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Complete Streets policy in Louisiana: Insights from a decade of state DOT implementation

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ABSTRACT

Complete Streets policies have been adopted at all levels of government to facilitate systematic and intentional accommodation of all modes of transportation, including walking and bicycling, over the last two decades. Louisiana was an early adopter of such a policy within its state Department of Transportation (DOT), but implementation in the subsequent decade has been uneven. Through a process evaluation centering on survey and interview data, this case study probes into the experience of implementing a policy at the state DOT level to identify successes, barriers, and opportunities based on 10 years of incremental change and persistence, highlighting the need to update agency processes and data to align with emerging federal policy and funding priorities, as well as the challenge of lateral and vertical policy assimilation in established agency culture.

1. Introduction and background

The purpose of a Complete Streets policy is to provide safe, convenient, and comfortable access for all users of a transportation system. A growing number of state Departments of Transportation (DOTs) have formally adopted Complete Streets policies, reflecting a shift toward a multimodal approach to accommodating all users and all modes on the public right-of-way (Smart Growth America, 2021). Though much progress has been made, fatal pedestrian and bicyclist crashes continue to rise (Smart Growth America, 2021), and the Federal Highway Administration (FHWA) still identifies eight states in the U.S. as Pedestrian or Pedestrian and Bicyclist Focused Approach States (i.e., "focus states") based on the proportion of non-motorized road user fatalities (Federal Highway Administration (FHWA), 2022). Policy adoption is only the first step: full and effective implementation requires a range of actions involving a variety of stakeholders. Many state DOTs have adopted Complete Streets policies, but few have methodically evaluated implementation results to assess whether policy goals are being achieved. This study aimed to 1) identify critical policy implementation actions, 2) assess the progress of one FHWA focus state (Louisiana) toward the adopted policy's goals, and 3) probe stakeholder' experience implementing a policy at the state DOT level to identify successes, barriers, and opportunities likely to be resonant in many jurisdictions.

In response to recent increases in vulnerable road user fatalities, FHWA has initiated a call for moving to a Complete Streets design model (FHWA, 2022). Several state, regional, and local agencies were invited to participate in the initiative, leading to the identification of five areas of opportunity for FHWA as it advances Complete Streets efforts (FHWA, 2022). It should be noted that: 1) the eight focus states mentioned above were not among the interviewed state agencies and 2) while many of the recommendations are broadly applicable at any level of governance, the identified opportunities are specific to FHWA as a federal agency in leading Complete Streets implementation. Given the renewed federal attention to improving road safety outcomes for pedestrians and bicyclists, each focus state might have a particularly acute motivation to examine their Complete Streets policy in order to identify implementation gaps and future opportunities to ensure that policymaking and spending result in fewer fatalities and progress toward other goals. However, many non-focus states would also benefit from reviewing their policy implementation efforts, both to highlight achievements and share stories of success, as well as to identify potential gaps in response to FHWA's call.

There are a variety of theoretical policy evaluation frameworks which may be employed to understand processes of policy adoption, diffusion, and implementation (Golden, 2020; Crabb and Leroy, 2012) The research team adapted a practical framework developed by the Centers for Disease Control and Prevention (CDC) for our policy

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implementation evaluation in the transportation sector (Center for Disease Control, 2023). Previous studies from the research team have covered each component and presented lessons learned and outlined a basic policy monitoring logic model for Complete Streets policy evaluation (Bian and Tolford, 2022). This study responds to FHWA's call for state DOTs to analyze the relationship of statewide active transportation plans to policy, institutional processes, and performance measurement, and improve project development processes by investigating and reporting 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 (Center for DIsease Control, 2023). In addition, continuously engaging stakeholders in policy implementation evaluation is a key to applying evaluation results successfully in practice (Moreland-Russel et al., 2013).

This paper first presents typical gaps in implementing Complete Streets policies and identifies potential stakeholders for survey and interview. The third section presents the survey and interview procedure, including survey/interview instrument development, administration, data management, and response analysis approaches. The fourth section summarizes survey and interview results based on responses from stakeholders in Louisiana (which is one of the eight focus states). The responses are organized in five subsections aligned with FHWA's identified areas of opportunity the state agency should consider as priorities for ongoing policy implementation. The last section summarizes major findings from this study and notes directions for future research and practice.

2. Theory

This section reviews typical gaps mentioned in past studies, which informed the survey and interview instrument development. The second subsection presents who are stakeholders in implementing Complete Streets policies, which informed the survey and interview procedure.

2.1. Typical gaps in Complete Streets policy implementation

As in many processes of change, adopting policy is only the first step; follow-up actions are required to advance policy implementation (Tolford et al., 2015). Many states which have adopted a complete streets approach have also identified a need to develop goals, revise other policies, manuals, or design guidelines, and set metrics for assessing progress (McCann and Rynne, 2010). Fewer agencies, however, have advanced formalized processes for tracking and reporting process- and outcome-oriented metrics, or engaged in comprehensive policy or program evaluation.

Several studies have analyzed state- and local-level Complete Streets policy diffusion and content, and the key facets of a robust policy are defined in the literature, including: defining a clear vision and goals, broad and inclusive applicability, specific definition of roles and responsibilities, and a directive to establish clear implementation actions that include excellent design guidance (Moreland-Russel et al., 2013; Porter, 2019). However, experience suggests that even states with well-written policies may fall short in their execution. Yet, limited examples exist documenting the actual outcomes of policy implementation in terms of agency processes and outputs, or the methods employed to collect evidence of such results. While several states have published at least one update on Complete Streets policy implementation actions, holistic evaluations of policy implementation and outcomes, particularly at the state DOT level, 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 (Seskin et al., 2015). A dearth of documentation on implementation, in turn, inhibits overall analysis of whether policies are, themselves, effective: are rising pedestrian and bicyclist fatality rates an indication that the United States' 1600 + Complete Streets policies aren't succeeding, or simply that key implementation steps are being missed?

This lack of robust policy performance measurement can be linked to the challenges identified in FHWA's "areas of opportunity" for Complete Streets. First, many state and local agencies have incomplete data pertaining to multimodal network inventory data, crashes, and pedestrian and bicycle volumes (FHWA, 2022). Without such data, for which federal standards are underdeveloped and which many jurisdictions lack the capacity to collect (United States Government Accountability Office, 2021), measurement of policy efficacy at improving conditions and outcomes for non-motorized road users is challenging. Our survey and interviews aimed to address this gap by assessing the extent to which multimodal data sources (including project scoping and plan documents, performance measures, and associated datasets, as identified in the authors' previous study (Bian and Tolford, 2022)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 (FHWA, 2022). A Complete Streets policy which does not stipulate mechanisms for project identification and prioritization that explicitly weight multimodal safety and holistically integrate potential benefits of active transportation projects into project selection and scoping is thus unlikely to achieve full implementation. Our study sought to investigate project delivery processes currently in place, 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 (FHWA, 2022). 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 current study 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, and that 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 (FHWA, 2022), 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. Our study sought to verify these observations and probe barriers to consistently implementing Complete Streets, and 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 so as to make recommendations for improved coordination and more consistent interpretation.

Finally, FHWA highlights the need to make Complete Streets the "easiest option for all stakeholders" (FHWA, 2022). In order to be easy,

Table 1
Survey questions.

Theme and Description	Question Topic
1. Respondent Background	1.1 Organizational affiliation
affiliation, role, working tenure, and geographic region	1.2 Professional role
	1.3 Tenure
	1.4 Geographic scope
2. Policy Familiarity and Diffusion	2.1 Concept familiarity
familiarity with the Policy goals and its applicability	2.2 Policy objectives
	2.3 Agency actions taken
	2.4 Policy applicability
	2.5 Policy exceptions
	2.6 Local policy diffusion
	2.7 Policy lead/contact(s)
	2.8 Stakeholder support
3. Project Development, Planning, and Design	3.1 Project prioritization
familiarity and improvement suggestions for tools, plans, manuals, and guidelines	3.2 Local involvement
	3.3 Planning tools
	3.4 Design guidance
	3.5 Gaps in guidance/support
4. Performance measurement, accountability, and training	4.1 Implementation plan
familiarity with the Implementation plan, participation in DOTD's Complete Streets training module and other related trainings, and implementation barriers	4.2 Changes to performance metrics
	4.3 Spatial data
	4.4 Equity
	4.5 Training
5. Barriers and Next Steps	5.1 Implementation barriers
potential actions to enhance future Complete Streets Policy implementation in Louisiana	5.2 Staff capacity
	5.3 Local participation
	5.4 Policy satisfaction
	5.5 Implementation efficacy
	5.6 Public support
	5.7 Key successes
	5.8 Future priorities

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 ROW conflicts. This study sought to clarify where more systematic policy and procedure changes are needed by identifying points where practitioners experience conflict, and to learn where more guidance is needed, both among DOT agency staff and external stakeholders who work with them. In other words, we sought to identify what resources are needed to truly make Complete Streets the default approach.

2.2. Stakeholders in Complete Streets 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 (Moreland-Russel et al., 2013). First, different offices, sections, and programs within a state Department of Transportation (DOT) play distinct but interrelated roles in facilitating policy implementation (Biton et al., 2014; LADOTD, 2017). 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 (McCann and Rynne, 2010; Tolford et al., 2015). FHWA division offices ensure that federal funds are spent in compliance with regulations, while encouraging adoption of best practices. 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.

3. Methodology

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 (Dillman, 2007). Survey recipients were personnel who regularly work on projects involving state roadways and/or funds administered by the state agency, such as employees of Department of Transportation and Development (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.

3.1. 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 1). The research team conducted several rounds of pilot survey testing to ensure that the questions were easily understandable.

The survey was developed on 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 June 25, 2021 and closed on August 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.

3.2. 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 min 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 2) 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 2 shows key themes which emerged in responses.

4. Survey/Interview result discussions and recommendations

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. As noted below, the five opportunities are not stand-alone but are interrelated with each other.

4.1. 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) (LADOTD, 2013). 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 (Smart Growth America, 2016). In construction, application of the Policy may refer to maintaining safe accommodations for people walking and bicycling through or around the construction site (Shaw, 2018). A concurrent review of when key documents pertaining to all

Table 2
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' • Possible conflicts between the CS Policy and other agency policies, documents, and/or practices • Design flexibility and guidance • CS training, outreach, and support	• Foundational documents Training Checkpoints
3. Project Development	• Pathways, processes, and leaders for identifying CS projects • 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)	• Consistency Early interventions Problem solving Outreach Coordination Leadership Preservation
4. Performance Measures	• Use and definition of equity as planning/funding consideration • CS performance metrics & data management practice	• Safety Demand Satisfaction Routine data collection Analysis toolkits
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

programs and stages of project delivery were last updated revealed that while most (though not all) manuals, checklists, engineering directives, and guidelines have been updated since the Policy was adopted, many still lack any direct reference to the policy and/or to the needs of non-motorized road users where such references would logically be anticipated. Without clear connections between policy language and the key documents which guide practitioners' day-to-day work, it is possible that Complete Streets is viewed as at best, extraneous to workflows in later stages or at worst, in conflict with the imperatives of practitioners' work as it is currently defined.

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 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 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, Minimum Design Guidelines, Stage 0 Checklist, and Design Report). These document updates are also recognized as a 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 (related to Section 4.4), while an internal platform hosting all policy related materials is needed to facilitate training and build awareness continuously (related to Section 4.2).

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 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; related to Section 4.2). 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 the 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 (related to Section 4.4), 2) more interaction and collaboration with District offices and other agencies (e.g., MPOs and local municipalities) in supporting local plan development (related to Section 4.3), and 3) more robust data support (related to Section 4.5). In addition, the existing project selection/prioritization process and criteria require agency document updates for clarification and a public facing platform for document sharing (related to Section 4.2). The combination of these efforts would greatly improve DOTD's ability to implement the Policy consistently and effectively.

4.2. 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, currently an open-response form field that can be filled in with as much or as little detail as the individual sees fit. The result is that this field is often answered with "NA," "TBD," or similar. This finding indicates that practitioners need additional guidance to ensure that checkpoints are effectively used, and that the resulting information is useful. Even in cases where it is ultimately determined that no specific facilities for pedestrians or bicyclists will be included within the project scope, the Policy calls for due consideration of how all modes are (or are not) accommodated, and why. Responses could be improved by using digital forms (reducing 'NA' responses) and providing answer templates that facilitate greater specificity in addressing both the "what" and the "why" (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, only

about 15% of the DOTD respondents report using the plan in their work. A "one-stop" platform – along with an effort by agency leadership to inform staff of the resources it contains and encourage their use – 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.

4.3. 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%). While per policy language, right-of-way acquisition is clearly identified as a prohibiting factor in Complete Streets implementation for preservation projects, roadway reconfigurations or adjustments (e.g., road diets, lane width reductions, etc.) which reallocate existing right-of-way can and should be considered. However, existing guidance does not directly prompt such consideration, and practitioners appear to conflate the potential reconfiguration of a right-of-way with the acquisition of additional land, in some cases. 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.

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 the 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 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 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.

4.4. 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.

4.4.1. 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.

4.4.2. 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 noted 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.

4.4.3. Provide support to locals

Both DOTD and non-DOTD interviewees observed that outreach to provide compatible introductory and advanced training to local agencies. 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 DOT should consider expanding its partnership with Local Technical Assistance Program (LTAP) to deliver more training for designing and engineering holistic and context-appropriate designs (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 design.

4.5. Improve data collection for performance measures

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

4.5.1. Process measures

Process refers to inputs and activities in the logic model around which this evaluation was structured. 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.

4.5.2. 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.

4.5.3. 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 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.

5. Conclusions

Culture change from focusing on auto-mobility to balancing accommodations for all modes is a long-term challenge, and the process is iterative: updates to one document may reveal new changes necessary elsewhere. This study sought to understand the extent to which policy has translated to practice, by unpacking the extent to which agency staff and external stakeholders have (or have not) made changes in their work, finding that while numerous resources have been developed to support policy implementation, several are underutilized and/or poorly understood. Several interviewees report substantial progress over the last ten 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-making. Overall, our results were consistent with FHWA's observations about some of the key barriers to Complete Streets implementation: design guidance that trades nuanced specificity for universal applicability, gaps in guidance for entire project categories, and challenges addressing interjurisdictional coordination. 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.

Taking stock of achievements over a decade of policy implementation has yielded valuable insight into areas of ambiguity or inconsistency which hinder progress toward policy goals. As in many government agencies, most time and attention is dedicated to the daily business of administering essential bureaucratic functions and programs, with limited capacity for data collection and analysis aimed at self-evaluation. Embedding such activities in policy language, either on an annual basis to benchmark key performance indicators, or through more in-depth periodic assessment, can help ensure that agency actions, document updates, and reported metrics align with adopted policy goals, as well as serve as a key tool for stakeholder and public outreach and engagement. Policy implementation is seldom a straightforward process, particularly when the policy is intended to apply — equally, but not uniformly — to all programs, projects, and personnel within an agency. One immediate action prioritized by stakeholders is to integrate the key recommendations of this study (e.g., continued design guidance and tool development, training, dataset development, and performance measurements and methods), into the state's long-range plan. A second near term priority is to develop an index of resources and documents for DOTD staff, FHWA, local governments, and the public to guide and inform policy implementation through each project delivery phase. While this study evaluates Louisiana's specific experience with Complete Streets, the steps taken to holistically assess both processes and outputs of policy implementation are of potential interest to other FHWA pedestrian and bicycle safety focused states (or any state with adopted Complete Streets policy) seeking to better understand possible disconnects between policy and practice from a variety of perspectives, and identify potential actions to address barriers. In addition, the implementation topics explored through this approach could be scaled to MPOs or local agencies.

Framing the need for Complete Streets as a problem to be solved is identified as a key strategy for continued "culture change" within the agency to embrace new ideas and adapt to changing needs. This study serves as a first step in solving the problem. Reviewing the state agency's policy implementation via solicitation of feedback from stakeholders directly involved in shaping the state's transportation network allowed the research team to reach the five major areas of opportunities for the future, and to tie national efforts to state-level actions. The identified opportunities generally align with those in FHWA's report as the agency advances Complete Streets efforts at federal level (Federal Highway Administration (FHWA), 2022), while highlighting gaps where Louisiana may need to focus additional attention and learn from other states, such as consolidating relevant information, resources, and technical support into an online portal, expanding and refining design guidance to support a broader range of project parameters, and revising adopted performance measures (that reflect recent and recommended enhancements to multimodal data collection). This study identified

opportunities for a state agency and brought up some of the challenges a historically auto-centric state faces in Complete Streets policy implementation. As FHWA has recognized, many states' efforts to improve safety for people walking and bicycling are hindered by inadequate design guidance, lack of clear, consistent prioritization of safety over other competing priorities, and a deficit of meaningful performance metrics (and/or the data with which to assess them). In seeking comparable assessments among peer agencies, we found that most state DOTs have not undertaken systematic evaluation of Complete Streets policy, and thus have limited ability to define and target needed implementation actions and/or policy refinements. Assessment can involve a variety of tactics and approaches, both quantitative and qualitative (Bian and Tolford, 2022). However, asking the individuals involved in implementation – both within an agency and among external stakeholders who work closely with that agency – to reflect on policy integration, impediments or misunderstandings, and opportunities for improvement, can be a key tool, as in Louisiana's case, to defining a roadmap to safety, mobility, and access for all.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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