DOTD stakeholders note that there does not appear to be clear incentive for innovative design. Some sections (e.g., Bridge) also note a need for design specifics not included in the MDG as they pertain to pedestrians and bicyclists, as well as more guidance on typical designs, facility selection, and how to incorporate these into the Bridge Design Manual.

Corresponding to updates to design guidance and adoption of the EDSM, a series of updates to the Stage 0 Checklist are also identified as a small but critical element in "making [DOTD staff] think about it" as relates to Complete Streets. The current iteration asks for articulation of whether and how active users are accommodated and provides an important checkpoint in ensuring consideration early in project development processes (for those projects for which a Stage 0 report is required).

Relatedly, the inclusion of a Complete Streets question in the Design Report was identified as another key checkpoint for accountability, with one interviewee calling it "the biggest win" due to the greater specificity it elicits. However, they also observed inconsistency in how individual project managers are responding to this question. Importantly, stakeholders note that for both the Stage 0 Checklist and the Design Report, "it's just a checkbox" and deviations from the Policy through the exception process are common. "It's not going to happen with one checklist," as

practitioners need additional guidance and training to ensure that this checkpoint is effectively utilized. And while the "intention" of the Stage 0 Checklist is to provide a consistent application of policy, personnel report that these are sometimes left blank, while the level of detail included varies widely. Moreover, other document update processes initiated by the Complete Streets Steering Group have occurred on a somewhat ad-hoc basis, with some document owners responding to requests for feedback on policy concurrence and proposed updates but no formal process for tracking and following up on change. On the other hand, interviewees broadly agree that these foundational documents have spurred designers to "think it through and recognize the issues." Conversations around Complete Streets are happening routinely and spurring change.

Training and Culture Change

Key themes: problem solving, outreach, institutional inertia, coordination

One interviewee said, "Engineers are problem solvers. We need to train them to solve the right problems!" Multiple interviewees expressed a variation on this idea as a key tool in empowering DOTD staff to design innovative and context-sensitive solutions for Complete Streets. Relatedly, several expressed a sense of slowly-shifting institutional inertia. Framing the need for Complete Streets as a problem to be solved, and providing the right toolkit for planners and engineers to do so is identified as a key strategy for continued "culture change" within the agency to embrace new ideas and adapt to changing needs.

Training of established and incoming staff is an important part of this culture change. DOTD and LTRC have already developed an introductory training module explaining the Policy that all employees are required to take in Louisiana Employees Online (LEO). However, several stakeholders note that it is unclear whether this is being enforced, and more importantly, that it only explains the "why" for Complete Streets and not the "how." Both DOTD and non-DOTD stakeholders observed that outreach to provide compatible introductory and advanced training to local agencies, consultants, and others who work with DOTD is needed. Several stakeholders noted that an influx of younger staff in recent years is an opportunity to expand institutional capacity for implementation, with the perception that newer employees may be less "set in their ways" and open to new ideas. In addition, interviewees suggested a need for review of the curriculum of civil engineering programs in the state to identify whether and how pedestrian, bicycle, and transit design are considered and opportunities for introducing these topics to future engineers.

The new position of Pedestrian, Bicycle, and Transit Design Expert has already begun to engage in internal trainings, including with the Plan Quality Unit with other sections to come. However, several stakeholders identified a need for additional structured training opportunities, such as the bicycle and pedestrian design workshops, which used to be sponsored by the Safety section through HSIP. Overall, stakeholders broadly agree that more opportunities for training and outreach are needed to improve policy impacts and empower both DOTD personnel and non-DOTD partners to advance successful projects.

Project Identification, Scoping, Planning, and Funding

Key themes: budget constraints, consistency, early interventions

The interviews also sought to clarify the mechanisms by which the Policy is integrated into early stages of project identification and development and where potential gaps exist in current practice where Complete Streets implementation could be clarified or enhanced.

Stakeholders broadly observed that much of the project-level implementation of Complete Streets has come from the relatively small Safety section, including but not limited to competitive funding programs targeting non-motorized road users. However, this limits spending to areas where crashes have previously occurred and competitive programs are applicant-driven. DOTD does not drive project identification.

Many DOTD projects (approximately 56% over the last 10 years) are focused on maintenance and preservation—an area where interviewees broadly recognize challenges and opportunities for expanding Complete Streets implementation, but which Stage 0 studies are not required and Minimum Design Guidelines do not typically apply. DOTD stakeholders note that Complete Streets is consistently discussed and included in alternative development for projects with Stage 0 studies (identified by one stakeholder as “the biggest point of intervention”). However, if pedestrian and bicycle accommodation is not framed as fundamental to the problem that the proposed project is trying to solve, alternatives that go beyond the Complete Streets Minimum Design Guidelines may not be likely to advance. For instance, many projects are primarily aimed at expanding highway capacity and/or reducing congestion or delay for motor vehicles. Conventional engineering practice tends not to view pedestrian and bicycle facilities as a solution to these issues. Thus, absent of a contextual understanding of the role of Complete Streets in efficient multimodal network design that mitigates excessive vehicular through-traffic, engineers may not view active transportation accommodation as a primary focus of the project overall. In this case, they are unlikely to dedicate resources (or, importantly, ROW) to walking

and bicycling access beyond what is required in the MDG. Some stakeholders also explicitly expressed a perception that "Complete Streets doesn't apply to the preservation program," indicating a critical gap that must be addressed to meaningfully advance policy implementation.

Numerous stakeholders identified a tension regarding where in the process decisions pertaining to Complete Streets should be made, with some emphasizing the imperative to plan for people walking and bicycling in Stage 0. For larger or more complex projects in particular, such elements may be considered an "afterthought." Other stakeholders indicated that while alternatives may be considered at Stage 0, these may lack specificity and decisions around scope may be deferred to later stages. At this point, however, it may be difficult or impossible to adjust plans to adequately support walking and bicycling. Divergent views on this point ("It's too preliminary, a lot can happen between Stage 0 and final plans" vs. "Once you get to Stage 1 it's too late") suggest a need for more tailored guidance for various funding sources, project types to clarify precise points of process to consider Complete Streets, and highlight the importance of identifying appropriate and necessary Complete Streets interventions as early as possible while ensuring accountability throughout the design phase.

Again, several stakeholders indicated that proactive planning efforts at both the state and local levels to identify future priorities in the pedestrian and bicycle network would greatly improve the agency's ability to consistently and effectively implement the Policy. The availability of safety funds to support pedestrian and bicycle planning (and corresponding outreach to encourage MPOs to access those funds) is identified as an important "win" for continuing to advance policy implementation across a wider range of projects and programs. However, some stakeholders cite a need for planning to play a greater role in aiding project managers by facilitating review of local and MPO plans.

Data, Tools, and Processes for Prioritizing Complete Streets

Key themes: safety, demand, satisfaction, routine data collection, analysis toolkits

Multiple stakeholders expressed a lack of clarity around how different programs assess the need for Complete Streets and the inputs or data considered. Safety was clearly identified as a key player in data analysis to identify active transportation needs, but stakeholders in other sections expressed uncertainty about what, how, when, and by whom data is reviewed for projects in other programs. Approaches to safety analysis for vulnerable road users appear to vary across programs and geography.

Lack of demand or exposure data was identified as a barrier. According to one of the interviewees, “It’s hard to convince people that it will get used if you don’t have the data.” On the other hand, most stakeholders expressed limited familiarity with the Bicycle Planning tool as an input for demand analysis while expressing a need for its outputs indicating a need for outreach and training in order to optimize use of this asset and justify its maintenance. At present, the degree to which DOTD projects directly address Priority 1 routes in the Planning Tool is “happenstance” rather than strategic implementation, and it is not being consistently used in Stage 0 or other planning processes. More stakeholders (including non-DOTD interviewees) noted that they used or had used Strava data, suggesting that, despite known limitations, this may continue to add value for DOTD and partners.

Some DOTD and non-DOTD stakeholders also identified a need for more qualitative data and research around safety and perceptions thereof. Are area residents satisfied with the quality and availability of facilities, particularly for vulnerable user groups? Interviewees referenced current efforts by DOTD to support local planning and cite a need for expanded outreach to derive community priorities, reiterating the potential role of planning (and/or support for local and regional planning efforts focusing on this topic).

Both DOTD and non-DOTD stakeholders highlighted the (growing) importance of local and MPO outreach and plans. Many projects originate at the district level, through local municipalities and MPOs. It is incumbent on the local jurisdiction to make district administrators aware of needs pertaining to pedestrian and bicycle accommodation. Therefore, effective Policy implementation statewide requires robust planning to identify local and regional priorities and define what a “complete street” needs to achieve in any given context. In some regions, well-defined local bicycle or pedestrian plans exist, and planners work together with community advocates to identify priority projects. In other jurisdictions, limited action has been taken to develop local plans that consider vulnerable road users.

Spatial data around pedestrian and bicycle accommodation is in an interim stage of development. Complete Streets projects are being tracked by control section and log mile and mapped as part of Complete Streets performance measurement but not necessarily as a routine component of asset management project close-out procedures. Spatial data from the Fugro geophysical data collection system may not be updated for several years between drive-overs and is known to have limitations pertaining to bicycle and pedestrian facilities, making it an important asset in terms of long-range analytic capabilities, but of limited use in year-over-year benchmarking.

In general, stakeholders cite a need for enhanced tools for assessing the pedestrian and bicycle network and evaluating connectivity as well as processes or protocols that encourage their

widespread use. Although the Planning section is identified as playing a lead role in tool development and long-range network development, their focus is largely not on specific projects. Thus, application of these tools needs to be more broadly diffused throughout the agency. Finally, multiple stakeholders cited a need for more support for the GIS group responsible for maintaining and integrating datasets in order to expand their utility for both project development and performance measurement.

Finally, stakeholders were asked to identify any mechanisms for assessing and prioritizing equitable outcomes within their programs or areas of expertise. DOTD and non-DOTD stakeholders identified federal NEPA/environmental justice legislation as the primary formal mechanism for ensuring that negative impacts are identified and mitigated. However, DOTD itself does not have any formal policy or agency-wide metrics assessing equity in outcomes, and some stakeholders describe meeting federal requirements as "basically ticking the box" without any proactive effort to explicitly prioritize equity outcomes. Studies conducted in the Safety section have implicitly prioritized an equity lens, through the correlation identified between pedestrian crashes and income. One notable exception to this within DOTD is in the SRTPP program, which awards more points for projects intended to address safety issues in low-income census block areas.

Design, Engineering, and Review Processes

Key themes: leadership, ambiguity, preservation

Returning to the processes by which projects make it from scoping and planning to design and construction, we asked stakeholders to reflect on how projects are reviewed and in what circumstances exemptions to the Policy are granted.

For new construction and major projects including on-system bridges, all plans are now routed through the office of the Pedestrian, Bicycle, and Transit Design Expert for review, and anything that doesn't meet Complete Streets Minimum Design Guidelines requires approvals from the Chief Engineer. The development of the project's Plan Quality Unit provides another opportunity for review to ensure compliance with the Policy. This unit reviews a subset of plans before they are sent to the Chief Engineer and has been trained on the adopted Complete Streets Policy, goals, and performance measures. Off-system bridge projects receive final design approval from local (parish) authorities, representing one gap in Policy application noted by interviewees.

A second, more common ambiguity is in how preservation projects are perceived under the Policy. While officially the Policy applies equally to preservation and maintenance projects,

stakeholders convey a lack of clarity around how to integrate Complete Streets elements into project scopes. While the directive to consider ways to accommodate pedestrians and bicyclists that don't require right-of-way acquisition seems to be widely known, responses varied as to what alternatives should be considered and how decisions are documented. Interviewees note that a facile "exemption" from Complete Streets Policy on the grounds of right-of-way availability is common. Importantly, preservation projects are led by districts, highlighting the need for outreach and training around possible interventions in different contexts (urban, rural, and transitional) that may meet Policy goals within roadway constraints such as road diets, narrower lanes, etc. Staff note that district administrators (and by extension local agencies) need to "drive" these discussions as they are responsible for determining scope within their budget allocation for each roadway type.

Importantly, the Minimum Design Standards and thus the standard review and exemption process do not apply to preservation projects. The primary document for evaluating preservation project scope is the PRR report form, which captures designers' decisions about scoping including a specific question about low-cost safety improvements. Preservation program staff note that updates to the Preservation Manual are underway, along with additional road design plan details to provide better definition about this process with more technical detail to guide consistent design. Numerous stakeholders identified preservation as an important area of opportunity for the next phase of policy implementation, given the number of projects let annually and the untapped potential of within-ROW enhancements to support active users. Additional guidance to help designers "solve the right problem" within the constraints of this program is emphasized as is encouragement and support for coordinating closely with local and regional planners to identify walking and bicycling priorities.

Finally, stakeholders indicate a need for improved consistency among design guidance documents, such as the use of shared-use paths as accommodation for both pedestrians and bicyclists. Stakeholders also indicate a need for providing a more streamlined process for review of certain project types, which currently trigger a design exception even though the Complete Streets Minimum Design Guidelines do not specifically address elements within the project scope (e.g., striping or signage-only projects funded by Safe Routes to Public Places Program).

Performance Measurement and Evaluation

Key themes: encouragement, promotion, communication, calibration

DOTD as an agency is guided by the goals articulated in its long-range transportation plan (an update of which is currently underway) and various departmental goals. However, stakeholders articulated few clear agency-wide performance metrics. Rather, the Complete Streets performance metrics included in each annual report were identified as a relatively unique feature. However, it is unclear from stakeholder interviews to what extent these metrics are used to inform practice. Likewise, processes for maintaining the implementation action plan are currently undefined.

Stakeholders identified a few additional metrics that may be considered for holistically understanding policy impact, ranging from the specific (e.g., reports of sidewalk construction and repair mileage, the amount of money spent on various project categories) to the broad (e.g., quality of life metrics that go beyond safety and mobility, and application of analytic lenses to reported metrics to reflect changes in populations served, facility use, and connectivity). In addition, several stakeholders cited the need for more project and program-level evaluation to understand the outcomes of investments in order to guide future spending; highlight successful projects; and use annual reporting as a "celebratory tool" to encourage continued commitment to Policy goals.

Barriers and Challenges

This section summarizes barriers to continued or enhanced Policy implementation identified during stakeholder interviews, including factors both internal and external to DOTD.

Internal factors:

Institutional inertia: Many staff "have been doing things the same way forever" and culture change to encourage innovation is inherently a slow process. Stakeholders report substantial progress over the last 10 years and major shifts in the degree to which active transportation is considered, discussed, and advanced. However, gaps in policy awareness and diffusion were also apparent, highlighting a need for ongoing outreach and sustained leadership to encourage broad institutional support for Policy implementation. Some stakeholders identified a widespread perception that Complete Streets "is just another component to make it difficult" to execute a project on time and on schedule and something that has to be "squeezed in" rather than integrated fully into the project scope from the outset. For instance, a planned redesign of Plank Road intended primarily to address congestion at a particular intersection was cited as an example where needing to also provide bicycle and pedestrian facilities is perceived as a secondary issue "to fit in."

Expanding the toolbox: Meanwhile, less experienced designers need more context and support to understand why and how to design for Complete Streets. Stakeholders noted that new engineering staff may not have received direct training in active transportation design during their degree programs or while working in other jurisdictions. There is no "one-size-fits-all" solution. Rather, planners, designers, and administrators in all programs need to have a basic understanding of the "toolbox" for Policy accommodation, which may itself need to be expanded in terms of nuanced design guidance aligned with federally-approved standards. For instance, stakeholders expressed frustration with a perception that designers may default to the bare minimum accommodation (a 4-ft. shoulder "accommodating" both pedestrians and bicyclists) rather than striping a bike lane or constructing a sidewalk (and thereby excluding either pedestrians or bicyclists respectively) even if it would make more sense for a particular context. More tools and/or use of existing tools for decision-making and design trade-offs are needed to facilitate defensible decision-making.

Staff capacity and training: Dedicated support for problem-solving across a variety of contexts is needed in parallel with resources to aid decision-making. Some stakeholders identified apparent errors in the interpretation and application of Complete Streets Policy (such as the removal of an existing sidewalk in an urban area in order to "meet" the minimum design guidelines by installing a paved shoulder), which would be improved by additional training on context-sensitive design and analysis. Meanwhile, interviewees reflect the challenge of integrating the Policy into all stages of the project delivery process. Some stakeholders in design roles asserted that, by the time a project gets to them, it's too late in the process to "add on" pedestrian and bicycle components, while others involved in planning countering that design decisions are ultimately outside their purview and many changes are inevitably made after the planning phase. Both statements can be simultaneously true. However, guidance is needed to more clearly articulate the roles of all sections and offices in policy implementation, including the role of planning (both in terms of long-range planning to define local, regional, and statewide network development and goal-setting, as well as in terms of the Planning Section's role in defining a project scope that considers the potential need for pedestrian and bicycle accommodation) and the role of design in identifying specific, feasible solutions to address that need. The institutionalization of a position dedicated to this kind of support is an important step but would be bolstered by additional training opportunities focused on identified design or engineering challenges. In addition, data-driven policies like Complete Streets demand expanded focus on and capacity for data collection, management, and communication. More support for sections involved in data management may also be needed.

Complex funding and organizational structures: DOTD manages a wide variety of programs, funding streams, and infrastructure types. Coordinating across these myriad programs to achieve shared agency-wide goals (including the Complete Streets Policy) is inherently complicated. Outputs and programmatic activities vary widely from year to year, making coordinated tracking, performance evaluation, and target-setting a challenge.

Funding: Relative to the state's infrastructure needs, multiple stakeholders mentioned that there is relatively little money available to address the backlog of needed projects, and the agency is limited by staff capacity. This is particularly true for work focused on walking, bicycling, and transit, which represents a small share of DOTD's overall spending. Trade-offs must be made, and if a project's primary identified need or goal (or "critical issue") does not directly involve pedestrian and bicycle accommodation, addressing non-motorized needs will be perceived as a secondary concern. One interviewee said, "If the cost [of bike/ped accommodation] is too high, it can kill the whole project; you need to show people that there is a [safety] need for this specific control section." For preservation projects in particular (including bridge preservation), the need to coordinate funding sources for any local jurisdiction looking to go beyond "what would be happening anyway" on a given corridor is emphasized. Significant changes that involve additional cost may need to combine funding from multiple programs. However, a lack of clear process for coordinating multiple funding streams was cited as a barrier by some. Additional guidance for lack of reliable and dedicated funding for Complete Streets implementation was consistently identified as a barrier to more rapid advancement toward policy goals. Stakeholders expressed optimism that federal support for walking and bicycling, which has been increasing in recent decades, would continue to grow. However, they also noted that developing reliable state funding streams, and the ability to use these for projects serving active transportation users is also imperative.

External Factors:

Uneven support for Policy across jurisdictions: While most stakeholders expressed an overall positive view of the Policy across a variety of cities and towns in Louisiana and the agencies that focus on transportation improvements, many also observed that the Complete Streets vision is inconsistently embraced (or as one stakeholder describes it, "not a policy issue, more of a politician issue"). In many jurisdictions, stakeholders noted competing priorities simply outweigh the desire to improve conditions for non-motorized users, while in a few places, direct pushback has stymied efforts to advance policy goals. The prevalent perception in some communities that "bikes and peds don't pay gas tax, so why should we spend money on them?" was reported by two stakeholders interviewed, and overcoming this was described as a "massive

philosophical shift." DOTD staff consistently reiterates that, while the agency is committed to implementing the Policy in all regions, local stakeholders must be involved and supportive to achieve optimum outcomes. Continued outreach and leadership is needed to ensure this result. In addition, interviewees cited the need to focus on potential economic benefits, and not just safety benefits, in order to persuade local stakeholders of the merits of policy implementation.

Limited local planning: Stakeholders consistently reiterated the value and necessity of robust local plans to guide state-involved projects. Local jurisdictions with a clear vision for active transportation network development in place are much better positioned to plan and advocate for an integrated approach to funding and project development that balances safety, access, and mobility needs for all across a network. This is particularly important when it comes to major projects or upgrades, such as bridges, where an iterative approach to retrofitting existing facilities to meet changing needs may not be possible. However, many jurisdictions, particularly in rural areas, have conducted little multimodal planning and may require additional support and incentives to initiate conversations around community needs as pertains to Complete Streets accommodation.

Maintenance and liability: A key limiting factor in advancing innovative designs for active transportation is the cost and responsibility of maintenance. Maintenance burdens are technically shared between local jurisdictions and DOTD, depending on whether improvements are within or outside the state-owned right-of-way and the nature of those improvements. Some elements of Complete Streets design are explicitly required to be paid for and maintained by local agencies. "In the absence of maintenance, all you're going to get is a shoulder," as one stakeholder confirmed. Maintenance and liability agreements were identified as barriers in some cases, particularly for unfamiliar treatments or elements for which established maintenance schedules or protocols have not been developed.

Appendix E: Output Mapping and Data Sources

To evaluate the physical outputs of the Policy (i.e., constructed infrastructure serving people walking, bicycling, or using transit), the research team sought to develop baseline spatial datasets identifying the locations of existing active transportation facilities, particularly those constructed by DOTD as identified from reviewing projects in the last 10 years. This mapping exercise includes the geolocation of linear features (e.g., bike lanes and sidewalks) as well as point features (e.g., intersection improvements). For each project identified from the review as including specific features relevant to pedestrian and bicycle accommodation, the research team derived an initial latitude/longitude coordinate point to develop a preliminary map of project distribution. Next, log mile data and, where needed, final project plans were reviewed to define specific start and end locations of pedestrian and bicycle facilities.

This detailed dataset, which can be joined to the extensive project data compiled in the project review, enables analysis of project location by district, facility type, roadway classification, and other categorical or geographic variables. The output file will also be compared against broader project data included in annual legislative reports to identify mechanisms by which routine development of detailed spatial data can be developed and applied in the future.

In addition, in recognition of the need to develop statewide spatial data for planning purposes, the research team initiated the development of GIS Shapefile layers aggregating and synthesizing disparate local datasets (and developing new data where none is currently available) illustrating the spatial location of existing as well as planned or proposed (where available, and published in adopted plans) bike, pedestrian, and transit facilities. These datasets are intended to provide more nuanced baseline data for evaluating the impacts of the Complete Streets Policy implementation over time by illustrating and quantifying active transportation network growth (e.g., miles of new bike lanes and sidewalks, number and distribution of marked crosswalks, etc.). These datasets also provide a tool for project scoping. Specifically, if a proposed DOTD project is planned along or connecting to an existing or planned active transportation facility or route, this context should be considered in project alternative development and design.

The following initial data categories and sources are utilized and/or developed:

- **Sidewalks**—Most local jurisdictions do not currently maintain a detailed spatial dataset indicating the location of pedestrian facilities. DOTD's sidewalk inventory (created based on Automatic Road Analyzer (ARAN) data) indicating locations of sidewalks is currently the most comprehensive dataset documenting pedestrian facilities statewide [76]. This data is collected through automated sensing and developed through post-processing, and

represents a robust summary file of sidewalk facilities statewide as well as their approximate condition. Importantly, preliminary analysis reveals gaps in the accuracy of this data, with numerous segments of roadway with existing sidewalks missing from the dataset, particularly in urban areas. However, this data is a valuable starting point for measuring the general extent and connectivity of pedestrian accommodation.

- **Bicycle and/or Bicycle and Pedestrian Facilities**—Where available, locally developed bikeway or bike and pedestrian facility Shapefiles have been joined to document the extent, type, and completion date of on- and off-street bikeways, shared-use trails, and new dedicated pedestrian facilities. At present, this data is available for the City of New Orleans, Baton Rouge, and Ruston, Louisiana. Additional data layers are currently in development by local agencies in Alexandria and Lafayette. Where requests for local spatial datasets have not been fulfilled or such data does not yet exist, the research team is developing this data using adopted pedestrian and bicycle plans, satellite imagery, and data from OpenStreet Map, TrailsLink, and other online sources.
- **Fixed-Route Transit Routes and Stops**—The locations of all current fixed-route (i.e., not demand-response) transit routes and stops will be aggregated or developed for the following jurisdictions:
    - Shreveport (General Transit Feed Specification (GTFS) data publicly available)
    - Monroe (manually drafted)
    - Alexandria (provided by MPO)
    - Lake Charles (manually drafted)
    - Lafayette (manually drafted)
    - Houma-Thibodeaux (provided by MPO)
    - Baton Rouge (public data portal)
    - Jefferson Parish (provided by MPO)
    - New Orleans (GTFS data publicly available)
    - St. Bernard Parish (manually drafted)

Data for the locations of transit shelters, stop accessibility features, or other transit assets has not yet been developed but is recommended as a future action.

This output mapping task represents a preliminary effort to develop robust statewide data layers, which may be presented in static and interactive formats to facilitate evaluation of the Policy implementation. Notably, as data availability expands, these layers can be expanded, updated, and enriched to include additional facility/program data (e.g., Louisiana Recreational Trails Program projects); pre-existing pedestrian and bicycle facilities where missing in DOTD's sidewalk inventory or not yet developed; new local and MPO-led facilities; and data about

facility quality, condition, LOS, etc. Preliminary Shapefiles developed have been shared with DOTD's GIS department for review, and discussion of next steps to publish and develop protocols for routine update in accordance with research recommendations outlined above.

Appendix F: Outcome Evaluation Method and Case Study Results

As an integral part of transportation planning and management, performance measurement is important for transportation operators and authorities to ensure the system service quality. Several studies have already reviewed typical outcome measures for evaluating Complete Streets projects [37]. This section focuses on comparing different data sources for practical outcome evaluations at the project level over a long time span (i.e., multiple years) and across a large geographic region (i.e., statewide). Understanding the policy goals and objectives is the first step in evaluating project outcomes [46]. The three major goals of Complete Streets policies include safety, mobility, and accessibility [77].

Measuring Safety

Safety measures are mentioned frequently and have more uniform data sources and analytic approaches than the other outcome measures. Typical safety measures include the frequency and type; severity of crashes for motorists, pedestrians, and cyclists; compliance with speed limit (e.g., the percentage of drivers exceeding the speed limit); and crash modification/reduction factors [37], [51], [55], [78]–[81]. Crash records kept by public agencies are the main data source for safety evaluations. In addition to traffic crash, risk of crime and crime-related incidents were also mentioned by some studies as safety measures [80]. Table 18 lists potential data sources for conducting safety evaluations in Louisiana.

Table 18. Potential data sources for safety measures in Louisiana

Data source	Spatial range	Spatial unit	Temporal range	Temporal unit	Measuring
DOTD's Crash 1 and 3 data	State	Longitude/ Latitude	Since 1990	Hour	Traffic crashes
New Orleans Crime Map [82]	Parish	Longitude/ Latitude	Since 2000	Minute	Risk of crime
Baton Rouge Crime Incidents [83]	Parish	Longitude/ Latitude	Since 2011	Minute	Risk of crime
Community Crime Map [84]	Nation (*)	Longitude/ Latitude	Since 2017	Minute	Risk of crime
CrimeMapping.Com [85]	Nation (*)	Longitude/ Latitude	Historical data within six months	Minute	Risk of crime
Crime Data Explorer [86]	Nation	Parish	Since 2003	Year	Risk of crime

(Note: (*) the dataset covers selected areas in each state. The following cities/parishes are included in the datasets: New Orleans, Lafayette, Shreveport, Houma, Iberia, St. Charles, St. James, St. John, and Terrebonne.)

In evaluating spot locations, "crash" was reported as the number of crashes within 150 ft. radius to the centroid of each nearby intersection in this study. The 150-ft. radius matches the threshold applied in Louisiana's Crash Report in defining crashes associated with intersections. Other states may use a different threshold. For example, Florida uses a 50-ft. radius in defining the physical area of an intersection [87]. In evaluating typical road segments, "crash" was reported as the number of crashes within 25 ft., 50 ft., 100 ft., and 150 ft. to the centerline of the road segments under evaluation. The purpose of applying different distance thresholds is to observe crashes on roadway segment and its adjacent area. In evaluating regional areas, "crash" was reported as the number of crashes within the whole region under evaluation.

Crash rate can be calculated only when traffic volume information is available. DOTD's Highway Performance Monitoring System (HPMS) provides traffic volume data on state-owned control sections. Metropolitan planning organizations (MPOs) and other local authorities may collect and maintain traffic volume data on some local streets. For spot locations, crash rate is typically calculated in considering the traffic volume on all intersection approaches as shown in the following equations [88]:

$$MEV_y = \frac{ADT_y \times 365}{10^6} \quad [1]$$

$$Crash\ Rate_y = \frac{Crash\ number_y}{MEV_y} \quad [2]$$

where,

MEV_y stands for million entering vehicles in year y;

$Crash\ Rate_y$ is the number of crashes per million entering vehicles in year y.

For road segments and regional areas, crash rate is typically calculated by using the following equations [88].

$$VMT_y = \sum_n L_{y,n} \times ADT_{y,n} \times 365 \quad [3]$$

$$Crash\ Rate_y = \frac{Crash\ number_y \times 10^6}{VMT_y} \quad [4]$$

where,

VMT_y is the vehicle miles traveled in year y;

$L_{y,n}$ is the length of a road segment n in year t. The unit is miles;

$ADT_{y,n}$ is the average daily traffic on a road segment n in year y. The unit is number of vehicles per day;
$Crash\ Rate_y$ is the number of crashes per million vehicle miles in year y;
$Crash\ number_n$ is the total number of crashes in year y;
$n \in N\ \{all\ road\ sections\ within\ the\ evaluation\ scope\}$.

Measuring Mobility

Typical mobility measures include mode share (e.g., pedestrian counts and transit ridership), vehicle miles traveled (VMT), efficiency in parking/loading, trip consistency (e.g., travel time by mode, travel time reliability, and the percentage of person-hour change in delay), level of service by mode, and multimodal level of service (MMLOS) [55], [78], [89], [90]. Data sources mentioned in past studies include field observations and traffic simulation models [89], [90]. Table 19 lists potential data sources for evaluating mobility. Among the identified sources, Regional Integrated Transportation Information System (RITIS) provides data of the finest unit for project-level mobility evaluations. Most state DOTs in the U.S. have subscribed to its service and can access historical INRIX traffic data from the platform. The traffic data are collected by agencies and third parties from various roadway sensors [72]. Traffic data (e.g., travel speed and time) on interstates and major arterials in the U.S. can be traced back to 2010 with specific time stamps.

Table 19. Potential data sources for mobility measures

Data source	Spatial range	Spatial unit	Temporal range	Temporal unit	Measuring
Regional Integrated Transportation Information System (RITIS)	Nation	Route (to segment)	Since 2010 (*)	Hour	Compliance with speed limit; traffic volume; travel delay; travel time reliability
National Transit Database (NTD) [91]	Nation	Agency	Since 1997	Year (**)	Passenger miles; Unlinked passenger trips; Average trip length; Average cost per trip
General Transit Feed Specification (GTFS) [92]	Nation	Transit route	(Up-to-date)	(Real time)	Transit service frequency

(Note: (*) the dataset has improved geographic coverage since 2017 and continues to be regularly improved. (**) some transit agencies did not begin to submit monthly ridership to NTD until 2002.)

It should be noted that the above-mentioned data sources fit outcome evaluations for road segments but not for spot locations (e.g., intersections), which is a potential data and

measurement gap. In current practice, a good source to get a one-time mobility evaluation for spot locations is from traffic studies. In addition, congestion at intersections is typically focused on autos, without any measure of pedestrian and bicyclist accommodation or delay in the current practice. The Highway Capacity Manual (HCM 2016) included methodologies for calculating a bicycle level of service (BLOS) and pedestrian level of service (PLOS) at signalized intersections [93]. However, the BLOS and PLOS measures are not sensitive to delay [94]. Consequently, any traffic signal improvements will not be reflected through these measures. In addition, BLOS and PLOS tend to be more focused on the user experience/comfort instead of safety. Measuring pedestrian and bicyclist delay is important for safety concerns because undue delay results in pedestrians and bicyclists disregarding traffic signals. The National Cooperative Highway Research Program (NCHRP) recently published a report including pedestrian and bicyclist delay as vital performance measures for intersections [73]. Treatments reducing pedestrian and bicycle delays are also included in the report [73].

The proposed measures were calculated based on traffic speed data from RITIS [72]. First, traffic calming is frequently identified as one of the benefits of implementing Complete Streets [40], [81]. Speeding (or speed limit non-compliance rate) was calculated as the percentage of times that the measured travel speed is greater than the posted speed limit in this study.

Second, congestion reduction is another priority of state DOTs. Reducing the number/width of travel lanes and using the space to accommodate pedestrians and bicyclists may raise the concern of increased congestion for motorists [32]. RITIS data can help inform mobility evaluations for road segments. Congestion is measured in different manners in practice [95]. This study used the speed reduction factor defined by Texas A&M Transportation Institute (TTI) [96]. TTI applies the congestion measure in its nation-wide Urban Mobility Report, which is published each year [97]. RITIS also applies TTI's definition in their system as they calculate travel delay. This study replicated TTI's congestion measure by using the same equation (as shown below) and the same dataset (i.e., RITIS/INRIX) in evaluating mobility outcomes achieved from Complete Streets projects [96]. As defined, morning peak period is from 6 a.m. to 10 a.m., while evening peak period is from 3 p.m. to 7 p.m. For non-freeways, speed reduction factors ranging from 80% to 100% is considered no to low congestion; ranging from 65% to 80% is considered moderate congestion; and less than 65% is considered severe congestion [96]. The case studies presented in the next section discuss how well the congestion measure works in evaluating mobility outcomes from Complete Streets projects.

$$Speed\ reduction\ factor(\%) = \left(\frac{Average\ Peak\ Period\ Speed}{Free\ flow\ speed}\right) * 100\% \quad [5]$$

Measuring Accessibility

Some past studies include mobility measures (i.e., the number of trips by different mode) or connectivity measures (i.e., closing network gaps) in evaluating accessibility [46]. In this study, accessibility refer to connections with major destinations (e.g., schools, employment centers, and parks) [46].

The economic benefits of Complete Streets projects include increased consumer spending, increased property values, higher business occupancy rates, higher employment rate, individual transportation cost savings, and positive perceptions from businesses and residents [46], [51], [55], [78], [81], [98]–[101]. Data sources mentioned in past studies include county/parish property tax databases, sales tax receipts, and surveys of business owners [37], [55], [99], [100]. Sales tax receipts are considered as providing the strongest and the most direct data for business vitality evaluations [99]. However, confidentiality of the data source restricts widespread use in practice. Employment information is considered a moderate indicator but does not fit evaluation at a finer scale (e.g., community or project level) [99].

Typical public health measures include health records (e.g., asthma, diabetes, chronic disease, and obesity cases), physical activity duration and frequency, and exposure to heat/heat-related illness [37], [51], [78], [80], [81]. Data sources include hospital records, self-reported physical activity, household surveys, field data collection, and databases of health-related state/local agencies [37], [51].

Table 20 lists potential data sources for evaluating accessibility along with economic and public health benefits. Among the identified sources, SafeGraph provides data of the finest unit for project-level evaluations. This large-scale data is passively and anonymously collected from mobile devices year-round. The data is available from January 2018 to date and new data is released every month. Specifically, the dataset presents how often 3.6 million points of interests (POIs) were visited by people in the U.S. each month. SafeGraph's POIs are places that fall in categories recorded in the North American Industry Classification System (NAICS). Overall, the dataset covers core public places.

Table 20. Potential data sources for accessibility, economic, and public health measures

Data source	Spatial range	Spatial unit	Temporal range	Temporal unit	Measuring
SafeGraph	Nation	Longitude/ Latitude	Since 2018	Month	Accessibility to major destinations;

Data source	Spatial range	Spatial unit	Temporal range	Temporal unit	Measuring
					Number of new businesses; Activity durations at commercial destinations; Activity durations at outdoor destinations
National Center for Education Statistics	Nation	Address	(*)	(*)	Accessibility to schools and colleges
Census: County Business Pattern (CBP)	Nation	Zone (to zip code)	Since 1994	Year	Accessibility to employment centers; Number of new businesses and employment
Longitudinal Employer-Household Dynamics	Nation	Zone (to census blocks)	Since 2002	Year	Accessibility to employment centers; Number of new businesses and employment
CDC National Environmental Public Health Tracking	Nation	Zone (to parish)	Since 2000	Year	Rates of obesity, asthma, diabetes, etc.
CDC PLACES [102]	Nation	Zone (to census tract)	Since 2021	Year	Health in 29 different indicators

(Note: (*) is based on the time of data collection.)

The proposed measures were calculated based on SafeGraph data. In this study, accessibility was measured by the number of public places covered within 0.2 miles (i.e., 1,000 feet) to the centerline of road segments under evaluation. In addition, the dataset also provides average travel distance from home to public places. Observing the longitudinal variation of travel distances can help find out whether short-distance trips increase after project completion, which is likely to contribute to nearby destination accessibility and area-wide congestion alleviation.

Economic and public health benefits were measured in a similar fashion. Proxies for economic benefits are the number of open/closed commercial businesses, the number of visits to commercial businesses, and the average dwell time (i.e., activity duration) at commercial businesses. Proxies for public health benefits are similar but shifting the place category from commercial businesses to open spaces (e.g., parks and playgrounds) and health-related businesses (e.g., clinics and hospitals).

The number of visits is likely to be affected by the number of devices counted in SafeGraph's data. Table 21 shows the number of devices counted by SafeGraph each year. The number of

visits reported in the following case studies was scaled by dividing the increment factor (shown in the second column on the right-hand-side) for making longitudinal evaluations.

Table 21. The number of devices counted for all the U.S. states

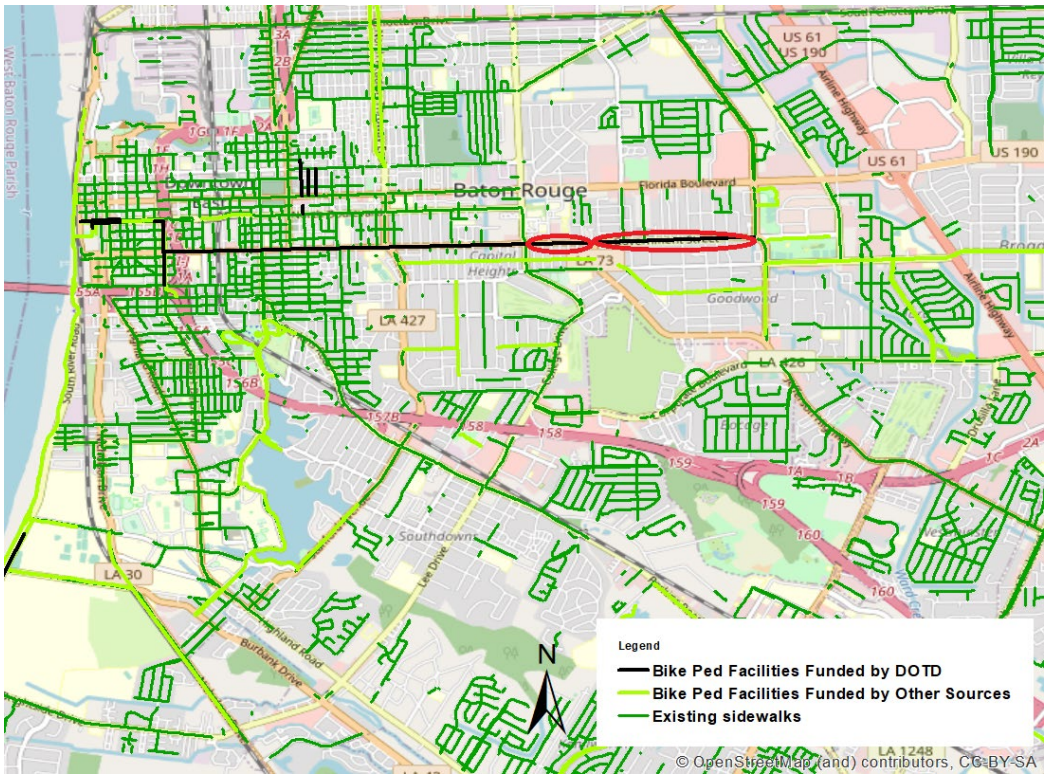
Year	The total number of devices seen in the year	Number of days	The average of devices seen per day	Increment in relative to 2018	Increment in relative to the previous year
2018	5,934,391,271	365	16,258,606	1.00	n/a
2019	6,606,080,908	365	18,098,852	1.11	1.11
2020	6,327,538,728	366	17,288,357	1.06	0.96
2021	5,740,700,020	365	15,727,945	0.97	0.91

(Note: “n/a” means not available.)

Case Study 1: A Corridor Improvement Project in the Capital City

The project is in Downtown/Mid City of Baton Rouge. The horizontal line in the center of Figure 46 shows its location. The project built four miles of bike lanes (4.5 ft.-5 ft.) and sidewalks (4 ft.-12 ft.) on Government Street, which is classified as a minor arterial. The project also involved the road diet concept, converting a four-lane roadway to three lanes. The project was started in early 2018 and marked as complete by the end of 2021. It should be noted that the majority of construction was already completed in early 2021. The evaluation period is from one year before the project starts to the latest date for which data is available.

Figure 46. Complete Streets projects in Downtown/Mid City of Baton Rouge



Safety. Table 22 presents the number of crashes on or near Government Street between East Boulevard and Lobdell Avenue. Four distance thresholds were applied to capture crashes on or near the road segments under evaluation. The number of crashes generally drops from year to year regardless of which threshold is applied.

Table 22. Crashes on or near Government Street (between East Boulevard and Lobdell Avenue)

Distance to the centerline	2017	2018	2019	2020	2021
<=25 ft.	352 (5)	363 (9)	335 (4)	210 (6)	256 (5)
<=50 ft.	382 (5)	397 (10)	352 (4)	226 (6)	287 (5)
<=100 ft.	399 (5)	409 (10)	364 (4)	231 (6)	296 (5)
<=150 ft.	407 (5)	420 (10)	373 (5)	240 (6)	305 (5)

(Note: the values presented in each cell stand for the total number of crashes (out of brackets) and the number of pedestrian and bicyclist involved crashes (in brackets).)

Traffic volume is available for part of the road segments on Government Street (i.e., between East Boulevard and Jefferson Highway.; control section 077-05). Table 23 presents the number of crashes and crash rates for the road segments with available traffic volume data. Crash rates also drop from year to year in general. An additional finding from the presented statistics is that

crash rate increases slightly in the early construction period (i.e., Year 2018), which may raise some concerns to work zone safety issues.

Table 23. Crashes and crash rates on Government St. (between East Boulevard and Jefferson Highway)

	2017	2018	2019	2020	2021
Number of crashes	314	306	261	168	207
ADT (Unit: thousands of vehicles per day)	13	12	12	12	12
VMT (Unit: million vehicle miles traveled pear year)	14	13	13	13	13
Crash rate (Unit: per million vehicle miles traveled)	22.0	22.4	19.0	12.3	15.8

Mobility. The posted speed limit on all segments of this corridor within the study area is 40 mph. According to the design guidance of National Association of City Transportation Officials (NACTO), unprotected bike lanes are generally considered inadequate for road segments with such a posted speed limit to accommodate bicyclists of different ages and abilities [103]. Table 24 presents the speed limit non-compliance rate by direction. The speed limit non-compliance rate drops about 50% on both directions in 2021, indicating that the project contributes to traffic calming since its completion. If we look at individual segments, the speed limit non-compliance rate is relatively higher on the segments between Jefferson Highway and Lobdell Avenue (i.e., segments in the right-hand-side circle in Figure 46) than other segments.

Table 24 also presents average travel speed and speed reduction factor by direction in peak hours. Free flow speed was extracted from RITIS, which defines it as, “the 95th percentile of the speeds between 10 p.m. and 5 a.m. over a 6-month period” [72]. As shown in Table 24, free flow speed is slightly higher than the speed limit on these road segments. This corridor generally sees severe congestion (speed reduction factor < 65%) in peak hours on both directions. If we look at individual segments, the most congested segments are between South Foster Drive and Jefferson Highway (i.e., segments in the left-hand-side circle in Figure 46).

Table 24. Mobility status on Government Street

Direction	2017	2018	2019	2020	2021
Westbound:					
Speed limit non-compliance rate	2.9%	2.7%	2.3%	2.9%	1.5%
Free flow speed (mph)	43	43	43	43	43
Morning peak hour average speed (mph)	27	25	26	27	25
Morning peak hour speed reduction factor	63%	60%	61%	64%	58%
Afternoon peak hour average speed (mph)	24	24	24	25	22
Afternoon peak hour speed reduction factor	57%	57%	56%	59%	52%
Eastbound:					
Speed limit non-compliance rate	2.2%	1.9%	2.3%	2.7%	1.3%
Free flow speed (mph)	43	43	43	43	43

Direction	2017	2018	2019	2020	2021
Morning peak hour average speed (mph)	25	25	25	27	25
Morning peak hour speed reduction factor	60%	59%	59%	64%	59%
Afternoon peak hour average speed (mph)	24	23	23	26	22
Afternoon peak hour speed reduction factor	57%	55%	54%	61%	53%

Accessibility. Table 25 shows that the total number of public places and the average dwell time generally increase from year to year and have a significant increment in 2021. The scaled number of visits significantly drops in 2020 (likely due to the pandemic) and bounces back in 2021. The average travel distance from home also increases in 2021, which means public places near Government Street attract more long-distance trips.

The top place category is "Restaurants and Other Eating Places" due to its leading numbers and attracted visits. Five new restaurants are open since the project completion. This suggests that the project has potentially resulted in economic benefits. In addition, the project provides convenient access to existing health-related businesses (e.g., "Offices of Dentists" listed in Table 25) and attracts new health-related businesses (e.g., three "Offices of Physicians" are open in 2021). Thus the project also has the potential of providing public health benefits.

Table 25. Public places near Government Street

Place category	2018	2019	2020	2021
The number of public places				
TOTAL	**212**	**211**	**228**	**253**
Restaurants and Other Eating Places	48	48	48	53
Offices of Dentists	14	14	14	14
Personal Care Services	16	16	16	14
Religious Organizations	10	10	13	12
Child Day Care Services	9	9	9	9
The scaled number of visits to public places				
TOTAL	**420,925**	**456,788**	**374,217**	**456,266**
Restaurants and Other Eating Places	135,975	150,759	125,810	154,145
Offices of Dentists	6,864	7,637	5,422	4,724
Personal Care Services	6,076	5,937	4,657	4,246
Religious Organizations	26,494	29,982	19,675	20,178
Child Day Care Services	7,831	6,125	4,596	4,812
The average dwell time (in minutes)				
AVERAGE	**76**	**64**	**72**	**86**
Restaurants and Other Eating Places	60	62	67	61
Offices of Dentists	147	155	169	109
Personal Care Services	109	124	118	115

Place category	2018	2019	2020	2021
Religious Organizations	63	64	74	83
Child Day Care Services	110	69	68	55
The average distance from home to public places (in miles)				
AVERAGE	**6.4**	**6.6**	**6.5**	**8.4**
Restaurants and Other Eating Places	5.9	6.4	6.3	7.3
Personal Care Services	6.7	6.6	7.0	7.8
Offices of Dentists	6.7	6.9	7.4	9.9
Religious Organizations	6.2	6.7	7.7	8.5
Child Day Care Services	5.3	6.8	7.2	7.5

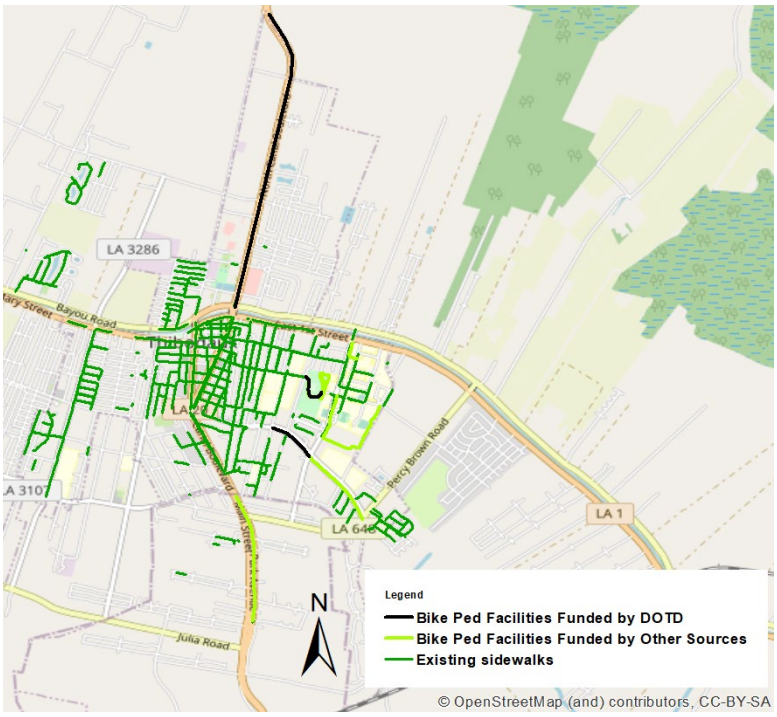
(Note: SafeGraph data is available since 2018. The table only lists the top five place categories.)

Recap. This case study suggests the existing data have the ability to facilitate outcome evaluations on urban corridors. The particular project contributes to traffic calming without inducing heavier traffic congestion. This project also attracts more businesses and longer visits after its completion, which is likely to bring both economic and health benefits.

Case Study 2: A Shoulder Expansion Project in a Small Town

This case study evaluates outcomes from building shoulders, which may be considered adequate Complete Streets accommodation for pedestrians and bicyclists in rural contexts under Louisiana's current Complete Streets design guidance. Figure 47 shows the project stretching out from the center of Thibodaux, which is the parish seat of Lafourche Parish. The 2.67-mile project built 8 ft. shoulders (which may vary to 4 ft. or 10 ft. at some places) and has bike lane markers to indicate that this is a designated bicycle route. The project was started in 2015 and marked as complete in 2017. The evaluation period is from one year before the project starts to the latest date for which data was available.

Figure 47. A shoulder expansion project in Thibodaux, LA



(a) Project location

(b) Bike lane markings (Image source: Google Street View)

Safety. Table 26 presents the number of crashes on or near the road segments under evaluation. Four distance thresholds were applied to capture crashes on road segments and in their adjacent areas.

Table 26. Crashes on or near LA 20 road segments under evaluation

Distance to the centerline	2014	2015	2016	2017	2018	2019	2020	2021
<=25 ft.	28	35 (1)	38	19	23	17 (2)	14	22
<=50 ft.	69	77 (2)	98	40 (1)	49	63 (3)	64	79
<=100 ft.	76	85 (2)	108	62 (1)	80	70 (3)	69	87
<=150 ft.	83	97 (2)	119	71 (1)	87	74 (3)	78	94

(Note: The values presented in each cell stand for the total number of crashes and the number of pedestrian and bicyclist involved crashes (in brackets).)

Traffic volume is available for these road segments on LA 20 (control section 065-06). Table 27 presents the number of crashes and crash rates for the road segments. The number of crashes and crash rate generally drop from year to year.

Table 27. Crashes and crash rates on LA 20 road segments under evaluation

	2014	2015	2016	2017	2018	2019	2020	2021
Number of crashes	71	73	105	61	67	59	66	77
ADT (Unit: thousands of vehicles per day)	12	11	11	11	12	12	12	12
VMT (Unit: million vehicle miles traveled pear year)	11	10	10	10	11	11	11	11
Crash rate (Unit: per million vehicle miles traveled)	6.2	6.7	9.7	5.6	5.9	5.2	5.8	6.8

Mobility. The posted speed limit is 55 mph. Table 28 presents the speed limit non-compliance rate by direction. It should be noted that the RITIS segment (of about 6 miles) is much longer than the road segments under evaluation (of about 3 miles). The data shows speed limit non-compliance rate increase about 50% after the project completion in 2017. Northbound traffic heading out of the town has a higher speeding rate than southbound traffic.

Table 28 also presents the average travel speed and speed reduction factor by direction in peak hours. First, congestion during afternoon peak hours is more severe than that during morning peak hours for both directions. Second, travel speed and speed reduction factors during peak hours increase slightly since the project completion in 2017. Thus the project potentially contributes to congestion alleviation.

Table 28. Mobility status on LA 20 road segments under evaluation

Direction	2014	2015	2016	2017	2018	2019	2020	2021
Northbound:								
Speed limit non-compliance rate	2.0%	2.5%	2.0%	1.9%	3.1%	2.4%	2.9%	3.5%
Free flow speed (mph)	59	59	60	60	60	60	60	60
Morning peak hour average speed (mph)	33	33	33	37	38	37	38	39
Morning peak hour speed reduction factor	55%	56%	55%	62%	64%	61%	63%	65%
Afternoon peak hour average speed (mph)	28	30	29	31	32	31	32	36
Afternoon peak hour speed reduction factor	48%	50%	49%	51%	53%	51%	53%	60%
Southbound:								
Speed limit non-compliance rate	2.2%	1.4%	1.6%	1.4%	2.5%	1.9%	1.9%	2.0%
Free flow speed (mph)	58	58	59	59	59	59	59	59
Morning peak hour average speed (mph)	34	33	32	35	38	37	38	40
Morning peak hour speed reduction factor	58%	57%	55%	59%	64%	63%	64%	69%
Afternoon peak hour average speed (mph)	29	29	30	30	33	31	32	35
Afternoon peak hour speed reduction factor	50%	50%	50%	51%	56%	52%	54%	59%

Accessibility. SafeGraph data do not cover years before the project start/completion, but the data provide an overview regarding how the project makes an impact after its one-year and three-year completion and beyond. Table 29 shows that the total number of public places increases slightly with a larger increment in 2021 (i.e., four-year completion). The total number of visits increases significantly in 2019 and keeps increasing in the following years (even during the pandemic). The average dwell time increases and reaches a peak in 2020. The average travel distance from home slightly drops, which means short-distance trips may be increasing in the study area.

"Restaurants and Other Eating Places" is the top place category in this case as well. The number of restaurants and the number of attracted visits are both the highest among all the place categories. The project also connects local communities to existing health-related businesses (e.g., offices of dentists and physicians) but it does not attract any new health-related businesses.

Table 29. Public places near LA 20 road segments under evaluation

Place category	2018	2019	2020	2021
The number of public places				
TOTAL	**101**	**100**	**103**	**111**

Place category	2018	2019	2020	2021
Restaurants and Other Eating Places	33	33	32	35
Health and Personal Care Stores	5	5	6	8
Depository Credit Intermediation	7	7	7	6
Gasoline Stations	4	4	5	5
General Merchandise Stores, including Warehouse Clubs and Supercenters	4	4	4	4
The scaled number of visits to public places				
TOTAL	**494,878**	**637,816**	**714,563**	**946,482**
Restaurants and Other Eating Places	144,667	194,447	228,449	278,019
Health and Personal Care Stores	25,055	31,333	37,378	42,204
Depository Credit Intermediation	2,692	3,859	3,976	5,397
Gasoline Stations	19,517	21,753	32,108	52,369
General Merchandise Stores, including Warehouse Clubs and Supercenters	85,662	110,796	117,199	111,385
The average dwell time (in minutes)				
AVERAGE	**50**	**58**	**63**	**57**
Restaurants and Other Eating Places	32	26	21	18
Health and Personal Care Stores	29	31	15	20
Depository Credit Intermediation	16	24	64	17
Gasoline Stations	8	10	10	14
General Merchandise Stores, including Warehouse Clubs and Supercenters	21	20	19	17
The average distance from home to public places (in miles)				
AVERAGE	**7.3**	**7.3**	**6.2**	**6.4**
Restaurants and Other Eating Places	5.1	5.2	5.5	6.1
Health and Personal Care Stores	4.4	5.0	4.6	4.5
Depository Credit Intermediation	4.0	4.4	4.7	5.1
Gasoline Stations	4.7	4.5	4.2	4.7
General Merchandise Stores, including Warehouse Clubs and Supercenters	4.7	5.0	5.1	6.6

(Note: The table only lists the top five place categories. Shaded cells represent unusual variations (i.e., ± 40% and beyond) from the previous year. "Depository Credit Intermediation" refers to places like banks and mortgage companies.)

Recap. Overall, this shoulder expansion project contributes to congestion alleviation, but speeding issues might be of potential concern in a longer term. Public places on the corridor attract an increasing number of visits even after the pandemic started spreading in 2020. The number of businesses like restaurants increases, which is likely to bring economic benefits. The project also has the potential of making public health benefits for providing convenient access to health-related businesses.

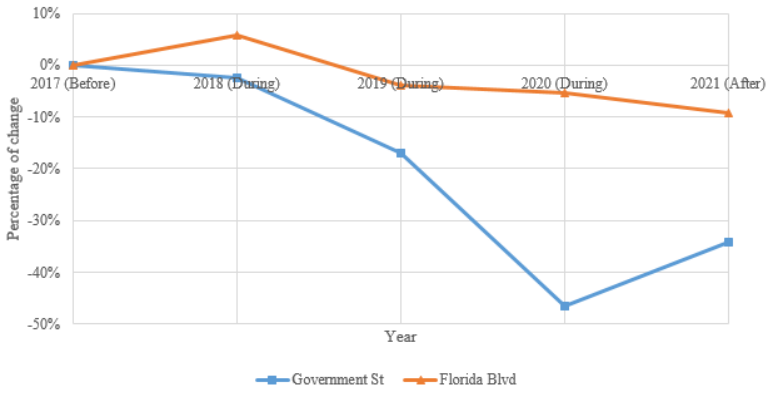
Incorporate Data of Control Groups

Additional data were collected for the two construction projects' control groups. The first project's control group for comparison is on a parallel route (i.e., Florida Boulevard; classified as a major arterial) that is about half a mile to the north of Government Street. The second project's control group for comparison is on LA 24, which is a major arterial. LA 24 connects with LA 20 but the selected LA 24 segments are about two miles to the south of the LA 20 segments under evaluation.

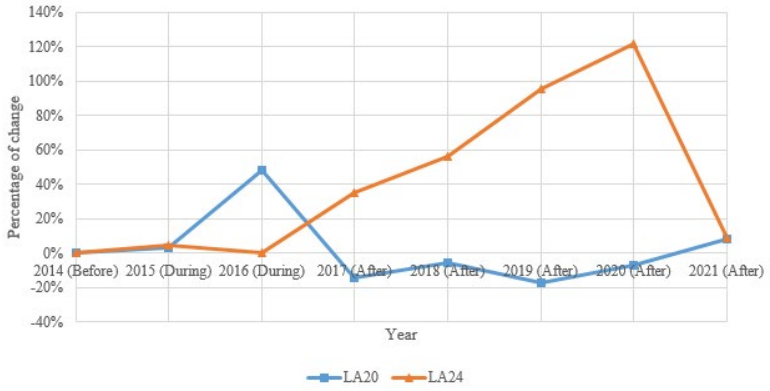
Safety. Figure 48 plots the percentage change of crashes relative to the base year (i.e., the year before construction). Here percentage change instead of absolute change was used to account for traffic volume disparities. Case 1 (i.e., Government Street vs. Florida Boulevard) shows that the crash rate dropped significantly on Government Street after project completion, while the rate roughly maintained the same on Florida Boulevard. In addition, the crash reduction rate of the Government Street project is 34%, which falls in the range of FHWA's crash reduction statistics [104]. Case 2 (i.e., LA 20 vs LA 24) shows that safety benefits from building shoulders on LA 20 may be limited since the crash reduction rate was less than 20% in the first few years after project completion and started increasing in the fifth year.

In addition, work zone safety issues in rural areas may need public authorities' attention. Specifically, Case 2 presents two crash peaks during the construction time period: (1) the peak appeared on LA 20 in 2016 was likely due to construction on the road segments under evaluation; and (2) the peak appeared on LA 24 in 2020 was likely due to pavement preservation work on its downstream road segments.

Figure 48. Percentage change of crashes in relative to the base year



(a) Case 1



(b) Case 2

Table 30 presents statistical significance of several factors that affect crash reduction in the study's context. First, the project located in an urban area had greater crash reduction impacts. Second, crash reduction impacts weakened after project completion, which seems counter-intuitive. The pandemic situation in 2020 (influencing traffic volume) and work zone safety countermeasures (influencing traffic speed) might be potential explanations for Case 1. The lasting effects of safety countermeasures could be potential explanations for Case 2. Third, ongoing construction could have negative safety impacts to up/down-stream roads without construction. This result calls for safety countermeasures to be applied at transitioning areas (i.e., between work zone and no-construction zone).

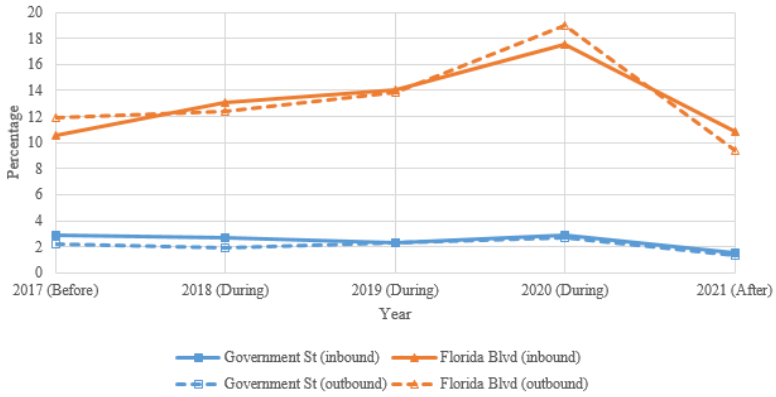
Table 30. Linear regression results on crash reduction

Variable	Parameter	Std. Error	t-value	p-value
Constant	-88.23	33.67	-2.62	0.02*
Urban/Rural (1 = Urban)	-31.06	14.47	-2.15	0.05*
Project completion status (1 = Complete)	104.53	31.69	3.30	0.00**
Up/down-stream construction(1 = Yes)	105.44	30.47	3.46	0.00**

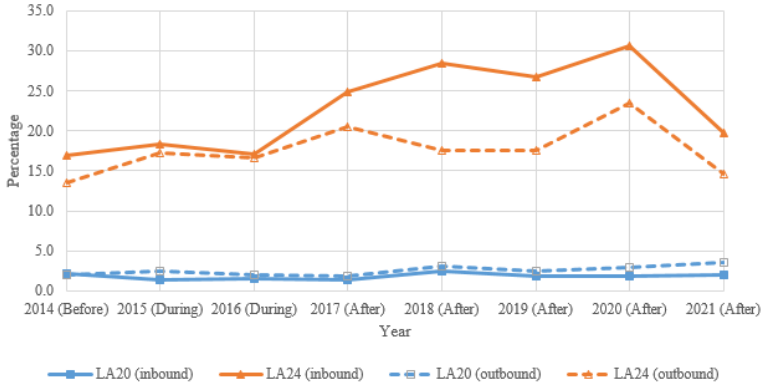
(Note: *p < .1; **p < .05; Multiple R-squared = 0.54; Adjusted R-squared = 0.46)

Mobility. Figure 49 plots how posted speed limit non-compliance rate changed. Without considering control groups, the non-compliance rate of traffic on Government Street dropped after project completion while the non-compliance rate of traffic on LA 20 increased slightly after project completion. If control groups are considered, the non-compliance rates on Government Street and LA 20 were much lower than their control groups, respectively, and did not change very significantly. In addition, traffic on control group road segments had higher non-compliance rates in 2020 (which is the pandemic outbreak year) than the other years, which might be of interest to studies investigating pandemic impacts on transportation.

Figure 49. Posted speed limit non-compliance rate



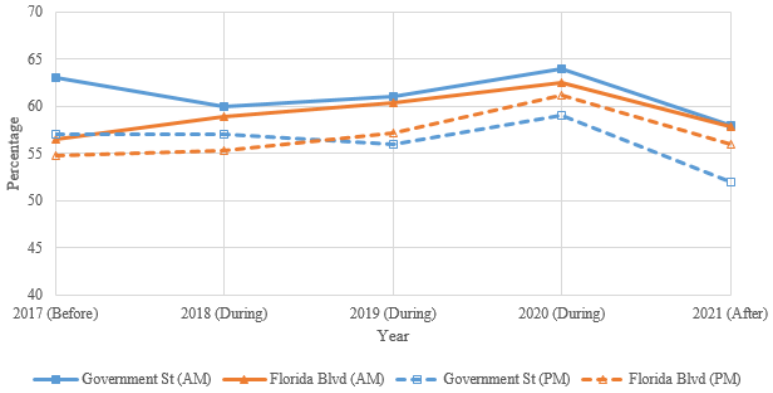
(a) Case 1



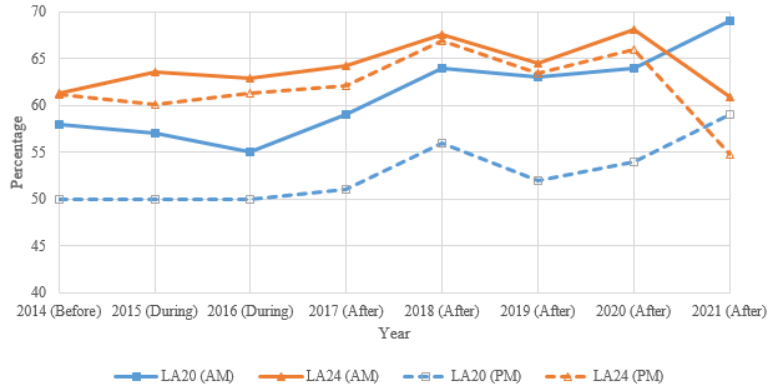
(b) Case 2

Figure 50 plots how peak hour speed reduction factor changed. For non-freeways, a speed reduction factor ranging from 65% to 80% is considered moderate congestion, while less than 65% is considered severe congestion [97]. The two roadways in Case 1 were classified as experiencing severe congestion (i.e., speed reduction factors less than 65%) before, during, and after project construction. Traffic conditions on the two roadways tended to improve in 2020 but became worse in 2021. In addition, traffic experienced relatively more severe congestion during afternoon peak hours than during morning peak hours. In Case 2, traffic condition on LA 24 was slightly better than that on LA 20, but the situation reversed in 2021.

Figure 50. Peak hour speed reduction factor



(a) Case 1



(b) Case 2

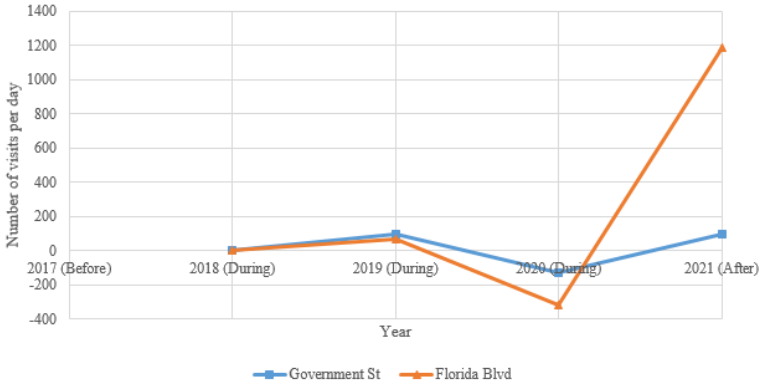
Statistically significant findings in mobility are limited to the following aspects. First, the correlation between posted speed limit non-compliance rate and peak hour speed reduction factor is 0.54 for morning peak and 0.79 for afternoon peak. The moderate correlations (> 0.50) between the two speed-related factors reiterate that speeding is less likely to occur in hours with heavier congestion. Second, highway functional classification (1 = major arterial and 0 = minor arterial) has a statistically significant linear association with posted speed limit non-compliance rate (parameter = 10.10, p-value = 0.04). This finding means we are more likely to observe speeding issues on major arterial than on minor arterial. Third, the pandemic indicator (1 = Yes and 0 = No) has a statistically significant linear association with the morning peak hour speed reduction factor (parameter = 2.37, p-value = 0.03). This finding means morning peak hours became less congested during the pandemic. Future studies with more samples and greater variations in contextual factors should help better explain the above-mentioned observations.

Accessibility. Figure 51 shows the number of daily visits to public places covered within 0.2 miles (i.e., 1,000 ft.) to the centerline of road segments under evaluation. SafeGraph data is available since 2018 so that the plots only show how daily visits changed afterwards. Even though the amount of data is limited to date, this dataset has potential for future longitudinal project outcome evaluations.

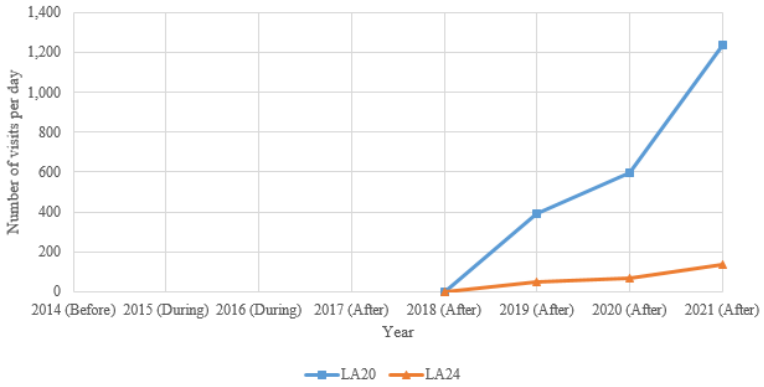
Case 1 shows that the control group (Florida Boulevard) outperformed Government Street. The significant visit increase on Florida Boulevard in 2021 can be attributed to the opening of one museum and five personal care stores on Florida Boulevard in that year. Meanwhile, the number of visits to public places on Government Street did not change significantly. The first explanation is related to highway functional classification. Florida Boulevard is a major arterial with traffic flow of about 24,000 vehicles/day, while Government Street is a minor arterial with about 12,000 vehicles/day. The second explanation is that the "after" evaluation time period is not long enough. For example, past studies suggested measuring project performance "one year before construction and then after one year and after three years" as a best practice [46], [105].

Case 2 shows that LA 20 outperformed its control group (LA 24) from about the third year after project completion. New businesses (including restaurants and strip malls) have driven an increase in the number of visits to public places on LA 20 since then.

Figure 51. Absolute change of daily visits in relative to 2018



(a) Case 1


1,400
1,200
1,000
800
600
400
200
0
Number of visits per day
2014 (Before)
2015 (During)
2016 (During)
2017 (After)
2018 (After)
2019 (After)
2020 (After)
2021 (After)
Year
LA20
LA24

(b) Case 2

Appendix G: Integrating the Concept of Complete Streets into Pavement Preservation

A large share of projects funded by state Departments of Transportation (DOTs) are for pavement preservation, which intends to maintain roadway pavement condition above a minimum acceptable level. The language of Complete Streets Policy indicates that the concept is theoretically applicable to all types of projects from new construction/reconstruction to preservation/rehabilitation. The project team started from a broader scan of state DOTs' official and publicly accessible documents, which discusses their preservation program (e.g., program guidelines and design manuals) and/or Complete Streets implementation (e.g., action plans and design guidelines). The broader scan led the project team to focus on 10 states with relatively more information responding to the "input" and "activity" components from the policy implementation logic model (i.e., cooperation, funding, staff training, and performance measure development).

Overall Strategies

The first column in Table 31 shows when each state DOT adopted/revised their Complete Streets policy. The second column presents synonymous terms for preservation programs utilized by different states in agency documents. Despite variation in how preservation programs are named, the authors refer to those pavement projects that need to be completed within the existing right-of-way and do not incur excessive costs. The rest of the columns present overall strategies mentioned by each state in their policy. The following subsections summarize challenges identified in applying low-cost safety countermeasures, implementing road diets, and upgrading preservation projects to involve construction.

Table 31. Concept integration strategies

State and policy year	Preservation synonyms	Low-cost safety improvement	Road diet	Project upgrade
Colorado (2009/2017)	Resurfacing and maintenance	√	×	√
Connecticut (2014)	Maintenance	√	√	×
Delaware (2009)	Maintenance and pavement rehabilitation	√	√	×
Florida (2014)	Resurfacing, restoration, and rehabilitation	√	×	√
Georgia (2012)	Maintenance	√	√	×
Minnesota (2013)	Rehabilitation and resurfacing	√	×	×
North Carolina (2000/2012)	Maintenance and resurfacing	√	√	√

State and policy year	Preservation synonyms	Low-cost safety improvement	Road diet	Project upgrade
Tennessee (2003/2015)	Resurfacing	√	√	×
Texas (2011)	Resurfacing and restriping	√	√	×
Washington (2011)	Preservation	√	√	×

(Note: '√' means the strategy is considered. '×' means the strategy is not considered.)

Challenges in Applying Low-Cost Safety Improvements. Low-cost safety improvements refer to interim treatments that can be applied at high crash locations. FHWA includes 28 low-cost safety improvement solutions in five crash focus areas: speed management, roadway departure, intersection, pedestrian/bicyclist, and crosscutting [106].

Past studies have noted the opportunity and significance of integrating safety into preservation programs. In 2006, a project team reviewed the effectiveness of incorporating safety improvements in pavement preservation [107]. The scan team included experts affiliated with FHWA/state DOTs with a background in highway design, local government operations, maintenance, pavement management, and safety. The most critical issue identified from the review was insufficient resources to address either all pavement preservation needs or all safety needs. Based on their review, several states have taken programmatic approaches to integrate safety into pavement preservation, such as including design matrices to provide standards for various projects, and following a project development guide to understand "what kind of safety treatments should be considered into preservation projects" and "when they should be completed" [107]. The expert team also observed some good institutional practices (e.g., establishing multi-fund project tracking, allowing for flexible project development cycles, and engaging safety experts in project development) and technical practices (e.g., identifying targeted safety improvements, installing traffic control devices and guidelines, and improving private and public access points) [107]. In 2011, Georgia DOT identified several challenges in integrating safety into preservation: (1) limited pavement preservation funding preventing additional funds being allocated for safety improvements, and (2) reliance on pavement condition as the top criteria in project selection [108].

Challenges in Implementing Road Diet. Road diet (or lane elimination) is to "remove travel lanes from a roadway and utilize the space for other uses and travel modes" [109]. The most common road diet application is to convert a four-lane undivided roadway into a three-lane undivided roadway (which is made up of two through lanes and a center two-way left-turn lane) [109]. Florida, Michigan, and Maine DOTs have stand-alone policies for road diet implementation. Those policies include road diet examples, impacts and limitations, minimum requirements, implementation guidance, etc. [110]. Some states (e.g., New Jersey, Ohio, Rhode Island, South Dakota, and Washington) include road diets in their Strategic Highway Safety

Plans (SHSPs) [110]. These state SHSPs consider road diets to help address safety issues involving lane departures, bicyclists, pedestrians, and intersections [110]. Some other states and local agencies may incorporate road diets in in their design manuals, Complete Streets plans, bicycle and pedestrian plans, or speed management and traffic calming plans [110].

Road diets are implemented to calm traffic, improve pedestrian safety, and add space for bicyclists, but may also raises several concerns [109]. First, road capacity reduction could induce traffic congestion and negatively affect motorists. Second, road diets may negatively affect commercial vehicle (e.g., truck) drivers due to lane width reduction. Third, maintenance funding can be affected in some states since lane miles are reduced after a road diet. In addition to these concerns, agencies also need to coordinate with various stakeholders (e.g., transit agencies), facilitate public outreach, and conduct rigorous planning and design studies to determine whether road diet is an appropriate alternative in a given context [109]. Overall, road diets are a low-cost safety solution when installation is coordinated with scheduled pavement preservation, but may require a substantial amount of engineering effort to implement.

Challenges in Upgrading Projects. Many agencies have a short timeframe to develop preservation projects, which can be less than nine months from the project list being developed to bids being requested [111]. The short timeframe can make it difficult to incorporate walking/biking facilities into preservation projects. In addition, preservation processes are largely driven by roadway conditions rather than improving safety or accommodating walking/biking needs.

Past studies discussed improving walking/biking network connectivity during preservation works [111], [112]. One study suggested the following approaches for improvement: providing longer project timeframes so that walking/biking facilities can be considered; involving agency staff with multimodal transportation experience/responsibilities in the preservation process; consulting local, regional, and state walking/biking plans in developing preservation project lists; and being flexible in walking/biking facility designs.

Supporting Documents

Supporting documents are used as references to identify Complete Streets opportunities in pavement preservation. Some states (e.g., Colorado, Georgia, and Washington) used their roadway design guideline handbook to guide all types of projects applying low-cost safety countermeasures, while some states (e.g., Connecticut and Georgia) included such content in their pedestrian and/or bicyclist safety action plans. Some states (e.g., North Carolina and Texas)

have developed dedicated design guidelines for Complete Streets implementation. The following subsections introduce how these states are implementing their strategies in practice and what content is included in their supporting documents for effective strategy implementation.

Facilitate Planning Activities. Chapter 8 of North Carolina DOT's *Complete Streets Planning and Design Guidelines* discusses "Implementing Complete Streets in Maintenance and Operation" in detail [113]. First, the chapter emphasizes that maintenance and operation projects provide substantial opportunity to integrate Complete Streets. It should be noted that NCDOT's integration principle is not to consider Complete Streets as "additional" elements but to consider it as a part of the project development process. Second, the chapter also presents their implementation process: "(1) NCDOT shares resurfacing lists with local government (some counties even develop a tentative 3-year resurfacing list); (2) local government reviews the resurfacing list for potential revisions to striping, lane assignments, shoulder widening, etc.; (3) local government or MPO/rural planning organization (RPO) as appropriate provides recommendations to NCDOT with supporting data, signal, and pavement marking plans (if necessary); (4) NCDOT reviews recommendations; and (5) NCDOT and local government collaboratively develop a plan for implementation." Third, the chapter provides lessons learned and project examples as further support. Overall, the document recognizes the tight schedule of preservation projects and their compressed project development process. Thus, the need for earlier and more intensive coordination between NCDOT and the local government is highlighted repeatedly to ensure successful policy implementation.

Table 32. Supporting documents

State	Manual, guideline, plan, and form
Colorado	Policy Directive 548.0: Safety Considerations on 3R Projects [114]; Roadway Design Guideline [115]; High Priority Bicycle and Pedestrian Corridors and Seasonal Paths [116]; Bicycle and Pedestrian Exemption Request Form [116]
Connecticut	Comprehensive Pedestrian Safety Strategy [117]
Delaware	Complete Streets in Delaware: A Guide for Local Governments [118]; ADA Transition Plan Self-Evaluation Checklist [118]
Florida	Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways [119]
Georgia	Pedestrian Safety Action Plan [120]; Bicycle Safety Action Plan [121]; Design Policy Manual [26]
Minnesota	Complete Streets Implementation Resource Guide for Minnesota Local Agencies [122]; Complete Streets-Minnesota Department of Transportation" [123]
North Carolina	NCDOT Complete Streets Planning and Design Guidelines [124]
Tennessee	TDOT Multimodal Project Scoping Manual [125]; Pedestrian Accessibility and Bicycle Accommodation Checklist [126]
Texas	Strategic Direction Report: Opportunities for TxDOT's Bicycle program [127]

State	Manual, guideline, plan, and form
Washington	Washington state DOT design manual [128]

Facilitate Design Activities. Chapter 14 of Colorado DOT's Roadway Design Guideline is dedicated to bicycle and pedestrian facility design [115]. First, the chapter re-emphasizes that designers must consider safety improvements for bicyclists and pedestrians in preservation projects according to Policy Directive 548.0: Safety Considerations on 3R Projects. If the needs warrant, project managers shall seek other funding sources to supplement project budgets and document their fund-obtaining actions/results in the design file. The project manager also determines whether other bicyclist and pedestrian projects are planned in the same area to identify potential opportunities for project consolidation. Second, in addition to providing detailed guidelines for bicycles and pedestrian facility design, the document specifies that any design exceptions must be documented in a design letter and get approval from both the Regional Transportation Director and the headquarter Bicycle Pedestrian Coordinator. The Bicycle and Pedestrian Exemption Request form explicitly lists all project types (including resurfacing and rehabilitation) and requests project exemption justifications. Third, low-cost safety improvement methods are well integrated in this chapter. Design references from AASHTO and FHWA (e.g., MUTCD) are cited as additional supports.

Chapter 9 of Georgia DOT's Design Policy Manual provides detailed interpretations towards their Complete Streets policy [26]. First, example bicycle and pedestrian network maps are provided to encourage regional commissions, MPOs, and local governments to develop walking and biking networks for continuous and convenient connections. The GDOT State Bicycle and Pedestrian Coordinator (within the Safety Unit of the GDOT Office of Traffic Operations) is the point of contact for local authorities to consult with questions. Second, similar to Colorado, GDOT also: (1) integrates low-cost safety improvement methods into their bicycle, pedestrian, and transit accommodation design guidelines, and (2) cites additional design references from AASHTO and FHWA for supports.

Facilitate Safety Actions. Georgia DOT includes improving safety for pedestrians and bicyclists in preservation projects as one of the strategies in their Pedestrian Safety Action Plan [120] and Bicycle Safety Action Plan (GDOT 2018b). Responsible parties, timeframes, and local actions are defined with annual performance reviews.

Connecticut DOT published their Comprehensive Pedestrian Safety Strategy in 2021 [129]. The document covers traffic calming, improving crosswalk design, upgrading signalized intersection, and implementing road diets. The document also states that "a feasibility assessment for road diets on state roadways is currently ongoing. Additionally, a feasibility assessment will be

initiated over the next year to identify potential road diets on municipally owned roadways. This exemplifies state DOT leadership in road diet implementation, and more broadly, in the Complete Streets movement.

Inputs and Activities

This section discusses how state DOTs build partnerships with stakeholders, funding sources and communication channels available, trainings provided to agency staff, and outcomes state DOTs aim to achieve from integrating the concept of Complete Streets into preservation.

Partnership. State DOTs involve various stakeholders (e.g., local agencies, MPOs/RPOs, and regional/district offices) at different stages for effective concept integration. Some states (e.g., Georgia) have a task force team involving a wide variety of stakeholders from the state to continuously review and maintain policy implementation. Some states (e.g., Colorado and Georgia) have a bicycle and pedestrian coordinator at their headquarters or representatives at their regional/district offices as the point of contacts for local governments. This subsection discusses how some of the state DOTs are collaborating with various stakeholders at different project stages.

A state's DOT, MPOs/RPOs, and counties/cities may all adopt their own Complete Streets policy and have their own implementation plan. A better understanding of the policies and plans adopted by different authorities within a state perhaps is a first step to improve communication. For example, Minnesota DOT summarizes local agencies' practices and policies in a table to enhance mutual understanding. The table summarizes different counties' and MPOs' Complete Streets approach by discussing parameters like policy adoption, definition, consideration of policy (must/shall basis), exceptions, review process, jurisdiction sharing, and performance measures.

When it comes to project selection and development, North Carolina DOT (NCDOT) and Tennessee DOT (TDOT) both mention the opportunity of moving their one-year list of upcoming preservation projects to a three-year list of tentative projects. NCDOT and local agencies meet to discuss the upcoming annual resurfacing schedule and identify Complete Streets opportunities once these projects are identified [113]. TDOT's resurfacing project list is shared with local and regional agencies to draw local attention, solicit feedback, and invite local funding contributions. TDOT also posts these projects on an online mapping platform to help the public identify upcoming projects near their neighborhood [130]. For Complete Streets exemption, Delaware DOT involves the following stakeholders in their exemption review process [131]: Title II ADA

coordinator, pedestrian coordinator, bicycle coordinator, transit planning manager, DOT representative, and MPO representative.

Once a project is completed, routine maintenance is needed and such maintenance responsibilities could become a hurdle for effective concept integration. Texas DOT (TxDOT) states, “maintaining bikeways within the roadway footprint (bike lane, shoulder) and a maintenance agreement is generally executed with the local entity for accommodations adjacent to the roadway. Maintenance is handled at the district level” [132]. Tennessee DOT (TDOT) states, “the operation and maintenance of the signals are typically the responsibility of the local agency. This includes maintaining appropriate signal timing strategies” [125]. Similarly, Florida DOT (FDOT) states, “upgrading the safety of the facilities during maintenance intervals is the responsibility of local agency and special attention should be given for pedestrian and bicyclist safety strategies like crosswalks and bicycle facilities”[119]. Soliciting local input might be the first step for concept integration in this process but follow-up activities like keeping/developing model maintenance agreements (e.g., clarifying maintenance responsibilities by Complete Streets element) can help agencies streamline the process and benefit policy implementation in the long term.

Responsibilities of different stakeholders could be complex and need additional clarification. Delaware DOT (DelDOT) uses a Complete Streets Subdivision Evaluation Matrix to specify responsibilities of cities, towns, and counties [118]. Municipalities’ responsibilities involve pedestrian accommodations (sidewalks), street overlay (connectivity design, block length), and ADA compliance. DelDOT’s responsibilities involve bicyclist accommodations (bicycle lanes/bicycle trails/shared use); pedestrian accommodations (sidewalk amenities, crosswalks, striping, and midblock crossings); transit accommodations (crosswalks/sidewalks near transit stops, and transit stop amenities); and street layout (narrow roads/traffic calming, connectivity design) [118].

Funding. The U.S. DOT provides a list of pedestrian and bicycle funding opportunities [133]. Funding programs are from the Office of the Secretary (OST), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), and FHWA. The list also presents program eligibility requirements that activities and projects need to meet.

In addition to funding sources, communication channels are also important in promoting concept integration strategies. According to Colorado DOT’s (CDOT) Roadway Design Guideline, CDOT’s Highway Maintenance Division can contact CDOT’s Chief Finance Officer to seek a budget to support integrating the concept into preservation activities. Texas DOT provides a funding program list that can fund bicycle and pedestrian improvements [132] in their strategic

guide book. TxDOT also provides how much they spent on bicycle and pedestrian projects by funding program [132]. Georgia DOT's bicycle and pedestrian action plans explain funding strategies/actions, responsible parties, and timeframes in detail with annual performance review. Their plans also introduce funding programs/amounts and define electricity and maintenance responsibility in discussing their partnership with local jurisdictions.

Staff Training. Staff training serves as one of the key factors for better projects' design. Staff training, in general, entails department staff, engineers, and planners receiving training in specific studies and becoming more familiar with the design policy, vision, roles, and responsibilities involved in decision-making. State DOTs are at different stages in developing their own training programs.

Colorado DOT has a well-established bicycle and pedestrian accommodation training program. As requested, region traffic engineers and design engineers are trained in "Bicycle and Pedestrian Facility Design" at least once every five years. Region bicycle and pedestrian representatives also get trained every five years in bicycle and pedestrian accommodation to serve as an expert in pedestrian and bicycle subject matter, and distribute information and best practices regarding bicycle and pedestrian accommodation to region staff. In addition, their highway maintenance curriculum includes bicycle and pedestrian training.

Florida DOT considers training their staff and consultants on FDOT projects as a core part of the department's mission. Training is being developed to fit the specific audience and their job responsibility roles (i.e., project managers and administrators; planners and environmental management office staff; design engineers; traffic operations; district bicycle and pedestrian coordinators; district bicycle and pedestrian safety specialists; district, MPO, and local government liaisons). FDOT outlines a "Complete Streets Training Program" framework that consists of a series of courses delivered in different manners: (1) workshop courses (to facilitate a policy-level discussion on vision, roles, and implications of decision-making); (2) computer-based training (CBT) courses (in-depth understanding of specific documents and travel modes using interactive modules); (3) public education and outreach tools (brochures and flyers); and (4) training for regional and local agencies (using a Mobility Review Guide and Multimodal Best Practices Guide).

Texas DOT plans to train their engineering, planning, environmental, and construction staff on bicyclist accommodations. TxDOT's bicycle program staff plans to develop their training programs by reviewing the department's needs and best practices. Training providers (i.e., instructors) and training types (i.e., courses and webinars) will then be determined for content delivery.

Performance Measures. Project performance/outcome evaluation helps measure project success after completion. State DOTs choose different evaluation processes and measurement tools. Among the states reviewed, Connecticut, Delaware, and Tennessee have clearly articulated evaluation processes.

Connecticut DOT uses before-and-after analysis to test the effectiveness of pedestrian safety zones. Using crash data (collected from municipal engineering studies) as a "before" analysis, CDOT works with University of Connecticut Transportation Research Center (UConn T2 Center) to perform an "after" study and assess project performance.

Delaware DOT conducts a before-and-after visualization test with the help from an "Institute for Public Administration (IPA)" research team. DelDOT plans to use IPA's online toolkit to understand how existing transportation infrastructure can be improved. As a part of the visualization test, IPA's research team conducts a series of field visits and photographs those locations by using the IPA's online toolkit. The toolkit's graphical representations assist local decision-makers in understanding how to include Complete Streets elements in future preservation projects.

Tennessee DOT's Data Visualization Portfolio includes a "Multimodal Suitability Index." The index considers four major factors (Safety, Equity, Multimodal Demand, and Supply) for project evaluation and prioritization. Weighting of the factors is also considered and is intended to be modifiable based on users' input.

Practice Gap Summary

The practice gap in integrating Complete Streets into preservation projects encouraged the research team to learn from best practices. The following are a few identified major challenges and relevant solutions for states' consideration. First, preservation projects have much quicker turn-around time than other types of projects—the average time lapse from design to letting could be less than one year [77]. Resurfacing lists are typically developed and published each year in current state DOTs' practices. North Carolina DOT (NCDOT) [113] and Tennessee DOT (TDOT) [130] both share their tentative three-year resurfacing project list with stakeholders for more effective Complete Streets policy implementation. Earlier communication and more intensive collaboration are highlighted to promote successful practice.

Second, funding is a key concern for most states. Making funding sources, available funding amounts, eligible activities, and application criteria publicly accessible are important to ensure successful concept integration. Texas DOT (TxDOT) uses a funding program matrix to list

various funding sources available for bicycle and pedestrian infrastructure in Texas [132]. The U.S. DOT also publishes their pedestrian and bicycle funding opportunity matrix to illustrate what activities can be supported by federal funds [133].

Third, clarifying responsibilities of involved stakeholders is another area to ensure successful concept integration. Within a state DOT, Colorado clearly specifies the responsibilities of chief engineer, region transportation directors, region engineers and design engineers, region bicycle and pedestrian representative, highway maintenance, and multimodal planning branch and region planners in ensuring effective Complete Streets outcomes [116]. A point of contact within the agency is provided for external stakeholders to consult on any questions [116]. For stakeholders out of a state DOT, Delaware specifies responsibilities of cities, towns, or counties in a matrix [118].

Fourth, data availability is a gap preventing states from evaluating project outcomes. North Carolina DOT (NCDOT) evaluated their Complete Streets policy in 2018. Their evaluation report indicated that limited availability of data on bicycle and pedestrian facility use and crashes is a barrier to making quantitative evaluations [56]. Data limitations are also identified as one of five challenges in FHWA's recent proposal of moving to a Complete Streets design model [134].

The current study only included publicly accessible documents in our review. When opportunities emerge, future studies might want to conduct surveys or interviews with state DOTs to gain in-depth understanding of concept integration procedures and challenges in practice. This study limitation perhaps reminds state DOTs to make their policy implementation supporting documents publicly available to their best extent. The open-access efforts could help build consensus among stakeholders from various agencies in a state and achieve more effective policy implementation outcomes in the future.

Tentative Concept Integration Roadmap for DOTD's Pavement Preservation Program

The following are some program specific recommendations. Recommendations are listed in chronological order:

Consider more low-cost safety countermeasures:

- Update the "Baseline Safety Improvement Checklist" to include safety considerations for bicyclists and pedestrians. Two associated update actions are: (1) updating/developing documents (e.g., design guidelines, safety action plan) to guide safety considerations for

bicyclists and pedestrians, and (2) specifying a point of contact for further consultations. Staff training might be needed in this process to maintain mutual understanding.
- Rigorous considerations of low-cost safety countermeasures (e.g., speed management) during/after preservation work to reduce crash risk. Preliminary results from the research team's study found that speeding might be an issue during/after preservation work, which indicates higher crash risk and potentially leads to greater number of crashes. The research team extended our work to investigate which type of preservation works need speed management the most and when is the best time (relative to project start) to implement speed management. Once the study is completed, results will be shared with DOTD to support quick decisions on speed management implementation.

Consider roadway reconfiguration ("road diet"):

- Develop quick-decision support tools to include mobility and accessibility into considerations. Sometimes the number of crashes might be low only because of insufficient facilities and suppressed demand. As a solution, conducting a statewide road diet study, which takes mobility needs, roadway characteristics, and public responses into considerations, can better support future decisions.

Consider project upgrade:

- Investigate the possibility of moving from one-year project list to three-year project list so that the possibility of including facilities serving biking and walking demands can be discussed as early as possible. Refer to the practice of North Carolina DOT (NCDOT) and Tennessee DOT (TDOT) in the previous section for more details.
- Create a clear channel (including point of contacts and procedure) to communicate project upgrade and funding opportunities. Refer to Colorado DOT's practice in the previous section for more details.

Once mobility/accessibility needs are identified and project upgrade channel is created, DOTD should consider updating related documents to remind project managers to check plans (e.g., a road diet plan) and discuss project upgrade possibilities. The following are guidance in the existing documents:

- The document Guidance for Preservation Rehabilitation Replacement (PRR) Projects lists the following three design guidelines for national highway system (NHS)/non-interstate and non-NHS roads: (1) DOTD Pavement PRR Minimum Design Guidelines, (2) 3R Minimum Design Guidelines, and (3) Match Existing.

- Compliance with *DOTD Pavement PRR Minimum Design Guidelines* is required in replacement and major rehabilitation work on NHS/non-interstates or non-NHS roads. The paved shoulder width of 2 ft. is considered desirable for both urban/suburban and rural areas in DOTD Pavement PRR Minimum Design Guidelines.
- Compliance with 3R Minimum Design Guidelines is considered desirable. The desirable compliance only applies in replacement and major rehabilitation work on NHS/non-interstates.
- Minor rehabilitation and preservation on NHS/non-interstates or non-NHS roads follows "Match Existing" as the design guidelines.

Appendix H: Complete Streets Policy Implementation—A Scan of Best Practices to Address Stakeholder—Identified Challenges

This section outlines key issues identified as contributing factors to Complete Streets policy implementation in Louisiana and compiles examples of policies, projects, programs, and resources in other states that may provide useful models for implementation by DOTD to advance toward Policy goals. In addition, this section includes a review of current policy and practice against national best practice guidance for Complete Streets policies (using the Smart Growth America is *Elements of a Complete Streets Policy* evaluation rubric, finding several areas of opportunity to improve state-level policy performance relative to peers.

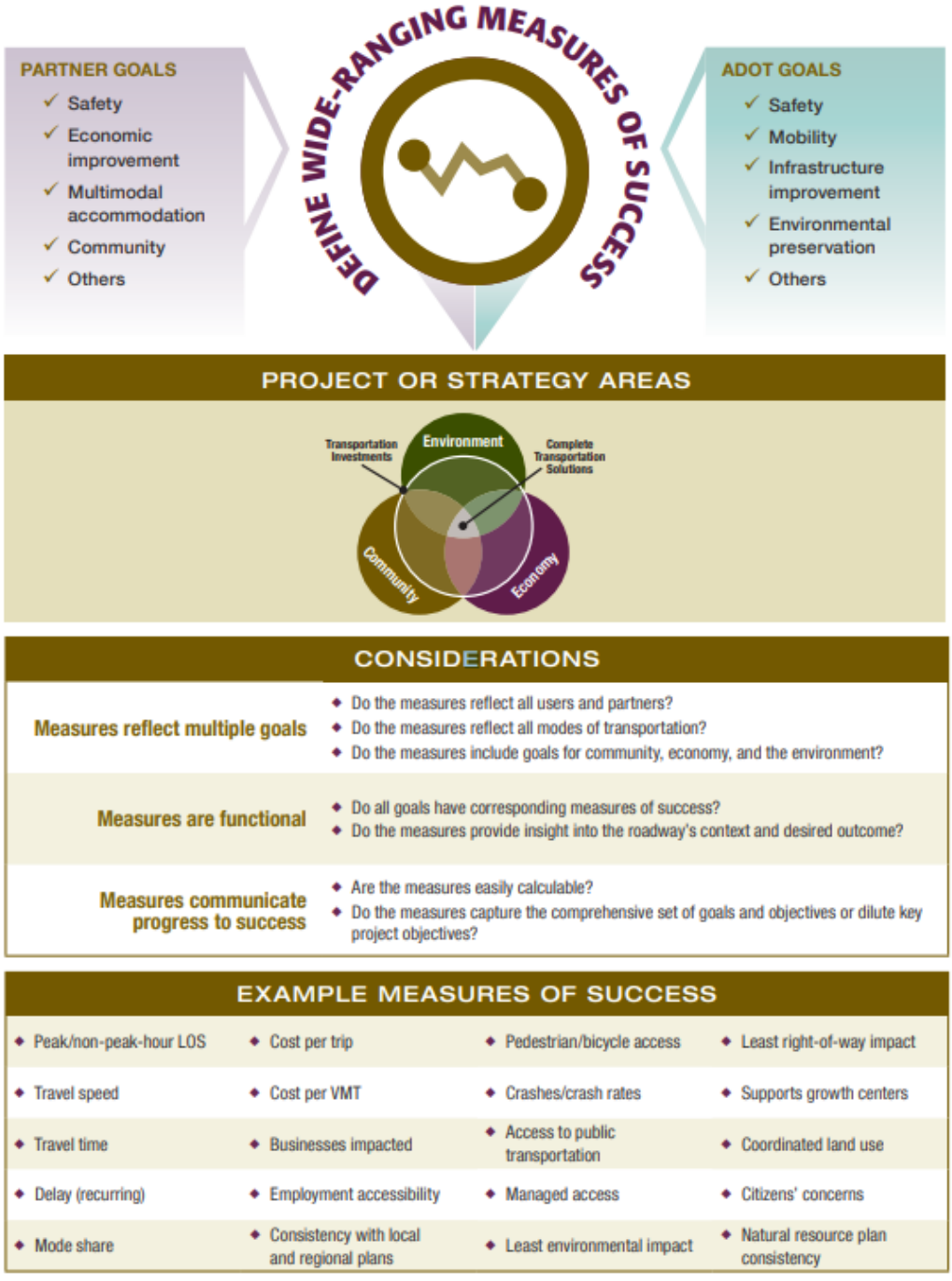
1. Legislative Reports Lack Context

Very few states conduct regular, comprehensive Complete Streets policy evaluation activities. However, several states have developed resources that provide updates on performance and/or progress toward identified active transportation goals.

Best Practices and Examples:

- Washington DOT's (WSDOT) 2021-2023 Report to the Legislature included a review of past performance of the state's pedestrian and bicycle program, including comparison of funding requested vs. funding awarded for bike/ped projects over time; a summary of projects completed or underway (as well as a prioritized future project list); and an overview of project selection processes and review criteria in relation to WSDOT's upcoming call for projects. A focus on presenting results of previous funding cycles, and clearly linking past results to upcoming funding opportunities and priorities makes this performance review relevant and actionable.
- Arizona DOT's (ADOT) Complete Transportation Guidebook (oriented toward DOT personnel as well as local partners) outlines strategies for Complete Streets implementation and suggested measures of success under a "triple bottom line" approach (e.g., Figure 52). The guidebook also prompts practitioners with a variety of economic, community, and environmental objectives and considerations for various phases of the project delivery process, many of which could be framed as measurable performance measures.

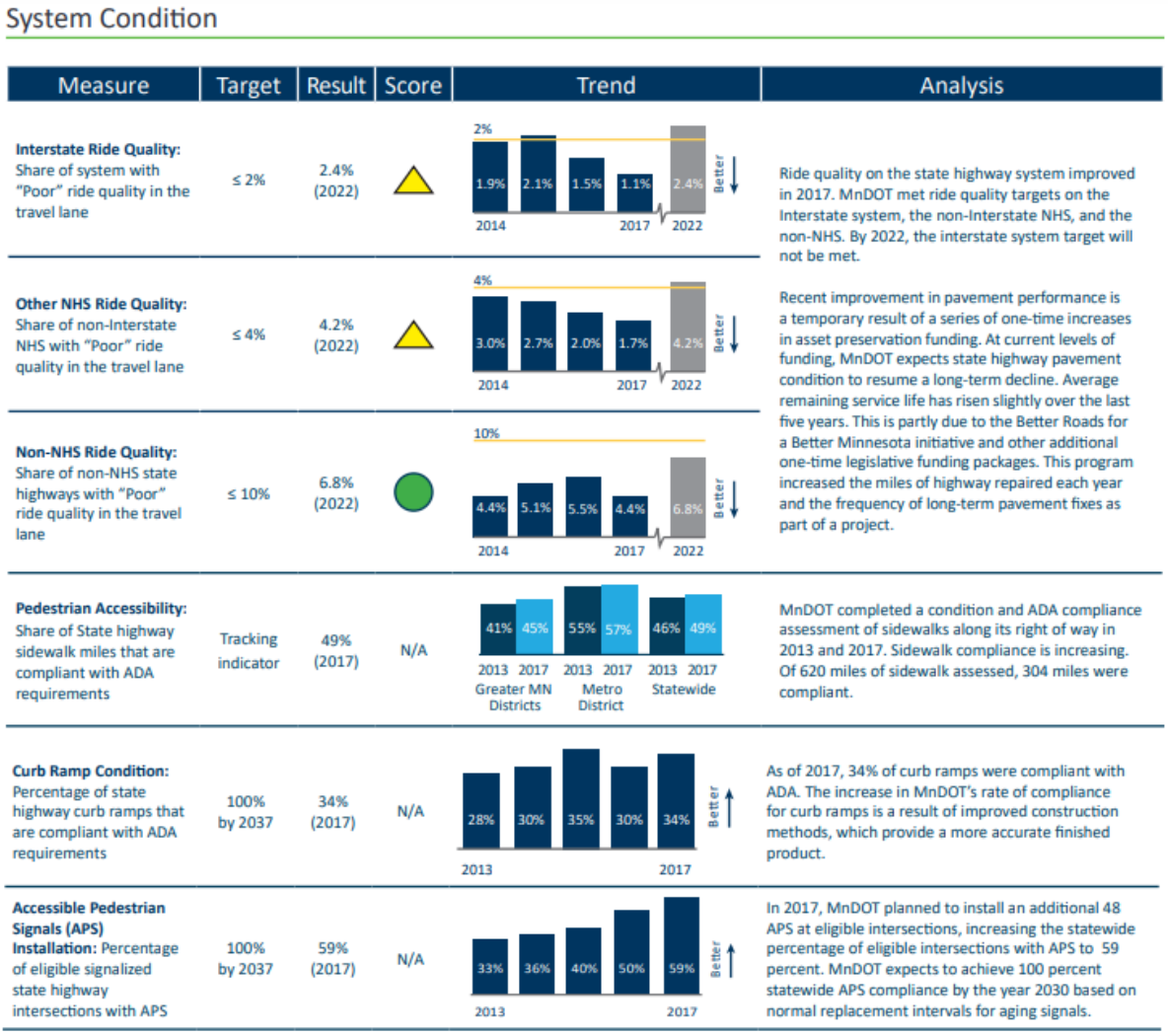
Figure 52. ADOT "Defining Wide-Ranging Measures of Success" diagram



- Minnesota DOT's (MnDOT) Complete Streets Performance Snapshot, a brief two-page report card, provides a concise overview of adopted measures; targets; results; "scores" (color coded as red, yellow, or green to indicate positive or negative scores); trends over time; and a brief summary analysis of the measure overall. Measures are categorized as

contributing to DOTD goals of traveler safety, system condition, system usage, or Complete Streets project implementation and projections (Figure 53).

Figure 53. Minnesota DOT Complete Streets performance snapshot: "System Condition" metrics



- Minnesota also maintains Minnesota Go Performance Dashboard, which provides robust information on various transportation topics, including pedestrian and bicycle transportation. The dashboard emphasizes ADA accessibility, job access, and public health and safety metrics based on MnDOT's regular public opinion surveys.
- New Jersey's North Jersey Transportation Planning Authority (which covers approximately half of the state) developed a Complete Streets Implementation Brief that calls for additional

evaluation/implementation actions (such as tracking local complete streets implementation actions) and identifies several outcome indicators recommended to evaluate performance summarized in Table 33.

Table 33. New Jersey recommended outcome indicators

Outcomes	Potential Indicators
Scope of technical assistance	Number of municipalities and/or planning projects supported
	Number of and/or spending on capital projects programmed as a result of planning efforts
	Percent of funded projects that include complete streets elements
	Number of facilities built, including bicycle facilities, pedestrian facilities, transit stops, street furniture (benches or pedestrian lighting), marked crosswalks
	Number of municipalities that have adopted and/or updated a Complete Streets policy
Accessibility	Percent of rail transit stations that are ADA accessible
	Number or percent of residents within ½ mile walk to amenities
	Percent of jobs and households within ½ mile of regional transit
	Percent of population within ½ mile of complete streets (or elements, such as transit or low-stress bike routes)
	EPA National Walkability Index (Census block group level)
	Ratio of sidewalk mileage to roadway mileage
	Ratio of bike facility mileage to roadway mileage
Travel Behavior	Reduced driving trips
	Reduced trip distance
	Increased bike/walk/transit trips and commute mode share
	Percent change in safety (crashes, crashes involving cyclists or pedestrians)
Fiscal Impacts	Reduced costs related to sprawl (measuring net municipal costs of new and existing developments)
	Reduced road maintenance costs due to lower vehicle traffic volumes on complete streets
	Reduced costs related to injury and loss of life from motor vehicle crashes

- Although metrics and targets were not officially adopted at the time, North Carolina's DOT's Complete Streets Evaluation recommended specific performance metrics for safety; MMLOS (using Highway Safety Manual methodology or other methods of measuring service quality for all modes, including non-urban settings); inventory development and facility tracking (including both existing and proposed facilities, and prioritizing transit as a current data gap); and economic development/equity (e.g., project proximity to commercial areas and low-income Census Block Groups).

2. Statewide Spatial Data is lacking

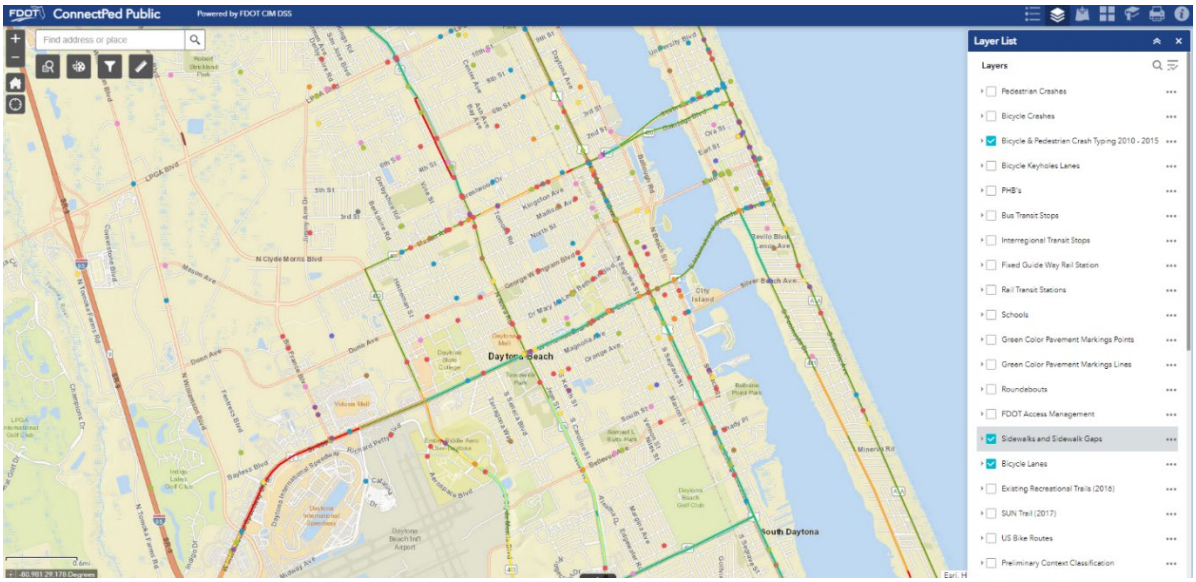
In order to adequately track policy implementation as well as evaluate accessibility improvements such as those listed above, spatial data capturing the nature and extent of active transportation infrastructure needs to be routinely collected and synthesized into a comprehensive statewide database.

Best Practices and Examples:

- Kentucky Transportation Cabinet Maps and Resources—An interactive map of bicycle and pedestrian facilities organized by county, including facility description and metadata; state and local roads; sidewalks and bike lanes; designated routes; multi-use paths; and marked crosswalks (available in some counties as a line feature). This resource also includes a map of U.S. bicycle routes (USBR 76) with elevation data, which can be synced to a device (Ride with GPS). A standard data disclaimer pops up on first use of the site. The platform allows for data collected from multiple sources (with source identified as an attribute); MPOs/development districts seem to be key contributors to the resource.
- Florida's FDOT Bicycle and Pedestrian Facilities website—Florida's "ConnectPed Public" shown in Figure 54 is a comprehensive public GIS portal with bike and pedestrian crashes (including heat maps and crash types in addition to crash locations); spatial layers for pedestrian hybrid beacons; bus and rail transit stops; schools; bike pavement markings; bike lanes; trails; speed limits; average daily traffic (ADT); and sociodemographic characteristics related to active transportation. The platform also includes a simpler map of "bicycle friendly roads" with major statewide routes suitable for interstate travel. A Statewide Non-Motorized

Traffic Monitoring Program map shows short and long-term count locations with links to static reports documenting counts.

Figure 54. FDOT ConnectPed public active transportation map



- North Carolina's NCDOT Division of Bicycle and Pedestrian Transportation—This web portal provides links to the state trails plan and bike/pedestrian plan documents as well as a pedestrian and bicycle infrastructure network map (PBIN) to which "municipalities are encouraged to submit their data in a standardized format compatible with NCDOT's existing geodatabase." A Geospatial Standards for Planning Grant Communities document has been developed to facilitate that for both existing and proposed facilities. Data is available for download but the portal also includes a web map. A separate crash map is also available, with coded crash types. Note that this is the "public site," which implies there may also be a separate "private site" for internal agency use.
- Virginia Roads—This web map and open data portal includes layers for curb ramps, crashes, a bicycle facility inventory and state bike map, and pedestrian signals. It also includes a separate application for trails and paths and an application showing some bike/ped counts.
- Iowa Bikes Interactive Map—Iowa DOT's web resource consists of a basic map of bikeways and trails with limited additional data. However, it does include layers indicating the locations of trailheads, restrooms, water fountains, bike rentals, and shops, reinforcing its utility for bicyclists in the state.

- Texas Bikeway Maps—This resource includes a compilation of links to city/regional maps (mostly interactive) rather than one statewide map.
- Minnesota Pedestrian Asset Inventory—MnDOT provides an interactive statewide inventory of sidewalks, driveways, and ADA curb ramps for all state routes.

3. Project-Level Outcome Analysis is Limited

Detailed crash analysis (e.g., to understand crash types, particularly as pertains to vulnerable road users), cost benefit analysis, and overall outcome analysis (potentially including economic impact and user satisfaction metrics) is needed to improve investment efficiency and build public trust and buy-in, particularly for innovative design.

Best Practices and Examples:

- Several examples of outcome evaluations were previously researched and discussed in the 21-2SS Interim Report. In addition to these studies, Smart Growth America has led development of tools and resources to document and guide holistic outcome evaluation, including but not limited to traditional traffic management goals. This includes:
  - An impact analysis based on 37 Complete Streets projects of varying scope and scale nationwide looking at safety, costs, multimodal activity, health, and automobile traffic impacts.
  - The Benefits of Complete Streets Toolkit applies an equity lens to evaluate safety, health, environment, and economic impacts.
  - In addition, the Pedestrian Bicycle Crash Analysis Tool, developed with support from FHWA and currently hosted by the Turner-Fairbank Highway Research Center, is an open-access crash typing web application that can facilitate more nuanced analysis of nonmotorized crashes using commonly available motorist and non-motorist movements/action information to categorize crashes into commonly identified crash types. Use of this tool in pedestrian and bicycle crash analysis at the segment, corridor, or areawide level (using data before and after interventions) can help illuminate the extent to which improvements have addressed the root cause of injurious crashes.
  - Similarly, the Safer Streets Priority Finder, developed by the City of New Orleans for the U.S. DOT Safety Data Initiative, is a low-barrier analytic tool that may be used to both model predicted crash incidence and resulting costs over five years as well as to

benchmark the outcomes of mitigation actions intended to prevent such costs. This tool can be used at neighborhood, city, or parish levels.

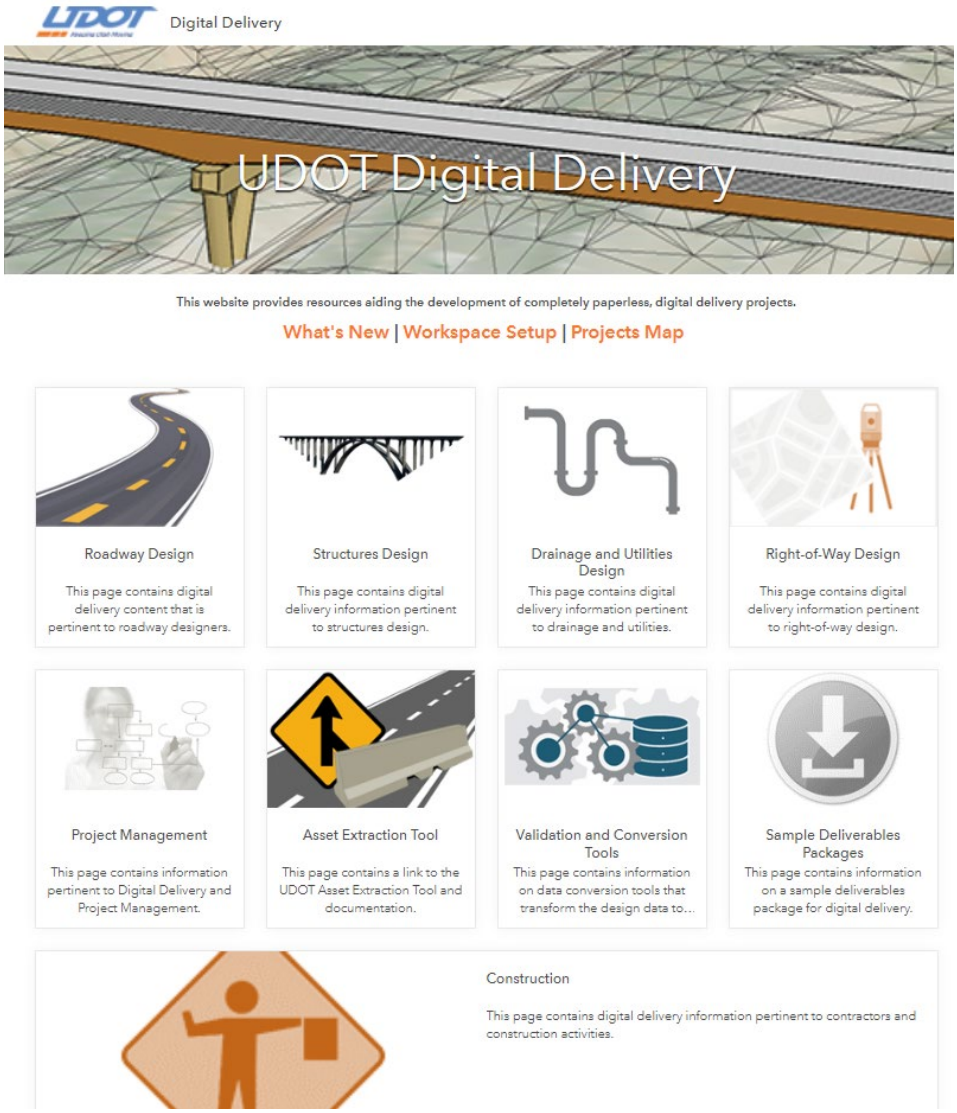
4. Internal Project Management Systems are Not Integrated

Having documents for different project stages and programs all in different digital locations makes it very difficult to track the life of the project and conduct cross-cutting analysis of agency performance relative to Complete Streets goals. In order to facilitate meaningful benchmarking and improve agency efficiency, updates are needed to overall agency data systems and processes to fully digitize and ensure that Policy implementation can be tracked and monitored for all projects, at all stages of project delivery.

Best Practices and Examples:

- Utah DOT (UDOT) has created a "one stop" platform (Figure 55) for navigating its digital delivery processes from design to project management to asset extraction and documentation (with all projects returning to UDOT as an as-built 3D model for the statewide "model library").

Figure 55. Utah DOT digital delivery portal



- Similarly, Montana DOT has begun to implement a Digital Delivery Initiative intended to digitize workflows, foster interdisciplinary design and collaboration, and improve public information and communication.
- California DOT's (Caltrans) *Strategic Roadmap for Caltrans Implementation of Virtual Design Construction/CIM* highlights the prerequisite of an agency-wide workflow to improve consistency of designs and deliverables (specifically, digital models) and to enhance interdepartmental communication.

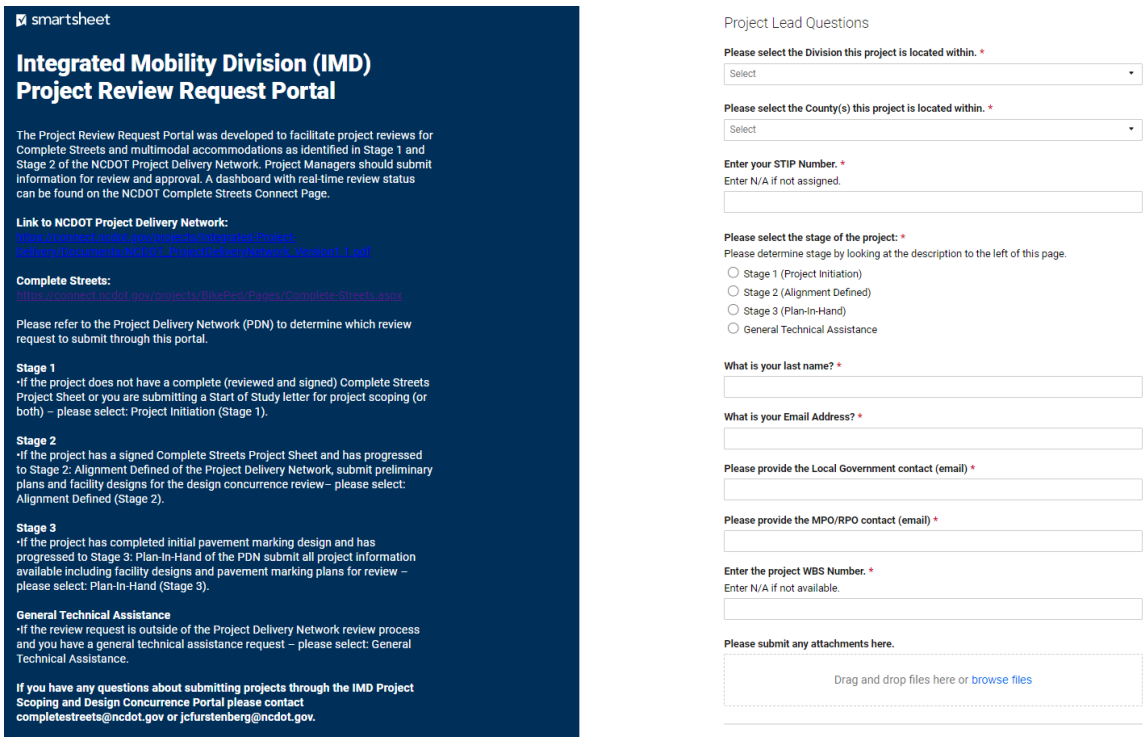
5. Documentation of Complete Streets Consideration Frequently Inadequate

Our review found that Stage 0 and Stage 1 documents often lack detail as pertains to Complete Streets policy compliance. It is often unclear the extent to which active transportation alternatives have been considered, with many "n/a" or excessively vague (e.g., "too soon to tell" or "insufficient ROW") responses to checklist questions intended to elicit information about Policy adherence.

Best Practices and Examples:

- North Carolina DOT's Integrated Mobility Division (IMD) project review request portal – This portal shown in Figure 56, completed in 2021 in parallel with development of an updated Project Delivery Network Manual, was created for project managers across DOT programs to submit their documents for Complete Streets review and approval from IMD at Stages 1, 2, or 3 (or for general technical assistance).

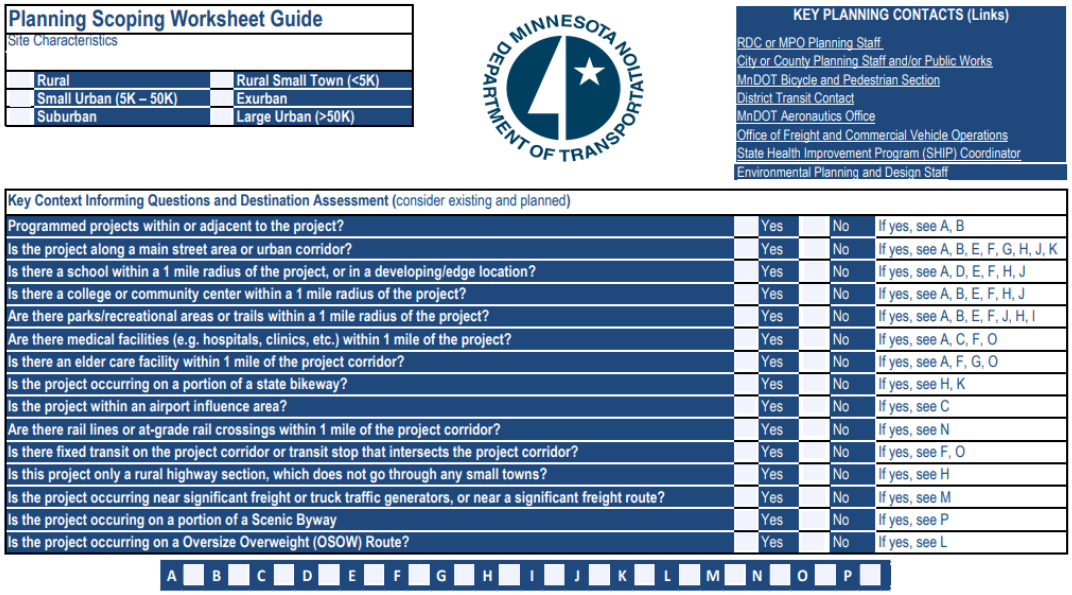
Figure 56. NCDOT Integrated Mobility Division Project Review Request Portal



- North Carolina also updated their Complete Streets Project Sheet to list specific reasons why pedestrian or bike facilities will not be evaluated as well as the types of facilities to be evaluated and includes section for public transit with prompts to guide the user.

- Minnesota's Planning Scoping Worksheet Guide (Figure 57) is a project scoping tool with prompts to help determine level of active transportation need/demand.

Figure 57. Minnesota Planning Scoping Worksheet Guide—key context informing questions and destination assessment



Planning Scoping Worksheet Guide

Site Characteristics

	Rural		Rural Small Town (<5K)
	Small Urban (5K – 50K)		Exurban
	Suburban		Large Urban (>50K)

MINNESOTA DEPARTMENT OF TRANSPORTATION

KEY PLANNING CONTACTS (Links)

RDC or MPO Planning Staff
City or County Planning Staff and/or Public Works
MnDOT Bicycle and Pedestrian Section
District Transit Contact
MnDOT Aeronautics Office
Office of Freight and Commercial Vehicle Operations
State Health Improvement Program (SHIP) Coordinator
Environmental Planning and Design Staff

Key Context Informing Questions and Destination Assessment (consider existing and planned)					
Programmed projects within or adjacent to the project?		Yes		No	If yes, see A, B
Is the project along a main street area or urban corridor?		Yes		No	If yes, see A, B, E, F, G, H, J, K
Is there a school within a 1 mile radius of the project, or in a developing/edge location?		Yes		No	If yes, see A, D, E, F, H, J
Is there a college or community center within a 1 mile radius of the project?		Yes		No	If yes, see A, B, E, F, H, J
Are there parks/recreational areas or trails within a 1 mile radius of the project?		Yes		No	If yes, see A, B, E, F, J, H, I
Are there medical facilities (e.g. hospitals, clinics, etc.) within 1 mile of the project?		Yes		No	If yes, see A, C, F, O
Is there an elder care facility within 1 mile of the project corridor?		Yes		No	If yes, see A, F, G, O
Is the project occurring on a portion of a state bikeway?		Yes		No	If yes, see H, K
Is the project within an airport influence area?		Yes		No	If yes, see C
Are there rail lines or at-grade rail crossings within 1 mile of the project corridor?		Yes		No	If yes, see N
Is there fixed transit on the project corridor or transit stop that intersects the project corridor?		Yes		No	If yes, see F, O
Is this project only a rural highway section, which does not go through any small towns?		Yes		No	If yes, see H
Is the project occurring near significant freight or truck traffic generators, or near a significant freight route?		Yes		No	If yes, see M
Is the project occuring on a portion of a Scenic Byway		Yes		No	If yes, see P
Is the project occurring on a Oversize Overweight (OSOW) Route?		Yes		No	If yes, see L

A B C D E F G H I J K L M N O P

- New Jersey's Complete Streets Checklist includes prompts at the scoping/concept development stage, asking the user to describe active transportation suitability/LOS, volumes, demand, safety, etc. This resource also includes a preliminary engineering checklist (which includes a check for transit).
- The City of Seattle and San Francisco Transportation Authority's checklist, while specific to large urbanized areas rather than state DOTs, provide additional ideas for how to solicit greater detail in responses with both direct prompts for planners and designers as well as with open-ended opportunities for more nuanced responses.

6. Minimum Design Guidelines Too Minimal

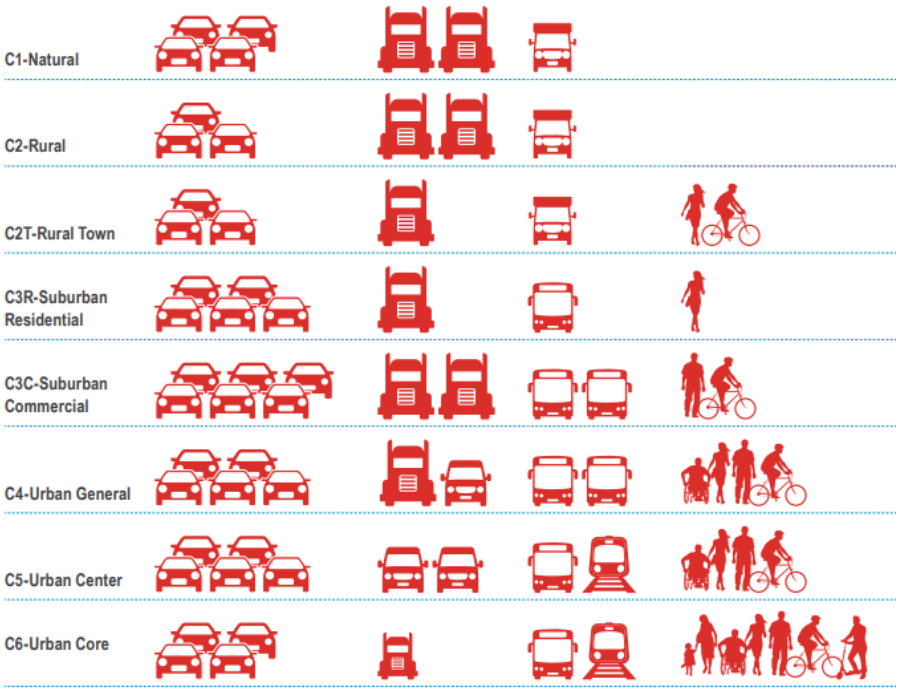
Additional design guidance is needed to effectively and consistently implement Complete Streets across a wide range of contexts. Active transportation design has evolved rapidly in recent decades, often faster than national standards (e.g., AASHTO, MUTCD). However, considerable

federal guidance does exist to facilitate expansion of state DOTs' "repertoire" of allowable facilities, and several states have charted a path for implementing FHWA interim approvals, etc.

Best Practices and Examples:

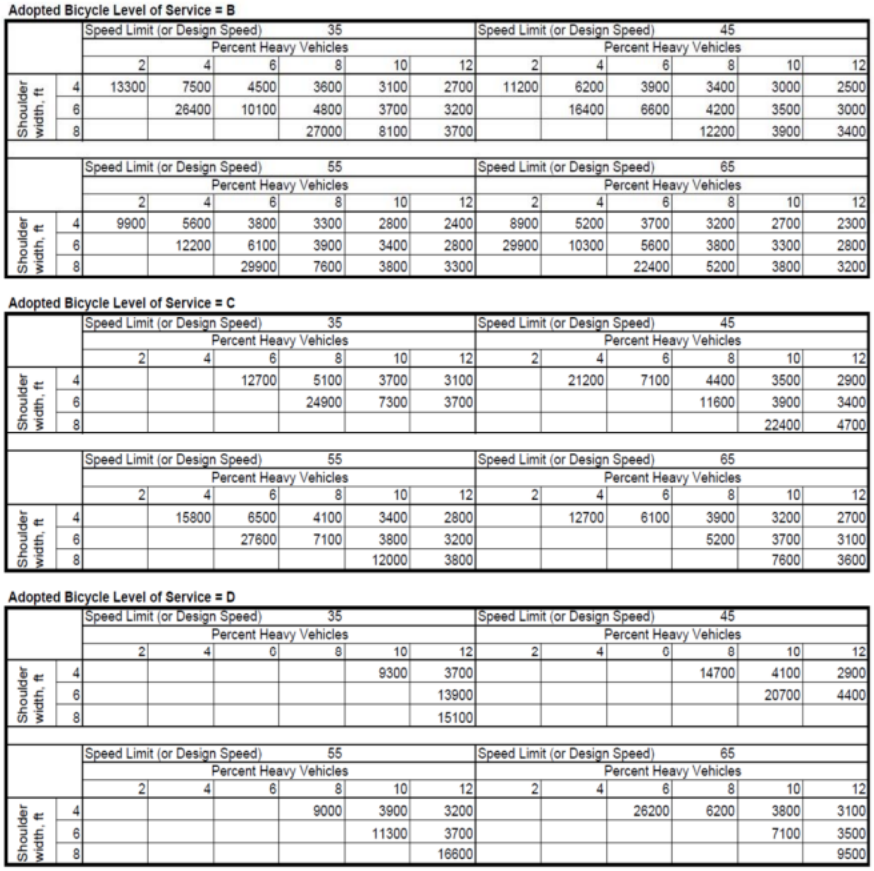
- North Carolina's Bicycle and Pedestrian Project Development and Design Guidance—This guide includes AASHTO, FHWA, MUTCH, and NACTO, and ADA guidance in one place, with a site oriented as "business partner resources." It also includes bike/ped facility cost tool and some specific design guidance for drainage grates, greenways, signs and maps. Also note this resource's extensive glossary of active travel definitions. The page notes that new design guidance forthcoming is to be housed in the updated Roadway Design Manual, which has not yet been published.
- North Carolina's Greenway Accommodations Guidelines—This guidance document specifically provides guidance for greenway accommodations under bridges in order to retain or create better connectivity when highways or constructed or rehabilitated.
- North Carolina's Complete Streets Planning Design Guidelines—(*UPDATE UNDERWAY*) the 2012 version includes discussion of maintenance, operations aspects of Complete Streets implementation.
- Florida's 2022 FDOT Design Manual—Sections 222-225 focus on Complete Streets. Although this manual generally aligns to standard AASHTO design and established facility configurations, it includes some unique features such as defining "keyhole lanes" for right turn lanes, discussing use of green paint lanes and establishing FHWA's Separated Bike Lane Guide as suitable for use on state routes.
- Florida's Lane Repurposing Guidebook—This document provides guidance for road diets and reconfigurations, including traffic analysis and safety analysis methodology as well as case studies.
- Florida's Context Classification Guide—This document outlines how to identify appropriate complete streets elements based on a transect-oriented definition of context. This may be a useful model for Louisiana to take a more nuanced approach to context-sensitive design (Figure 58).

Figure 58. FDOT context classification guide—expected user types in different context classifications



- Virginia's Bicycling and Walking in Virginia "Resources" page—This site is a compilation of national and state design guidance, including interim approvals; transit has been integrated into bike/ped facility guidelines.
- Washington's Pedestrian and Bicycle Facilities—This page provides a compilation of manuals, standard plans and specs, contacts, and other resources for bike/ped facilities.
- Colorado's Roadway Design Guide - Bicycle and Pedestrian Facilities—Colorado's guide aligns with AASHTO but highlights the state's emphasis on count collection and coordination, provides extensive information about bicycles as design vehicles, and defines appropriate required shoulder widths based on bicycle LOS, speed, and presence of heavy vehicles (such as establishing that 4-ft. shoulders are only acceptable where there are few heavy vehicles and/or low total volumes). It provides nuanced guidance for bike lane width based on context (Figure 59).

Figure 59. Colorado Roadway Design Guide—maximum motor vehicle service volumes for given bicycle LOS grades



Adopted Bicycle Level of Service = B

		Speed Limit (or Design Speed) 35						Speed Limit (or Design Speed) 45					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	6	8	10	12	2	4	6	8	10	12
Shoulder width, ft	4	13300	7500	4500	3600	3100	2700	11200	6200	3900	3400	3000	2500
	6		26400	10100	4800	3700	3200		16400	6600	4200	3500	3000
	8				27000	8100	3700				12200	3900	3400

		Speed Limit (or Design Speed) 55						Speed Limit (or Design Speed) 65					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	6	8	10	12	2	4	6	8	10	12
Shoulder width, ft	4	9900	5600	3800	3300	2800	2400	8900	5200	3700	3200	2700	2300
	6		12200	6100	3900	3400	2800	29900	10300	5600	3800	3300	2800
	8			29900	7600	3800	3300			22400	5200	3800	3200

Adopted Bicycle Level of Service = C

		Speed Limit (or Design Speed) 35						Speed Limit (or Design Speed) 45					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	6	8	10	12	2	4	6	8	10	12
Shoulder width, ft	4			12700	5100	3700	3100		21200	7100	4400	3500	2900
	6				24900	7300	3700				11600	3900	3400
	8											22400	4700

		Speed Limit (or Design Speed) 55						Speed Limit (or Design Speed) 65					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	6	8	10	12	2	4	6	8	10	12
Shoulder width, ft	4		15800	6500	4100	3400	2800		12700	6100	3900	3200	2700
	6			27600	7100	3800	3200				5200	3700	3100
	8					12000	3800					7600	3600

Adopted Bicycle Level of Service = D

		Speed Limit (or Design Speed) 35						Speed Limit (or Design Speed) 45					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	0	8	10	12	2	4	0	8	10	12
Shoulder width, ft	4					9300	3700				14700	4100	2900
	6						13900					20700	4400
	8						15100						

		Speed Limit (or Design Speed) 55						Speed Limit (or Design Speed) 65					
		Percent Heavy Vehicles						Percent Heavy Vehicles					
		2	4	6	8	10	12	2	4	6	8	10	12
Shoulder width, ft	4				9000	3900	3200			26200	6200	3800	3100
	6					11300	3700					7100	3500
	8						16600						9500

- Oregon's Draft 2022 Highway Design manual—This updated guide integrates bike/pedestrian accommodation throughout, with an additional chapter on pedestrian design, transit design, bikeway design (beginning on p. 660).
- Oregon's 2011 Bicycle and Pedestrian Design Guide—This appendix to Oregon's existing Highway Design Manual (HDM) includes comprehensive guidance for bike ped facilities as well as transit general guidelines (including guidance about pervious surfaces). The bicycle section aligns with the Proposed AASHTO Bike Guide, 5th edition.
- Texas's TxDOT Planning and Designing—TxDOT's planning and design resource compendium provides bike design guidance (updated in 2021) and establishes that FHWA bike guidance more recent than AASHTO should take precedence.
- Arizona's Complete Transportation Guidebook—ADOT's guide is a reference tool for integrating active transportation into all ADOT projects, beginning with the rationale for a

Complete Streets approach and outlining various strategies to achieve identified goals including specific design guidelines for urban, suburban, and rural contexts.

7. Transit Design Guidance is a Gap

Description of issue, barrier, or opportunity for improvement: additional guidance is needed to ensure that transit users are fully considered as part of Complete Streets implementation and to ensure that state-owned roadways which also serve as transit corridors, common on urban arterials in particular, address the needs of transit users.

Best Practices and Examples:

- North Carolina's Bus Shelter and Bus Stop Guidelines—This guidance memo defines rules for establishing bus stops/shelters, turn outs, pedestrian connectivity, shelter minimum requirements, and placement guidelines along with elaboration of the process for initiating encroachment agreements.
- Oregon's Draft 2022 Highway Design Manual—This updated manual (pending adoption) includes a chapter on transit design (beginning page 660) that includes diagrams for bus pullouts, curb extensions, guidance for midblock, near, far-side stop placement (and how to select the most appropriate option), and various other amenities appropriate for effective transit operation and service (Figure 60).

Figure 60. Oregon Draft Highway Design Manual—advantages and disadvantages of far side, near side, and mid-block bus stops

FAR-SIDE STOP	
Advantages	**Disadvantages**
• Minimizes conflict between buses and right turning vehicles traveling in the same direction • Minimizes sight distance problems on approaches to the intersection • Encourages pedestrians to cross behind the bus • Minimizes area needed for curbside bus zone • If placed just beyond a signalized intersection in a bus pullout, buses may more easily reenter the traffic stream • If a pullout is provided, vehicle capacity through intersection is unaffected	• If bus stops in travel lane, could result in traffic queued into intersection behind the bus (pullout will allow traffic to pass around the stopped bus and should be installed with signalized intersections) • If bus stops in travel lane, could result in a high rate of rear-end accidents as motorists fail to anticipate stopped traffic • May cause passengers to access buses further from crosswalk • May interfere with right turn movement from cross street
NEAR-SIDE STOP	
Advantages	**Disadvantages**
• Minimizes interference when traffic is heavy on the far side of an intersection • Allows passengers to access buses close to crosswalk • Driver may use the width of the intersection to pull away from the curb • Allows passengers to board and alight when the bus is stopped for a red light • Provides the driver with the opportunity to look for oncoming traffic, including other buses with potential passengers when more than one route stop is located at the intersection	• Stopped bus may interfere with a dedicated right turn lane • May cause sight distance problem for cross-street traffic and pedestrians • If located at a signalized intersection, and if the shoulder width at the stop is such that buses will exit the traffic stream, a traffic queue at a signal may make it difficult for buses to re-enter the traffic stream • At single lane, signalized intersections with no pullout, prohibits through traffic movement with green light, similar to far-side stop without a bus pullout • May cause pedestrians to cross in front of the bus at intersections
MID-BLOCK STOP	
Advantages	**Disadvantages**
• Minimizes sight distance problems for vehicles and pedestrians • May result in passenger waiting areas experiencing less pedestrian congestion • May be closer to passenger origins or destinations on long blocks • May result in less interference with traffic flow	• Requires additional distance for no-parking restrictions • Increases walking distance for patrons crossing at intersection, or requires special features to assist pedestrians with mid-block crossing

Source: Adapted from the Guidelines for Planning, Designing, and Operating Bus-related Street Improvements. Texas Transportation Institute.

- Florida's Transit Facilities Design—This webpage provides a design handbook, guidelines, typical sections, traffic management guidance, and a context classification framework for bus transit to aid in effective transit facilities design and operations.
- Maryland DOT's Bus Stop Design Guide provides guidance for the hierarchy, placement, and design of transit facilities.

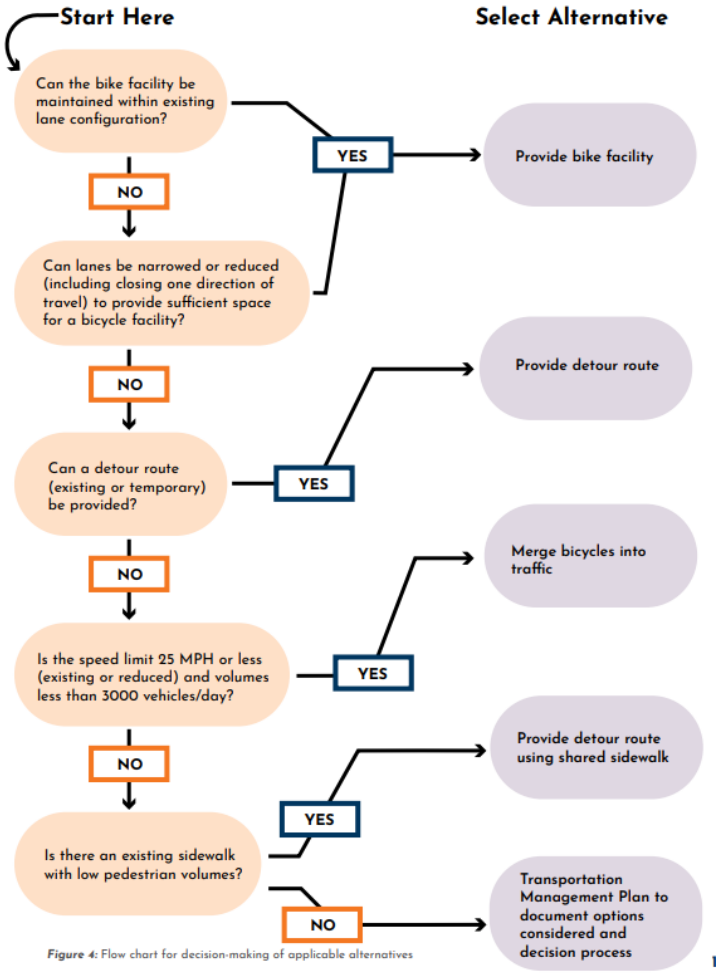
8. Complete Streets Under Construction

Complete Streets policy applies to all stages of project delivery including construction. However, too often, work zone traffic plans inadequately accommodate people walking, bicycling, and using transit and temporary changes to roadway configurations during sometimes lengthy periods of disruption, which create hazards and barriers to accessibility for non-motorized road users. Additional guidance is needed to ensure that such impacts are minimized or mitigated, and temporary traffic control measures support safety for all road users.

Best Practices and Examples:

- North Carolina's Evaluating Temporary Accommodations for Pedestrians During Construction—This guide discusses guidelines for pedestrian accommodation during construction, for use during project planning and development phases to anticipate needs in advance of construction. It outlines a process for data collection, pedestrian accommodation requirements based on observed/anticipated volume, pedestrian management plans, and implementation protocols.
- North Carolina's Bicycle Policy—This policy articulates guidelines addressing construction, maintenance, and operations as it pertains to providing bicycle accommodation for all phases of project delivery.
- Florida's Bicycle and Pedestrian Temporary Traffic Control—This brief two-page document outlines basic concepts for accommodating active users during construction.
- Minnesota's Pedestrian and Bicycle Accommodations Through Work Zones —This guide specifies standards and sample plans for bypasses, intersections, detours, etc. for areas under construction (Figure 61).

Figure 61. Minnesota bicycle accommodation through work zones decision-making flow chart



- Minneapolis's Transportation Action Plan—This web-interactive local plan establishes the following actions for Complete Streets policy implementation:
  - "Provide safe, direct, and comfortable temporary facilities for non-motorized users during construction in accordance with the current and updated Complete Streets policy;
  - Price lane obstruction permits to reflect the Complete Streets hierarchy such that removal of pedestrian or bicycle access is more costly than general purpose travel lane closures;
  - Reconstruct disturbed pedestrian, bicycle, and transit facilities in accordance with planned future conditions, not existing, when altered by development or utility work as documented in this plan and the Street Design Guide."

9. "All Projects and All Stages" Includes Intersections and Operations

Active transportation accommodation approaching and through intersections presents particular challenges, many of which are managed through traffic signal design and operation, in complement with physical changes to street striping, curbs, medians, etc. Additional guidance is needed to facilitate effective planning for safe and efficient roadway operations that facilitates all users and all modes.

Best Practices and Examples:

- North Carolina' Complete Streets Planning Design Guidelines—(*UPDATE UNDERWAY*) North Carolina's 2012 Design Guidelines include a discussion of operations, specifically noting opportunities for adding turn lanes, installing marked crosswalks, pedestrian refuges, sidewalks, or ramps during restriping projects and/or installing pedestrian signals, retiming signals to improve pedestrian level of service during signal installation/upgrade can advance complete streets goals.
- California's Te-41 Traffic Signal Design: Complete Streets Application—This training course offered periodically in partnership with Caltrans Division of Local Assistance is focused on how to design and operate traffic signals for bikes, pedestrians, and transit. Topics include signal phasing, cabinet configuration/controller firmware, signal head and detection layouts, adaptive traffic control, and considerations for specific facilities, users, and contexts (e.g., bus rapid transit, emergency vehicles, rail crossings, etc.).
- Denver's Complete Streets Design Guidelines 2020—These guidelines provide extensive information about signal timing for bicyclists and pedestrians, dedicated bicycle signals, etc. (including how to manage speeds through traffic signal timing) select appropriate intersection/traffic control elements based on street context, and modal hierarchy.
- Minneapolis' Transportation Action Plan—This plan recommendations pertain to traffic operations including:
  - — Identifying locations where operation of traffic signals should be evaluated to prioritize pedestrian mobility, comfort and safety;
  - — Implementing transit advantages along all high frequency transit corridors, through transit only lanes, transit signal priority, queue jumps, and other treatments as appropriate;

— Using traffic signals to increase efficiency of people biking. Include specific bike signals on the All Ages and Abilities Network and time signals to reduce the need for people biking to stop; and

— Retiming traffic signal coordination to encourage vehicle speeds at or below the posted speed limit.

10. Public Pedestrian/Bicycle Data Portal Needed

A public facing platform for statewide complete streets data supports stakeholder and public awareness of the policy and implementation actions taken, such as checklists, CSAC, identification of performance metrics, and enhanced data collection actions initiated. The current Complete Streets web page provides access to the Policy and previous legislative reports, but needs update and expansion to provide value to local agencies as well as DOTD personnel and the general public.

Best Practice Examples: Complete Streets Information Portals

- North Carolina's NCDOT Complete Streets web portal includes background information about NCDOT's policy approach, implementation guidance, project examples, training resources, and information about relevant training and events.
- North Carolina's Connect NCDOT Business Partner Resources provides further resources for training opportunities, demand estimation tools, a project review dashboard, access to the project review request portal, and staff contacts. It also includes a page for bike/ped plans from around the state in one place.
- Florida's Bicycle and Pedestrian Facilities Website provides links to district coordinators and the statewide pedestrian and bicycle coordinator, links to the ConnectPed data page and other maps and resources, including FDOT's design manual and standard plans with information about how to find relevant standards for bike/ped design, as well as information about traffic laws, plans, grant resources, etc.
- Florida's Complete Streets: A 360 Approach is a GIS-based portal with resources as well as a Complete Streets project map (based on project point locations rather than linear features) and related resources such as Connect Ped. Note the linked "context classification guide," which has been updated to match FDOT's updated design manual for a more context-sensitive/transect-based approach to complete streets design.

- Colorado's CDOT Bicycle & Pedestrian Program page includes count information, design guidance, information for local partners (e.g., a guide for bike/ped pan development) and highlights various encouragement resources.
- Oregon's Pedestrian and Bicycle Program resource page features a quarterly newsletter, information about the state's advisory committee, contact information by region, design resources, data and research, and funding opportunities.
- Massachusetts' MassDOT Complete Streets Funding Program Portal provides resources for Complete Streets training, funding, cost estimation (via a downloadable excel tool), and program participation status (with participation in training opportunities and plan development activities linked to expanded funding eligibility) .
- Texas' TxDOT Bicycle and Pedestrian page provides planning and design guidance, information about state bike laws, bikeway maps, state bike/ped committee information, count program data and reports, an active transportation plan inventory, funding opportunities, and coordination guidance.

11. Enhanced Training Opportunities Needed

DOTD has developed a basic introduction to Complete Streets—focused on why DOTD has adopted the policy approach—which all DOTD personnel are required to complete. Other training opportunities have been offered intermittently with direct or indirect links to Policy goals. However, stakeholder surveys indicate that most agency personnel have not completed this training (or do not remember doing so), and advanced training and guidance is likely needed for those most directly involved in project scoping, design, and review. Existing DOTD resources, such as the Statewide Bicycle and Pedestrian Plan, and Bicycle Planning Tool, are underutilized and/or unknown to many agency stakeholders. The development of mechanisms by which to better integrate these resources into staff workflows and training on use where applicable is needed. In addition, additional training opportunities are needed for contractors working with DOTD as well as local agency partners.

Best Practices and Examples:

- FHWA's Training Options for Pedestrian and Bicyclist Safety Focus States—FHWA offers a variety of planning and design courses, including "Complete Streets Planning and Design."
- Massachusetts' University of Massachusetts (UMass) Amherst Transportation Center—UMass offers course listings for a variety of traffic and engineering topics, including several Complete Streets courses.

- Maryland's Maryland Transportation Technology Transfer Center—Context Based Complete Streets is a one-day course addressing context and functional classification-based Complete Streets design and operation. Courses are available by request from government agencies.
- New Jersey's NJDOT Complete Streets Workshops include curriculum and video intended for regional workshops and hands-on explanations of how to use NJDOT's Complete Streets guidebook.
- Smart Growth America offers a Creating Complete Streets e-learning series, which includes a series of webinars for interactive distance learning aimed at practicing planners.
- American Society of Civil Engineers (ASCE)'s Complete Streets Design is on-demand webinar for engineers.
- Florida's LTAP Introduction to Designing for Complete Streets is a recorded webinar, open to the public (three part series).
- California's Berkeley Tech Transfer Complete Streets Planning and Design course is offered in partnership with Caltrans local assistance.

12. Inconsistent Regional Implementation and Support

Survey results indicated that public support for Complete Streets is regionally inconsistent; policy implementation is inconsistent across regions and DOTD districts; and that additional outreach is needed to ensure that DOTD district employees are aware of resources available at DOTD HQ to support Policy implementation.

Best Practices and Examples

- North Carolina DOT's Integrated Mobility Division (IMD) project review request portal—This portal, completed in 2021 in parallel with development of an updated Project Delivery Network Manual, was created for project managers across DOT programs to submit their documents for Complete Streets review and approval from IMD at Stages 1, 2, or 3 (or for general technical assistance).
- New York State's Complete Streets Report provides case studies of successful projects, and next steps for policy implementation-related outreach to local agencies.
- Oregon's Pedestrian and Bicycle Program resource page features a quarterly newsletter, information about the state's advisory committee, contact information by region, design resources, data and research, and funding opportunities.

13. More Local Planning, State Planning Support Needed

Although numerous local and regional agencies have adopted a Complete Streets approach in Louisiana and several have developed local comprehensive or transportation plans that address walking and bicycling, many communities (especially small and rural jurisdictions) still lack local plans with a clear vision for an active transportation network. Relatedly, local input in project selection and prioritization, the key driver for several DOTD programs and funding sources, could be improved. While active transportation is specifically integrated into funding evaluation criteria for some programs, not all project prioritization processes explicitly consider multimodal benefits. As the Bipartisan Infrastructure Law (BIL) is implemented, revisions to agency processes to align with federal guidelines may be needed. Finally, maintenance and liability were cited as top barriers to more widespread implementation of Complete Streets.

Best Practices and Examples

- North Carolina's Complete Streets Review process merged pedestrian and bicycle planning with public transit to become the state's "integrated mobility division" in 2021. NCDOT's guide explains the process for how the IMD is integrated into project delivery, provides tools to use (e.g., estimating demand, how to address "low" demand areas by consulting MPO land use/growth data or plan documents), and guides facility selection based on demand, speed, and annual average daily traffic (AADT).
- North Carolina's Demand Estimation Tool (Beta)—A web app for looking at estimated Complete Streets demand in any given area of the state, similar to DOTD's bicycle planning tool.
- North Carolina's Project Scoping Reviews - PM View—This resource (primarily for internal use) indicates use of the Complete Streets review tool by stage, including counts of projects submitted by outcome. This highlights the utility of having an online review process for Complete Streets in that the agency can track project level outcomes (similar to first phase of this evaluation project) in real time.
- Washington's 2021-2023 Report to the Legislature focuses on a list of prioritized projects, selection process and review criteria, such as safety, equity, deliverability/other, value, and project quality.
- Massachusetts' MassDOT Complete Streets Funding Program Guidance articulates guidelines for funding Complete Street, which is based on local participation in program that provides planning, training, and technical support.

13. Once-Leading Policy Now Lags behind National Standards

Although DOTD's Complete Streets Policy was initially ranked as one of the best in the country, the state of the practice has continued to evolve, particularly in regard to moving from policy adoption to implementation. Smart Growth America has developed a rubric for assessing policy comprehensiveness. We evaluated DOTD's Policy along with key implementation documents such as the EDSM, MDG, and Draft Implementation Plan to assess our progress, finding that the current policy would likely score approximately 36 out of 100. Overall, while DOTD's policy and implementation efforts are strong in some areas, there are several areas where there is room for improvement, notably in emphasizing equity, integrating Complete Streets into long-range plans, enhancing design guidance, and updating project selection/prioritization processes to encourage projects which incorporate Complete Streets from the outset.

Recommendations for Improvement:

1. Define and consistently use specific equity criteria in implementation *(2 - Diverse Users).*
2. Establish clear policy and supports (i.e., training) for workzone accommodation for active users *(3 - Commitment in all projects and phases).*
3. Provide mechanism for public notice/feedback for projects where Policy exceptions are granted *(4 - Clear, accountable exceptions).*
4. Clearly establish in policy/implementation guidance that projects that address how they will account for the needs of all modes, and users are prioritized or awarded extra weight for funding and/or inclusion in long-range transportation improvement plans (TIPs) *(5 - Jurisdiction).*
5. Direct and establish a timeframe for continued adoption of state-of-the-practice, contextually appropriate design guidance (*6 - Design).*
6. Improve guidance for assessing and designing for community context and consultation of local plans *(7 - Land use and context sensitivity).*
7. Establish specific targets and timeframes for adopted performance measures (*8 - Performance Measures).*
8. Establish criteria for encouraging funding prioritization of Complete Streets within all programs (*9- Project selection criteria).*
9. Create community engagement plan for improving local/community participation in project selection, design, and implementation (*10 - Implementation steps).*

Table 34. Smart Growth America elements of a Complete Streets policy scorecard: DOTD

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
1	Vision and Intent		12	9	
	The policy is clear in intent, stating firmly the jurisdiction's commitment to a Complete Streets approach, using "shall" or "must" language. This needs to be in the body of the legislation, not the "whereas" statement.	(1 point) – The policy states the jurisdiction "may" or "considers" Complete Streets in their transportation planning and decision-making processes. (0 points) – The policy language is indirect with regard to their intent to apply a Complete Streets approach, using language such as "consider Complete Streets principles or elements."	3	1	language revised from "shall" to "should" with revision
	Mentions the need to create a complete, connected, network.	(0 points) No mention.	2	2	"comprehensive, integrated, connected transportation network"
	Specifies at least one motivation or benefit of pursuing Complete Streets	(0 points) No mention.	2	2	"ensures a fully integrated transportation system"
	Specifies equity as an additional motivation or benefit of pursuing Complete Streets.	(0 points) No mention.	1	0	No mention
	Specifies modes, with a base of four modes, two of which must be biking and walking	(0 points) Policy mentions fewer than four modes and/or omits biking or walking	4	4	
2	Diverse Users		9	0	

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	The policy language requires the jurisdiction to "prioritize" vulnerable users or neighborhoods with histories of systematic disinvestment or underinvestment. This could include neighborhoods with insufficient infrastructure or neighborhoods with a concentration of vulnerable users	(3 points) Policy states its intent to "benefit" the neighborhoods or vulnerable users above, as relevant to the jurisdiction (1 point) Policy mentions or considers any of the neighborhoods or users above (0 point) No mention	5	0	No mention
	The policy establishes an accountable, measurable definition for priority groups or places. This definition may be quantitative (i.e., neighborhoods with X% of the population without access to a vehicle or where the median income is below a certain threshold) or qualitative (i.e., naming specific neighborhoods).	(0 point) No mention	4	0	No mention
3	Commitment in all projects and phases		10	5	
	Policy requires all new construction and reconstruction/retrofit projects receiving state or federal funding to account for the needs of all modes of transportation and all users of the road network.	(1 point) Policy considers or mentions these projects as opportunities to apply this policy (0 points) No mention	4	4	

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	Policy requires all maintenance projects and ongoing operations, such as resurfacing, repaving, restriping, rehabilitation, or other types of changes to the transportation system receiving state or federal funding to account for the needs of all modes of transportation and all users of the road network	(1 point) Policy considers or mentions these projects as opportunities to apply this policy. (0 points) No mention.	4	1	EDSM calls for "considering" improvements on PRR projects
	Policy specifies the need to provide accommodations for all modes of transportation to continue to use the road safely and efficiently during any construction or repair work that infringes on the right of way and/or sidewalk.	(0 points) No mention.	2	0	No mention
4	Clear, accountable exceptions		8	4	
	Policy includes one or more of the above exceptions—and no others (users prohibited, disproportionate cost, documented absence of need, emergency repair, no transit service, routine maintenance, other project on same corridor programmed)	(2 points) Policy includes any other exceptions, including those that weaken the intent of the Complete Streets policy. (0 points) No mention	4	2	Preservation exception is written broadly
	Policy states who is responsible for approving exceptions.	(0 points) No mention.	2	2	EDSM establishes clear line of authority with Chief Engineer

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	Policy requires public notice prior to granting an exception in some form. This could entail a public meeting or an online posting with opportunity for comment.	(0 points) No mention.	2	0	No mention
5	Jurisdiction		8	1	
	A state's or Metropolitan Planning Organization's policy clearly notes that projects that address how they will account for the needs of all modes and users are prioritized or awarded extra weight for funding and/or inclusion in long-range transportation improvement plans (TIPs).	(2 points) A state's or MPO's policy mentions or encourages projects receiving money passing through the agency to account for the needs all modes and users (0 points) No mention	5	0	No mention
	Policy specifies a requirement for interagency coordination between various agencies such as public health, housing, planning, engineering, transportation, public works, city council, and/or mayor or executive office.	(1 point) Policy mentions or encourages interagency coordination (0 points) No mention	3	1	"DOTD will work with a diverse group of stakeholders" but language is non-specific
6	Design		7	0	
	Policy directs the adoption of specific, best state-of-the-practice design guidance and/or requires the development/revision of internal design policies and guides.	(1 point) Policy references but does not formally adopt specific, best state-of-the-practice design guidance. (0 points) No mention.	5	0	No mention
	Policy sets a specific time frame for implementation.	(0 points) No mention.	2	0	No mention

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
7	Land use and context sensitivity		10	3	
	Policy requires new or revised long-range transportation plans and/or design guidance to specify how transportation projects will serve current and future land use such as by directing the adoption of place-based street typologies	(2 points) Policy discusses the connection between land use and transportation or includes non-binding recommendations to integrate land use and transportation planning. (1 point) Policy acknowledges land use as a factor related to transportation planning. (0 points) No mention.	5	2	References connections to bike/ped generators, but not land use explicitly
	Policy requires the consideration of the community context as a factor in decision-making.	(1 points) Policy mentions community context as a potential factor in decision-making. (0 points) No mention	3	1	Consultation of local complete streets plan called for, but weak guidance if no such plan exists
	Policy specifies the need to mitigate unintended consequences such as involuntary displacement.	(1 points) Policy acknowledges the possibility of unintended consequences (0 points) No mention.	2	0	No mention
8	Performance measures		13	9	
	Policy establishes specific performance measures under multiple categories such as access, economy, environment, safety, and health.	(1 point) Policy mentions measuring performance under multiple categories but does not establish specific measures. (0 points) No mention.	3	3	goals adopted - safety, mobility, accessibility

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	Policy establishes specific performance measures for the implementation process such as tracking how well the public engagement process reaches underrepresented populations or updates to policies and documents.	(1 point) Policy mentions measuring the implementation process but does not establish specific measures. (0 points) No mention	2	1	implied through legislative reports but few targets articulated
	Policy embeds equity in performance measures by measuring disparities by income/race/vehicle access/language/etc. as relevant to the jurisdiction.	(1 point) Policy mentions embedding equity in performance measures but is not specific about how data will be disaggregated. (0 points) No mention.	3	0	No mention
	Policy specifies a time frame for recurring collection of performance measures.	(0 points) No mention.	2	2	implied through legislative reports but few target articulated
	Policy requires performance measures to be released publicly	(0 points) No mention.	2	2	Legislative reports
	Policy assigns responsibility for collecting and publicizing performance measures to a specific individual/agency/committee	(0 points) No mention.	1	1	Through CSAC legislation
9	Project selection criteria		8	0	
	Policy establishes specific criteria to encourage funding prioritization for Complete Streets implementation.	(1 point) Policy mentions revising project selection criteria to encourage Complete Streets implementation (0 points) No mention.	5	0	No mention—some programs have updated criteria to encourage CS but no agency-wide change

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	Policy specifically addresses how equity will be embedded in project selection criteria	(0 points) No mention	3	0	No mention
10	Implementation steps		15	5	
	Policy requires that related procedures, plans, regulations, and other processes be revised within a specified time frame.	(1 point) Policy mentions revising procedures, plans, regulations, and other processes. (0 points) No mention.	3	1	implied: draft action plan
	Policy requires workshops or other training opportunities for transportation staff. Policy is specific about the timing and/or staff members for the training and workshops.	(1 point) Policy mentions workshops or other training opportunities for transportation staff. (0 points) No mention.	3	1	implied: basic training module requirement
	Policy assigns responsibility for implementation to a new or existing committee that includes both internal and external stakeholders that are representative of underinvested and vulnerable communities. Policy is specific about which internal and external stakeholders are/will be represented on the committee.	(1 point) Policy assigns oversight of implementation to a specific body that may not include both internal and external stakeholders. (0 points) No mention	3	3	CSAC
	Policy creates a community engagement plan with specific strategies for who, when, and how they will approach public engagement in the project selection, design, and implementation process.	(3 points) Policy creates a community engagement plan with specific strategies for who, when, and how they will approach public engagement but does not address underrepresented communities.	6	0	No mention

	Goal/Metric	Partial Credit Scoring Criteria	Points Possible	DOTD Policy/ EDSM	Justification
	Policy specifically addresses how the jurisdiction will overcome barriers to engagement for underrepresented communities	(1 point) Policy mentions community engagement but does not go into detail about specific strategies. (0 points) No mention.			
		TOTAL	100	36	

(Adapted from: https://smartgrowthamerica.org/wp-content/uploads/2017/12/CS-Policy-Elements__2017.11.30.pdf)