



RESEARCH & DEVELOPMENT

Bench-marking Non-motorized Policies and Project Delivery

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BENCH-MARKING NON-MOTORIZED POLICIES AND PROJECT DELIVERY

Final Report

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Executive Summary

In recent years, and especially now during the global pandemic, there has been increasing interest in future bicycle and pedestrian projects in the United States. The American Community Survey estimates that only 2.7% and 0.6% of adult commuters in the United States walk and bicycle to work as their primary means of transportation, respectively (American Community Survey 2017). However, these forms of active transportation have value and provide many benefits such as health, environmental, and economic benefits for communities and require more attention.

This report has three components: a literature review, a survey of local officials in North Carolina, and a study of comparative state DOTs. The literature review findings conclude that improving participation in active transportation will require multidimensional solutions and the ability to address transportation and land use as shared parts of the same system rather than as distinct policy imperatives. Installing and maintaining any type of infrastructure is an expensive, time-consuming process. Elected officials, administrators, and Department of Transportation (DOT) planners/engineers are understandably challenged to pursue active transportation given that a) most commuters (i.e., voters) travel alone in personal vehicles, b) roads and automobile-oriented infrastructure dominate DOT budgets, and c) the return on investment for bicycle and pedestrian infrastructure is not always clear. Yet, linear pathways alone are an insufficient stimulus of active transportation. Bikeways and pedestrian pathways must connect origins and destinations with a mix of land uses. Linear infrastructure is best complemented by corresponding changes in density, connectivity, and land use types. This requires contributions from multiple bureaucracies and multiple intersecting policies, likely at different scales of government.

To understand the perspective of local government officials and other professionals (referred to as local officials), who are critical in the adoption of improving bicycle and pedestrian infrastructure, a quantitative and qualitative survey of 298 local officials across the state of North Carolina was conducted as a part of this study. The survey was based on the literature review and input from local transportation officials. The majority of local officials across the state are familiar with the North Carolina Department of Transportation (NCDOT) WalkBikeNC program and Complete Streets policy. However, rural officials are less familiar than more densely populated areas. Most communities across the state identified walkability and bikeability as high priorities. The majority of local officials surveyed were concerned with bicyclist and pedestrian safety in the communities they serve. Most local officials agree that it is safe to walk in their jurisdiction but do not agree that it is safe to bicycle.

According to local officials, the lack of sidewalks and infrastructure were the largest hinderances to walking and distance is second. Two-thirds of local officials said their organization values bicycle and pedestrian policies to create opportunities for tourism. In addition, almost two-thirds said their organization values bicycle and pedestrian policy to

improve access to the local economy. Demand could be increased in urban and mixed urban areas especially if sidewalk, bicycle, and pedestrian lanes had better connectivity.

While all communities face the challenge of funding, officials from rural communities indicate their biggest barrier to improving active transportation was their annual bicycle and pedestrian budget allocation and their inability to meet the matching fund requirements of grants. Respondents from urban and mixed urban areas indicate that administrative capacity is their biggest limitation for accessing state and federal grant funding.

The study of comparative DOT's included 20 survey questions to gather information from 50 state DOTs. The questions were targeted to obtain information about state DOT budget, allocation of funds for bicycle/pedestrian projects, hindrances for walking and bicycling, and bicycle/pedestrian policies and best practices from as many states as possible. Thirteen states responded including the four selected comparable states to North Carolina (Florida, Georgia, Tennessee, and Virginia). In consultation with NCDOT, the comparable states were identified based on characteristics such as population, population density, area type, DOT organizational setup/ structure, and highway funding.

All state DOT respondents indicated that bike-ability and walkability are high priorities regardless of population density, land use, state DOT budget, organization setup, or other criteria. Safety, accessibility, and multi-use paths followed by community health are also top priorities for the state DOT respondents. Shoulders, bicycle lanes, or shared-use paths are a priority for North Carolina and two other comparable state DOT respondents. State DOT respondents indicated hindrances to active transportation include destinations are too far, lack of sidewalks and bicycle lanes, unsafe intersections, and bad driver behaviors as major reasons for low pedestrian and bicycling activity.

NCDOT's bicycle/pedestrian operating budget (for independent projects as well as those that are part of highway projects) is lower than the bicycle/pedestrian operating budget of other state DOT's. Dedicated funding is a concern and seen as an opportunity by all the state DOT respondents. This is followed by planning/technical resources and political/local support. Most state DOT respondents indicate that they had applied for and been moderately or fully successful in receiving federal grant funding, while the NCDOT had been somewhat successful in receiving federal grant funding.

Respondents from other state DOTs indicate that they emphasize and use ADA compliance policy, access policy, context-sensitive design solutions, and multimodal design guidelines in addition to the Complete Streets policy and WalkBikeNC. The state DOT respondents indicated trails and paved roads/shoulders in rural areas and road safety audits, road diets, safe routes to schools, sidewalks, bicycle lanes, bridges, and greenways/trails in urban areas are best practices for active transportation.

The best practices derived from all three components of the report: scoping and literature review, local official survey, and the information gathered from the state DOTs identified five best practices and recommendations.

- 1) Invest in matching funds for federal grants and build administrative capacity with municipal government to leverage more federal funding since local officials see walking and bicycling as a priority for their communities;
- 2) Leverage local government and regional support for active transportation that creates economic development opportunities;
- 3) Support the installation of infrastructure designed specifically for bicycling and walking;
- 4) Continue emphasizing Complete Streets policy and encourage the development of infrastructure that supports all modes, ages, and abilities by taking advantage of more multimodal, ADA, and context sensitive policies; and
- 5) Capitalize on local priorities for bicycle and pedestrian safety.

The information and recommendations from this report are available for immediate use by staff at NCDOT for bench-marking the success of current and future NCDOT bike/ped infrastructure projects and help articulate clearer standards to local governments applying for state- and federally funded bike/ped projects moving forward into the future.

Chapter 1. Introduction

1.1 Need for the Research

Implementing safe, accessible, and cost-effective bicycle and pedestrian infrastructure leads to a variety of public health and environmental benefits, at multiple scales. In North Carolina (NC) and other states, successfully funding, permitting, and installing such infrastructure requires coordination among local, state, and federal government actors. Projects of such institutional complexity benefit from clearly articulated standards, which can be informed by best management practices, policies, and laws already in place around the United States (US). This report is based on a twelve-month multi-methodological study that assesses state-level best management practices for the funding, designing, permitting, and installation of both independent non-motorized infrastructure and non-motorized infrastructure as part of highway projects.

1.2 Research Objectives

The research objectives are: 1) to identify states in the US that are comparable to NC in population, economic condition, DOT organizational structure / setup, and size, 2) to identify non-motorized transportation project delivery rate, Transportation Alternative Program (TAP) spending rate, duration and their frequency, and the percent of highway projects constructed with bicycle and pedestrian facilities, 3) to document existing policies, laws, and processes of comparable states and compare them with those being adopted by NCDOT, and, 4) to identify and recommend best policies, laws, and processes to NCDOT.

1.3 Organization of the Report

Chapter two is a comprehensive literature review that details the history and background of NCDOT bicycle and pedestrian projects and uses internet-based research and telephone inquiries to scan other state DOT's policies and metrics. This was used to select Florida, Georgia, Tennessee, and Virginia, in consultation with NCDOT to compare to NC and to guide a quantitative and qualitative survey.

Chapter three presents the findings based on interviews with 298 local transportation officials involved in bicycle and pedestrian policy from across the state of NC. The survey results demonstrate an understanding of the demand for future bicycle and pedestrian projects in NC, identify key barriers to participation and receive input from transportation and planning expert's opinions on how NCDOT processes can best accommodate the needs of NC municipalities.

In chapter four, the research team used a comparative case study approach to select interview subjects from five comparable states selected in Task 1 and interviewed and surveyed (i) other state DOT officers and (ii) local transportation and bicycle and pedestrian program managers

that have administered federal matching grants. This task focused on integrating and analyzing all survey data collected for this research and comparing it with the existing policies adopted by NCDOT. The analysis established what types of state policies and laws facilitate successful implementation of bicycle and pedestrian projects in urban, suburban, and rural areas.

Chapter four concludes with the data obtained from the states comparable to NCDOT on their respective policies, laws, and processes on delivering non-motorized projects to document them by state, category, type of project, etc. The documented policies, laws, and processes are compared with NCDOT's current policies, laws, and processes to identify the policies, laws, and processes that influence non-motorized project delivery. Furthermore, the best policies, laws, and processes from the comparable states are identified and recommended to NCDOT.

The report closes (Chapter 5) with the five recommendations about best practices and benchmarks for successful bicycle and pedestrian projects, policies, and state laws. The report and recommendations can be used as a reference for NCDOT staff to move forward and as a resource as they craft new policy for bicycle and pedestrian infrastructure design and installation. It can also serve as a guide for implementation through the Strategic Prioritization Office of Transportation (SPOT) 7.0 for improved non-motorized project delivery rates.

Chapter 2. Scoping Study and Literature Review

2.1 Introduction

The purpose of this literature review is to offer a multidimensional, multiscale overview of the state of active transportation in the US. Given finite resources, finite time, and the seemingly priceless imperative of a clean, efficient, and accessible transportation system, it is important that public officials are well informed about what types of transportation investments work, and for whom. The review below is one part of a Scoping Study, which is itself the first task (Task 1) of a research project entitled *Bench-marking Non-motorized Policies and Project Delivery* (henceforth “the project”). The project is funded by the NCDOT. The Scoping Study also includes an original database produced to help select case studies for later tasks in this project.

A brief overview of the subsequent tasks in this project is worthwhile: Task 2 of the project involves interviews with state DOT officials in NC. These interviews were used to produce comparative case studies that help contextualize NCDOT’s ability to stimulate and support active transportation at the local level. Task 3 involves a survey of state DOTs with an emphasis on policies and practices that contribute to successful project delivery. Tasks 4 and 5 involve data analysis and report preparation, respectively.

Overall, the project offers a fresh look at the challenging multilevel governance issues of planning, funding, designing, and installing bicycle and pedestrian infrastructure, and assesses the best practices of DOTs in other US states. A network of public agencies at different scales approach the imperatives of bicycle- and pedestrian-friendly environments with different tools and priorities. NCDOT and other state DOTs serve as an important nodes in this ecosystem: they mediate between federal authorities (who primarily fund bicycle and pedestrian projects) and local authorities (who primarily design and build bicycle and pedestrian projects) and have considerable power to set the rules about access to funding. This Scoping Report and the data collection tasks that follow aimed to learn how NCDOT can best facilitate the interaction of local design, funding, and permitting processes (itself the consequence of multiple local authorities) with federal regulations and granting.

2.1.1 The Importance of Active Transportation

In this report “active transportation” refers specifically to walking or riding a bicycle. The health, environmental, and economic benefits of active transportation to the individual, to the community, and to the general public have been firmly established by research from around the world. Walking and bicycling are low-cost, low-carbon modes of travel, and Americans that use active transportation are at lower risk for illnesses like heart disease and diabetes (Pucher et al. 2010; Pucher and Buehler 2010; Bassett et al. 2008; Gordon-Larsen et al. 2009). While active transportation presents risks like physical injury and exposure to air pollution, these risks appear to be outweighed by the public health benefits of shifting away from cars and toward active transportation (Lindsay, Macmillan, and Woodward 2011; Tainio et al. 2016; Mueller et al. 2015; Rojas-Rueda et al. 2011; Grabow et al. 2012).

In 2017, transportation in the US was responsible for 29% of all US energy-related greenhouse gas emissions, representing a larger share than electricity production (27.5%), industry (22.2%) and all other sources (US Environmental Protection Agency 2019). Most transportation emissions (59%) come from “light-duty vehicles,” which includes the cars and light trucks that millions and millions of Americans drive to work, school, and other destinations every day. Evading the more severe challenges of climate change and achieving clean energy goals will require transitions in transportation systems.

2.1.2 Methodology

What follows is a synthesis of literature related to active transportation. Most of the sources cited are peer-reviewed articles from journals of urban planning, public administration, public health, civil engineering, preventative medicine, and associated fields. The review also uses data from several non-academic reports and government sources (e.g., the US Census) to illustrate trends in active transportation. The primary purpose of this review is to identify research gaps for subsequent tasks in the broader research project. A secondary objective is to offer NCDOT officials an overview of the most current research related to active transportation research.

To every extent possible, the review prioritizes studies conducted in the US, although some international literature is cited for purposes of contrast as well as to illustrate global trends.

The literature review consists of six additional sections:

- The following section (**Section 2**) presents the state of active transportation in the US, describing where active transportation is common, why walking and bicycling remain marginal modes of transportation in almost every American community, and how different organizations plan for active transportation.
- **Section 3** focuses on what types of people use active transportation, why people transition to active modes of transportation, and how social experience and life course variables influence an individual’s chances of riding a bicycle or walking.
- In **Section 4**, the review turns specifically toward built environment strategies, focusing on physical features of the environment associated with more bicycling and more walking, and by extension, land use and design strategies that can stimulate individuals to use active transportation.
- Next, in **Section 5**, the review pays special attention to active transportation to-and-from schools, and multilevel strategies that have worked to reverse a multi-decade decline in active transportation to school.
- Finally, in **Section 6**, the review discusses research surrounding funding for active transportation, including why certain places are more likely to access federal monies for bicycle and pedestrian projects, and alternative local funding solutions that communities have used to jumpstart bicycle and pedestrian projects.

- **Section 7** offers a brief summary of the literature and considers questions for subsequent stages of this research project.

2.2 The State of Active Transportation in the United States

Walking and bicycling as modes of transportation in the US are very rare. The American Community Survey estimates that 2.7% and 0.6% of adult commuters in the US walk and bicycle to work as their primary means of transportation, respectively (American Community Survey 2017). Meanwhile, 86% of commuters travel in a private car, truck, or van. In only four states do more than five percent of commuters walk to work: Alaska (7.9%), New York (6.2%), Vermont (5.6%), and Montana (5.1%) (ibid). Alaska’s abnormally high proportion of pedestrian travel is due to the presence of dense rural villages, limited road networks, high gas prices, and a young population (State of Alaska 2019, 12). In the US not a single state has more than 2.5% of commuters use a bicycle as their primary means of transportation—Oregon is highest, with 2.3% (American Community Survey 2017).

Descending to the local level, it is apparent that both walking and bicycling as modes of commuting concentrate in a small number of exceptional places. While most US municipalities have at least a 1% walking commute share, less than one-fifth of cities of any size have a greater than 5% walking commute share. Riding a bicycle is even more rare. While the majority (52%) of medium-sized cities have at least a 1% bicycle commute share, less than 30% of large or small cities have greater than 1% bicycle commute share. Few cities, of any size, have walking or bicycling commute shares greater than 10% (see Table 2.1: American Community Survey 2014).

Table 2.1 Percentage of large, medium, and small cities with different thresholds of active transport

	Large US Cities (>200k inhabitants; n=111)		Medium US Cities (100k-199k inhabitants; n=178)		Small US Cities (<100k inhabitants; n=1,463)	
	Walking (%)	Bicycling (%)	Walking (%)	Bicycling (%)	Walking (%)	Bicycling (%)
% with 10% or greater	4	0	10	1	3	0
% with 5% or greater	18	2	13	3	14	14
% with 1% or greater	97	29	88	52	78	17

A list of the top walking and bicycling cities reveals that places with higher levels of active transportation often host large university campuses—physically distinct places populated by young people, often without immediate access to a motor vehicle (see **Error! Not a valid bookmark self-reference..2**). Otherwise, the commute share of walking and bicycling rarely exceeds levels higher than 10% in US localities.

2.2.1 How has the Proportion of Walking and Bicycling Changed over Time?

In recent decades, the proportion of Americans that walk to work has declined steadily from 5.6% (1980) to approximately 2.7% (2017). Meanwhile, the proportion of bicycle commuters has increased from a paltry 0.4% (1980) to 0.6% (2017). The percentage of children that walk or ride a bicycle to school has declined dramatically from just over 48% in 1969 to just under 13% in 2001 (McDonald 2007), although recent data suggests that rates of active transportation to school may have increased subtly in the past decade (National Center for Safe Routes to School 2016).

Table 2.2 Top walking and bicycling cities in the USA and NC

	Large US Cities (>200k inhabitants; n=111)				Medium US Cities (100k-199k inhabitants; n=178)				Small US Cities (<100k inhabitants; n=1,463)			
	Walking	%	Bicycling	%	Walking	%	Bicycling	%	Walking	%	Bicycling	%
1	Boston, MA	15.1	Portland, OR	6.1	Cambridge, MA	24.0	Boulder, CO	10.5	Ithaca, NY	42.4	Cleburne, TX	18.6
2	Washington, DC	12.1	Madison, WI	5.1	Berkeley, CA	17.0	Eugene, OR	8.7	Athens, OH	36.8	Clinton, MS	17.4
3	Pittsburgh, PA	11.3	Minneapolis, MN	4.1	Ann Arbor, MI	15.6	Berkeley, CA	8.1	State College, PA	36.2	Davis, CA	11.2
4	New York, NY	10.3	Boise, ID	3.7	Provo, UT	14.5	Cambridge, MA	7.2	N. Chicago, IL	32.2	Key West, FL	9.2
5	San Francisco, CA	9.9	San Francisco, CA	3.4	New Haven, CT	12.4	Fort Collins, CO	6.8	Kiyas Joel, NY	31.6	Corvallis, OR	8.5
6	Madison, WI	9.1	Seattle, WA	3.4	Columbia, SC	11.3	Gainseville, FL	6.5	Oxford, OH	29.7	Santa Cruz, CA	7.6
7	Seattle, WA	9.1	Washington, DC	3.1	Providence, RI	10.6	Tempe, AZ	4.2	Pullman, WA	23.5	Palo Alto, CA	6.8
8	Honolulu, HI	9.0	Sacramento, CA	2.5	Syracuse, NY	10.4	Ann Arbor, MI	3.7	East Lansing, MI	23.3	Menlo Park, CA	6.8
9	Philadelphia, PA	8.6	Oakland, CA	2.4	Boulder, CO	9.2	Provo, UT	3.1	College Park, MD	21.5	East Lansing, MI	6.6
10	Jersey City, NJ	8.5	Tucson, AZ	2.4	Hartford, CT	8.2	New Haven, CT	2.7	Burlington, VT	20.3	Laramie, WY	6.2
	Walking NC	%	Bicycling NC	%	Walking NC	%	Bicycling NC	%	Walking NC	%	Bicycling NC	%
1	Fayetteville	4.7	Durham	0.9	Wilmington	2.9	Wilmington	1.5	Chapel Hill	10.2	Caroborro	5.3
2	Durham	2.9	Raleigh	0.6	High Point	1.8	Cary	0.2	Jacksonville	10.2	Chapel Hill	2.2
3	Charlotte	2.1	Greensboro	0.3	Cary	1.2	High Point	0.2	Havelock	6.2	Jacksonville	1.1
4	Greensboro	2.1	Charlotte	0.2					Asheville	3.7	Salisbury	0.8
5	Raleigh	2.1	Fayetteville	0.2					Greenville	3.1	Goldsboro	0.7

At the state level, between 2010 and 2017, the share of active commuters has increased in 16 states while declining in 34. The greatest increase in the share of active transportation commuters occurred in Massachusetts (0.39% increase), Rhode Island (0.31% increase), South

Carolina (0.31% increase), and Virginia (0.2% increase). The greatest decrease in the share of active transportation commuters occurred in South Dakota (0.86% decrease), Idaho (0.66% decrease), Vermont (0.50% decrease), and Nebraska (0.49% decrease). NC experienced a subtle 0.03% increase in active transportation commute share between 2010 and 2017.

Detailed analysis of active transportation at the metropolitan scale offers some evidence of increasing frequency of active transport. A recent study employing count data from 13 major US metropolitan areas, and controlling for changing density, land use, and infrastructure conditions near count locations offers evidence that rates of bicycling and walking increased 2-6% and 2-3%, respectively between 2004 and 2016 (Le, Buehler, and Hankey 2019).

Of course, utility travel (i.e., for work, school, or errands) is not the only reason individuals walk or ride a bicycle. According to the 2017 National Household Travel Survey, more people cycle and walk for social/recreational purposes than for any single purpose. As discussed below, recreational bicycling may serve as a “gateway” to encourage individuals to transition toward active utility transportation.

2.2.2 Why is Active Transportation so Rare in the United States?

The marginal nature of active transportation in the US is the consequence of a transportation system built to accommodate personal motor vehicles. A brief description of how we got here is important to understanding why serious attempts to encourage walking or bicycling will require multidimensional solutions and broad coalitions of support. Since the early twentieth century, decisions about the built environment including the design of homes, neighborhoods, and entire cities have accommodated the personal vehicle as the default form of transportation (Jackson 1985; Watson 2012). This is exacerbated by local ordinances that *require* developers to install space for car parking, which is often offered to motorists free of charge, and consequently, subsidized by patrons of other travel modes (Shoup 2017; Shoup 2001). In the US, and increasingly around the world, the outward physical expansion of urban regions, segregation of land uses, and adherence to the demands of a modern work day have left many commuters little choice but to drive a personal vehicle between their home and workplace, as well as to and from other destinations during the day (Ewing et al. 2007; Verma 2015; Jeekel 2016, 17–18; Yang et al. 2017; Ewing, Pendall, and Chen 2003; Hamidi et al. 2015).

A transportation system built for motor vehicles presents a tiresome dilemma for public authorities interested in promoting active transportation. It is challenging to justify increasing investments in active transportation and decreasing investment in automobile infrastructure when the vast majority of daily travel happens in a car. Even armed with clear research documenting the health, environmental, and economic benefits of active transportation, cities and regions have effectively committed themselves to maintaining a car-based transportation network by investing the vast majority of transportation funding into motorways. Thus, transitioning to a transportation system in which bicycling, and walking are safe, convenient, and desirable will likely involve policy and infrastructure investments that simultaneously promote active transportation while reversing the policies that allow single-occupancy vehicles to dominate American thoroughfares.

2.2.3 Planning for Active Transportation

Creating a plan for active transportation does not guarantee the construction of bicycle and pedestrian infrastructure, nor does a plan independently inspire individuals to walk or bicycle. However, given the multisectoral, multilevel complexity of funding and constructing transportation infrastructure, the presence and use of plans is arguably a necessary component of successful active transportation. Plans are critical in conditions of interdependency, irreversibility, indivisibility, and imperfect knowledge about the future (Hopkins 2001; Boyer and Hopkins 2016). These conditions are especially salient to decisions in the built environment. As discussed next, active transportation projects typically involve funding and implementation at multiple levels of government, and by different bureaucracies within the same level. Installing new infrastructure almost certainly involves negotiation with different jurisdictions and different public and private landowners. Actors in these different organizations rely upon each other's plans as signals, so that they can coordinate funding and ensure the efficient allocation of resources. Elements of a plan can also signal to other actors in an ecosystem that an organization is seriously committed to the execution of certain types of projects. As such, it is important to understand who plans for active transportation.

In NC, the incidence of bicycle and pedestrian planning has increased dramatically since 2006, two years after NCDOT initiated a competitive grant program that funded local bicycle and pedestrian plans (Aytur et al. 2013). Prior to this program—and as far back as 1974—the cumulative number of bicycle plans hovered at 12, and pedestrian plans at 8. By 2011, cumulative pedestrian plans reached 81 while bicycle plans reached 41. By 2019, cumulative pedestrian plans totaled 117, cumulative bicycle plans totaled 53, and the program has funded 32 combined bicycle and pedestrian plans¹. Matching requirements are on a sliding scale, with small municipalities (population < 10,000) receiving 90% support from the NCDOT, and large municipalities (population > 100,000) receiving only 50% support from NCDOT². All applicants are required to enlist the support of a pre-approved planning consultant firm, and application guidelines recommend allocating anywhere from \$25,000 (for small municipalities) to \$190,000 (for large communities) for consultant fees.

A recent assessment of 51 state DOTs by Dill, Smith, and Howe (2017) finds that levels of support for innovative bicycle and pedestrian policies were highly correlated with the proportion of urban inhabitants in each state. In their assessment of different policies' tools, very few plans required any bicycle and pedestrian measures, and only two policy tools were encouraged by over 50% of plans. While many plans encouraged the installation of trails, sidewalks, or bicycle and pedestrian lanes, they generally failed to mention land use and design policies that slow motorized traffic (e.g., road diets and narrower streets). The article also finds

¹ <https://connect.ncdot.gov/municipalities/PlanningGrants/Pages/Grant-Recipients-and-Completed-Plans.aspx>

²

<https://connect.ncdot.gov/municipalities/PlanningGrants/Documents/Bicycle%20and%20Pedestrian%20Planning%20Grant%20Initiative%20Overview.pdf>

that support for active transportation at the state level is not shared deeply within DOT bureaucracies. Support comes primarily from top managers, and less so from engineering staff.

Unsurprisingly, implementing bicycle and pedestrian projects competes for funding and staffing with other priorities, namely automobile infrastructure. In a survey of NC municipalities, Evenson, Aytur, Satinsky, and Rodriguez (2011) asked transportation planners (or individuals most familiar with active transportation) “What barriers do you face in terms of implementing projects, policies, or programs to support walking/bicycling in your locality?” The strongest barriers to walking projects and policies included lack of funding (93%), other infrastructure priorities (79%), automobile infrastructure priorities (66%), and staffing challenges (65%). Barriers to bicycle projects were similar: lack of funding (94%), other infrastructure priorities (79%), automobile infrastructure priorities (73%), issues were not priorities for the municipality (68%), staffing challenges (68%), and insufficient support from resident (63%). Municipal staff representing rural areas selected issues related to staffing challenges much more often than their urban counterparts, and levels of political support for bicycling was much lower in rural areas.

2.3 Who Uses Active Transportation?

In the US, bicycling as a means of transportation is most common among able-bodied younger men living in city-centers (Nehme et al. 2016; Pucher, Buehler, and Seinen 2011b; Handy and Xing 2011; Rowangould and Tayarani 2016; McAndrews, Tabatabaie, and Litt 2018).

International research, however, challenges notions that bicycling is inherently an activity for young men. In high-cycling countries like Germany, the Netherlands, and Denmark where utility bicycling is many times more common than in North America, disparities in bicycling rates between men and women and among individuals of different age groups greatly diminish or disappear (Pucher and Buehler 2008). While bicycling represents a small share of total trips in Canada, Canadians still cycle at double the rate of Americans because a) Canadian cities are generally denser and more mixed-use, resulting in shorter trips; b) the costs of parking and refueling a car are higher; and c) a suite of policies and educational opportunities enhance bicyclist safety (Pucher and Buehler 2006; Pucher, Buehler, and Seinen 2011a). Interestingly, data from the 2009 National Household Travel Survey shows that women and youth in the US are more likely to ride a bicycle in sparsely-populated places than in high-density urban areas (McAndrews, Tabatabaie, and Litt 2018).

An array of studies that probe why certain individuals use active transportation for utility purposes suggest that individuals can reach a threshold level of experience after which they are more likely to use active transportation consistently, on a greater variety of roads, and in more types of weather. A study by Mitra and Schofield (2019) surveyed Toronto-area rail commuters about their willingness to ride a bicycle to and from the train as part of their commute. The results classify respondents into four categories:

- 1) *all-purpose bicyclists* who ride constantly, and are willing to ride in adverse weather (10%);

- 2) *recreational bicyclists* who ride only in good weather, mostly for fun, with a desire to be physically active (29%);
- 3) *safety-conscious occasional bicyclists* who rarely cycle for transportation purposes, and feel uncomfortable in traffic, even with a bicycle lane (28%); and
- 4) *facility-demanding occasional bicyclists* who feel end-of-trip facilities very important, and protected bicycle lanes are very important (28%).

These categories resemble Roger Geller's (Bicycle Coordinator for the City of Portland) four categories of bicyclists:

- 1) *Strong and Fearless* - willing to ride in all weather and roadway conditions;
- 2) *Enthused and Confident* - comfortable sharing the roadway with automobile traffic, but prefer separated facilities;
- 3) *Interested but Concerned* - who would like to ride more, but are nervous about the dangers of riding in traffic; and
- 4) *No Way No How* - who are completely disinterested in bicycling for a variety of reasons.

A national telephone survey of individuals in the 50 largest US metropolitan areas found that 7% of individuals consider themselves "Strong and Fearless", 5% "Enthused and Confident," 51% "Interested but Concerned", and 37% "No Way No How" (Dill and McNeil 2016). The authors suggest that efforts to convince "Interested but Concerned" individuals to cycle more often for transportation purposes ought to emphasize the health benefits of bicycling and offer infrastructure that reduces bicyclists' interaction with motor vehicles (the particular implications of bicycling infrastructure are discussed in detail next).

Several studies out of the United Kingdom show that perceived barriers to bicycling change as individuals gain more experience riding to and from their place of work, even in unsupportive circumstances (Gatersleben and Appleton 2007; Guell, Panter, and Ogilvie 2013). Similarly, Boyer (2017) finds that the odds of an individual riding a bicycle for utility purposes in Charlotte, NC increase dramatically if they ride a bicycle for recreational purposes just once a week. This suggests that since individuals can cycle for recreational purposes at more flexible times and in places of their choosing, recreation can serve as a context in which individuals gain experience, confidence, and the proper equipment that encourage utility bicycling.

Another study based in Charlotte, NC investigates how individuals transition from "recreational bicyclists" to daily or near-daily "transportation bicyclists" (Caldwell and Boyer 2018). Interviews with twenty-six bicycle commuters (20 men and 6 women) revealed that this transition is rarely a simple choice but instead involves the gradual acquisition of an array of new skills, social connections, and equipment. For example, individuals were often guided by friends or acquaintances that could inform them about the proper equipment (e.g., bicycles, clothing, lights, locks, etc.) and point to preferable, if unexpected, bicycling routes in the city. As expected, individuals had to renegotiate their relationship to the workplace in terms of parking

and travel attire, but they also had to navigate workplace policies related to travel and parking reimbursement, which don't routinely consider bicycling as a mode of transportation.

Finally, some research observes that the practice of bicycling can disappear and reappear as individuals' life circumstances change (Bonham and Wilson 2012). While many individuals have warm memories of bicycling as a child, they typically stop bicycling by the time they reach high school. Later, changing parental and work responsibilities, changing friendships, and changes in health status can open and close opportunities for individuals to ride a bicycle over their lifetime.

2.4 Built Environment Strategies for Encouraging Active Transportation

This section discusses the influence of physical infrastructure and other built environment factors on the frequency of bicycling and walking. Each travel mode is analyzed separately, although there is considerable overlap in the research surrounding bicycling and walking. In summary, research from inside and outside the US offers strong evidence that the installation of infrastructure designed specifically for active transportation has a significant stimulating effect on rates of walking and bicycling. The presence of infrastructure, however, offers only a partial explanation for the success of certain facilities over others. The quality and design of facilities matters as well. Generally, facilities that offer generous space and a clear physical separation from vehicular traffic are more likely to attract active travelers. Bikeways and pedestrian pathways must connect origins and destinations and are thus more successful in higher-density places with a mix of land uses.

2.4.1 Bicycling and the Built Environment

2.4.1.1 *More bikeways, more bicycling*

A robust set of literature offers evidence that active transportation is more common in places with more infrastructure built specifically for bicycling and walking (Le, Buehler, and Hankey 2019; 2018). The presence of bicycle infrastructure is particularly important for relatively inexperienced riders (Rowangould and Tayarani 2016). Research focusing on linear public bikeways— including on-street bicycle lanes, greenways, and signed routes— as predictors of daily utility bicycling has consistently found that a higher concentration of bikeways in a city or region is associated with a higher bicycling commute share. In a comparison of 18 US cities, Nelson and Allen (1997) find that each additional mile of bikeway per 100,000 residents increases the percentage of daily bicycle commuters by 0.075%, controlling for local terrain, weather, and the size of the local student population. In a similar study, Dill and Carr (2003) find that each additional mile of bike lane per 100,000 residents is associated with a roughly 1% increase in the share of daily bicycle commuters. Comparing the 90 largest US cities and controlling for a variety of land use, weather, and safety variables, Buehler and Pucher (2012) find that the presence of bicycle lanes and separated bicycle paths are significant predictors of bicycle commuting. Studies that focus on specific cities, neighborhoods, or corridors confirm this positive association as well (Parker, Gustat, and Rice 2011; Boyer 2017; Monsere et al. 2014). An exception is Krizek, Barnes, and Thompson (2009) who suggest that the installation of

bicycle facilities in Minneapolis and St. Paul is associated with an increase in bicycle commuting between 1990 and 2000. However, the authors are candid that the effect is inconsistent across the region, as bike facilities appear to stimulate commuting in some areas but not others.

2.4.1.2 Quality matters: Connected, direct, spacious, segregated

While more linear bikeways appear to stimulate utility bicycling, the quality of bicycle facilities matters as well. As a rule of thumb: more spacious and more segregated facilities tend to stimulate more ridership than on-street facilities. A spatial analysis of bikeway networks in 74 US cities finds that network connectivity, density, and directness are important factors in predicting facility use when controlling for demographics and city-size variables. A one-unit increase in network density corresponds to about 150 additional bicycle commuters per 10,000 commuters in a city (Schoner and Levinson 2014). Similarly, a study that closely followed utility bicyclists of variable experience through six European cities (Hull and O'Holleran 2014) prescribes the following improvements to bicycle infrastructure:

- wider lanes
- more direct routes
- segregated (from vehicular traffic) pathways
- clear signage
- continuous lanes
- high quality surface materials
- visible speed barriers that don't require bicyclists to dismount
- high quality lighting on darker routes
- frequent and high-quality parking
- better end-of-route facilities, and
- a holistic approach that does not treat bicycle infrastructure as an add-on.

Infrastructure that forms a physical barrier between bicyclists and motor vehicles increase perceptions of safety and thus stimulates additional ridership. This increases visibility of bicycling generally and can further stimulate awareness and safety. A multi-city investigation of protected bicycle lanes that used intercept surveys of bicyclists, hundreds of hours of video observation, and surveys of neighborhood residents (whether or not they were bicyclists) offers very strong evidence that any form of physical barrier between a bicycle lane and the car lane increases ridership and perceptions of comfort. Protected bicycle lanes also receive strong support from local residents, the vast majority of whom report that protected bicycle lane installation improved perceptions of safety and increased the desirability of the neighborhood (Monsere et al. 2014). Similarly, a quasi-experimental matched-pairs analysis of bicycle crash sites across the state of Iowa concluded that the presence of on-road bicycle facilities decreased crash risk substantially: as much as a 60% decrease with a bicycle lane or shared lane arrow, and 38% decrease with bicycle specific signage (Hamann and Peek-Asa 2013). Pulugurtha and Thakur (2015) concluded that bicyclists are three to four times at higher risk

(based on traffic conditions) on segments without on-street bicycle lane than when compared to segments with on-street bicycle lane.

A review of 23 studies on the relationship between bicycle infrastructure and bicyclist safety by Reynolds et al. (2009) finds consistent evidence that purpose-built bicycle-specific facilities decrease crashes and injuries among young bicyclists. They find, specifically, that sidewalks and multiuse paths pose the highest risk, major roads are more hazardous than minor roads, and the presence of bicycle-specific facilities is associated with the lowest risk.

Lusk et al. (2013) report that bicycle crash rates are lower on US cycle tracks than on roadways, contradicting guidelines by the American Association of State Highway Officials (AASHTO), which exclude cycle tracks from recommended bicycle infrastructure.

2.4.1.3 More than bikeways: High-density, mixed-use places

Of course, bikeways are more likely to stimulate ridership when combined with other physical features of the built environment like density and land use mix. These features tend to facilitate active travel by decreasing the distance between origins and destinations, and/or by increasing the complexity and lowering the speed of motorized traffic. A study observing over 12,000 adults in 14 cities and 10 different countries finds that greater land use mix, higher residential density, and higher intersection density are associated with bicycling for transportation (Christiansen et al. 2016; results are similar for walking, see below). An Australian study of over 9,000 adults shows that increases in residential density, neighborhood walk score, and street integration were associated with higher odds of bicycle use. However, the stimulating effects of density and connectivity were most evident at very high densities, leaving authors to question whether moderate increases in density are sufficient to stimulate bicycling (Koohsari et al. 2019). A review paper by Heath et al. (2006) shows that community-scale and street-scale urban design can help increase physical activity. Stimulating policies include transit-oriented development, policies that address street layout, and policy that encourages higher concentrations of stores, jobs, and schools within walking distance of residences.

2.4.1.4. Bicycling in rural and sparsely populated places

Most bicycling research today focuses on urban areas. To the extent that rural places are covered in the literature, they are often included as part of very broad studies at the national, state, or metropolitan scale. Scholarship on rural active transportation suggests that there are qualitative differences in rural inhabitants' motivations for bicycling. An analysis of the 2017 National Household Travel Survey by Tribby and Tharp (2019) suggests that while bicycling for any purpose is substantially more common in US urban areas than in rural areas, adjusted data shows that the odds of bicycling in high-density urban areas and very low-density rural areas have overlapping confidence intervals. In other words, urban and rural bicycling may not be statistically distinguishable when adjusting for demographic, economic, and seasonal covariates. Interestingly, the variables that best explain variation in the odds of urban bicycling and rural bicycling appear different: for urban bicyclists variables like population density,

household count of different travel modes, household income, and taxi use are most important. In rural areas, age, number of walking trips, walking for exercise, household count of trips, and household count of different travel modes seem important. Precisely why these variables have a greater influence in their respective contexts will require deeper investigation.

Several recent studies offer insights into the particular challenges of bicycling in rural areas. Firstly, non-metropolitan counties are less likely to implement bicycle and pedestrian projects than their metropolitan counterparts, due in part to lack of planning capacity present in Metropolitan Planning Organizations (MPOs) (Cradock et al. 2009). Rural communities often lack political or cultural motivation to plan for or begin implementing major bicycling infrastructure (McAndrews, Tabatabaie, and Litt 2018). A study of bicycle and pedestrian planning in NC, however, showed that while bicycle and pedestrian plans in rural areas are relatively less common, they tend to have higher *quality* plans than urban areas (Aytur et al. 2011).

Several studies also suggest that the influence of built environment variables becomes less important in rural areas, and an individual's sociodemographic characteristics grow in relative importance. A study that compares the state of Maryland's urban, suburban, and rural areas finds qualitative differences in bicycling behavior in three types of places. 1) Residential density is positively associated with rates of bicycling statewide and in urban areas. 2) Household and population density is not as strong a predictor in rural areas. 3) Surprisingly, the number of households without cars had a negative association with rates of bicycling in rural areas (Cui, Mishra, and Welch 2014). This appears to align with findings from a study focused on travel mode choice in suburban King County, Washington, which finds that demographic characteristics like an individual's sex, age, and physical ability are much stronger predictors of bicycling than the presence of physical features like bicycle and pedestrian lanes, traffic speed and volume, slope, block size, and the presence of parks (Moudon et al. 2005). This may indicate that stimulating substantial increases in bicycle ridership requires a threshold level of infrastructure, network density, and connectivity that is rarely present in rural areas.

2.4.2 Walking and the Built Environment

Many of the built environment characteristics associated with more bicycling are also associated with more walking. Generally, and unsurprisingly, individuals are more likely to walk when their destination is close. Walking has effectively zero monetary costs and can take less time than other modes of transportation if the total trip distance is small. A recent study by Christiansen et al. (2016) surveying 12,000 adults from 14 cities in 10 countries found that land use mix, residential density, intersection density, and number of parks are positively associated with walking for transportation. These findings are consistent with Saelens and Handy (2008) whose multinational review of research from the early 2000s reports consistent positive associations between walking and a) the proximity to non-residential destinations, b) land use mix, and c) density, all three of which complement the others. A similarly broad literature review conducted nearly a decade later offers very similar findings (Wang and Wen 2017).

The attractiveness of the built environment is also regularly associated with more walking, although this variable is measured inconsistently across studies. One recent example by Tsai et al. (2019) finds that individuals in Milwaukee and Green Bay, Wisconsin living near more street tree cover are more likely to use active transportation.

The relationship between the presence of sidewalks and the frequency of walking is less clear, however, and differs based on whether walking is for transportation or for recreational purposes. Saelens and Handy (2008) find that the presence and condition of pedestrian infrastructure like sidewalks is consistently associated with walking for recreational purposes, but less consistently for transportation purposes. Lee and Moudon (2006) find that the presence of sidewalks is associated with recreational walking but has no significant relationship to transportation walking. This is somewhat inconsistent with Wang and Wen (2017) who report that the majority of studies find that walking (for any purpose) is associated with the presence of sidewalks. For example, a survey of residents in multiple neighborhoods of the cities of Manchester and Portsmouth, New Hampshire found that a) the presence of sidewalks and b) street connectivity were by far the strongest indicators of walking for transportation (Carlson et al. 2012). A similar study of residents in Perth, Australia found that the presence of sidewalks stimulated walking for transportation, but not for recreation (McCormack et al. 2012). These variable outcomes are related to either differences in research methodology or context specific differences that are not captured—or captured inconsistently—by available research.

2.5 Active Transportation to and from School

As discussed above, active transportation to and from schools in the US has declined from nearly 48% in 1969 to less than 13% in 2009 (McDonald et al. 2011). That proportion appears to have declined even further in the intervening years. A recent analysis of the National Household Transportation Survey finds that in 2017 about 9.6% of students usually walked to school while 1.1% of students usually bicycled to school (Kontou et al. 2019). Meanwhile, 50.2% usually arrived at school in a car, while the remaining took the bus. Transportation mode is closely associated with residential distance to school. Nearly 78% of students that walked to school reported walking less than a mile, while 82% of bicycling students reported traveling less than two miles. In both urban and rural areas, walking is the most common mode of transportation for children living less than 0.5 miles from school. When distance variables are modeled with spatial and sociodemographic variables, distance and population density have the strongest influence on walking and biking to school, with higher density being associated with higher odds of active transportation. While race, gender, and ethnicity variables appear to have no apparent influence on the odds of a student using active transportation, children of higher-income households are more likely to use active transport, all other things being equal (Kontou et al. 2019).

Since the late 1990s/early 2000s, state and federal programs have invested in infrastructure and educational programming to encourage more active travel to and from school. Safe Routes to Schools (SRTS) is a nation-wide program funded in part by the Federal TAP, which was

established as part of the SAFETEA-LU program in 2005 (more on SAFETEA-LU and similar programs discussed next). Between 2005 and 2012, Congress appropriated \$1.2 Billion for SRTS. In 2015, Congress authorized TAP through the year 2020, and it remains the primary federal source of funding for building active transportation infrastructure and implementing SRTS.

State DOTs receive TAP funding based on student enrollment and select local projects on a competitive basis to receive federal funding. Funds are directed to municipalities or school districts and used for both active transportation infrastructure projects and non-infrastructure projects like education, encouragement, and law enforcement. TAP also allows state DOTs to transfer up to half of their TAP funds to other transportation projects (e.g., for non-active transportation projects). States may also let their funding lapse. This flexibility results in a substantial variation in SRTS funding levels and investment strategies across states. In 2018 the SRTS National Partnership issued a state-by-state report card, evaluating each state's performance based on SRTS standards (Lieberman et al. 2018). Scores are determined by 27 indicators in four major topic areas: 1) Complete Streets and active transportation, 2) safe routes to school and active transportation funding, 3) active neighborhoods and schools, and 4) state physical activity planning. Table 2. lists overall scores for all fifty US states.

A 2005 study on the effectiveness of California's SRTS program—which predated the federal SRTS program by six years—shows that children who pass SRTS projects on their way to school are more than three times more likely to increase their rate of bicycling or walking than children who do not pass SRTS projects (Boarnet et al. 2005). A 2014 evaluation of the impact of the federal SRTS program at 801 schools in multiple states shows that engineering improvements are associated with an 18% increase in walking and bicycling (McDonald et al. 2014). These findings are consistent with other studies that find a significant association between built environment features and the mode of transportation students take to school (McMillan 2007; Larsen et al. 2009).

Table 2.3 State overall scores on Safe Routes to School (2018) Report Card

Rank	STATE	SRTS Overall SCORE	Rank	STATE	SRTS Overall SCORE
1	California	185	26	Connecticut	86
2	Washington	155	27	West Virginia	84
3	Minnesota	147	28	Arkansas	83
4	Colorado	146	29	Wisconsin	81
5	Massachusetts	146	30	Montana	79
6	Florida	142	31	North Carolina	77
7	New Jersey	140	32	Kansas	76
8	Oregon	138	33	Illinois	74
9	Michigan	127	34	New Mexico	74
10	Hawaii	125	35	Georgia	73
11	New York	123	36	Iowa	73
12	Utah	122	37	Texas	72
13	Virginia	122	38	Alabama	70
14	Pennsylvania	119	39	Kentucky	68
15	Maine	118	40	South Carolina	68
16	Rhode Island	112	41	Wyoming	68
17	Tennessee	111	42	Missouri	67
18	Delaware	109	43	Nebraska	65
19	Maryland	106	44	Alaska	63
20	Indiana	102	45	New Hampshire	62
21	Vermont	102	46	Arizona	59
22	Ohio	97	47	Mississippi	56
23	Idaho	95	48	South Dakota	49
24	Nevada	92	49	North Dakota	37
25	Louisiana	89	50	Oklahoma	35

2.6 Funding Active Transportation

The funding landscape for active transportation in the US is multileveled and complex. Relationships among entities at the federal, state, metropolitan, local, and even neighborhood levels can determine access to funding for bicycle and pedestrian transportation systems. The vast majority of funding designated specifically for bicycle and pedestrian projects originates at the federal level, but it is allocated to state and metropolitan entities that work with local governments to design and install bicycle and pedestrian facilities. As federal funding levels have fluctuated with national politics, local entities and even non-government entities have pioneered alternative funding strategies as supplements or replacements to federal revenues.

Federal funding for bicycle and pedestrian projects has been available through the Federal Highway Administration (FHWA) since the passage of the *Intermodal Surface Transportation Efficiency Act* (ISTEA) in 1991, which allowed for more flexibility in the allocation of federal highway revenues. ISTEA authorized funding from 1992 to 1997. In the intervening three decades, Congress has authorized spending on bicycle and pedestrian projects through a series of different programs. ISTEA was effectively replaced by the *Transportation Equity Act for the 21st Century* (TEA-21) between 1998 and 2004; by *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU) between 2005 and 2009; by *Moving Ahead for Progress in the 21st Century Act* (MAP-21) in 2012, and the *Fixing America's Surface Transportation* (FAST) Act in 2015.

Accessing these funds for bicycle and pedestrian projects requires action at either the metropolitan level through a MPO or a State DOT. Different MPOs and state DOTs have accessed and allocated this funding in different ways. Since there are relatively weak directives from the federal government about how to spend these monies, there is a wide variety of spending strategies and a huge gap between places that spend a little and a lot on bicycle and pedestrian projects per capita.

State policy can create conditions that encourage and support increased allocations at the local level. The federal government gives MPOs control over only a small proportion of allocated funds, requiring them to negotiate with state DOTs over portions they do not control. Even inside metropolitan areas with MPO coverage, states can control implementation of projects. The state can sub-allocate funding to MPOs, giving their priorities more importance. States can also enhance federal funding through additional state funds for infrastructure or funds for planning. A study by Handy and McCann (2010) that interviewed officials in Sacramento, Minneapolis, Orlando, Denver, Baltimore and Memphis found that more money gets spent in states that sub-allocate funding directly to MPOs. They also found that higher spending was associated with states that required less local money for federal matching because state sources were able to provide the required matching funds. They also noted that planning requirements at the local level helped build up local capacity, and that states can provide staff support, which can assist MPOs during planning.

Understanding where and how federal funds are allocated by state and regional authorities can illuminate critical gaps and present policy opportunities for improving active transportation accessibility. Craddock et al. (2009) examined bicycle and pedestrian investments in all US counties from 1992-2004, examining the differences between counties that receive federal active transportation funding and counties that do not. Their study accounted for \$3.17 billion, across 10,012 projects. About 61.7% of US counties had one or more bicycle or pedestrian projects in the 12-year time period. The authors discovered significant disparities in implementation and system-building outcomes depending on population size, location, and socioeconomic indicators. Non-metropolitan counties were less likely to implement bicycle and pedestrian projects. Counties characterized by persistent poverty (20% or more of the population was in poverty in four census decades) or low education status (< 25% of residents age 25-64 had high school education) were less likely to implement projects. The proportion of

workers commuting by bicycle, walking, or public transit was directly associated with higher per capita funding. The authors recommend improved planning assistance to underserved communities, e.g., communities that aren't covered by an MPO or that otherwise lack institutional capacity for project planning. Streamlining application processes and lowering matching requirements might also facilitate funding in underserved areas.

Cities and counties are also considering new funding mechanisms for bicycle and pedestrian projects as livability becomes a more salient local economic development issue, and state/federal funding becomes more competitive (Riggs and McDade 2016; Miller and Coutts 2018). Several local funding mechanisms include one-time sales taxes tied to specific projects, developer requirements, crowdsourcing, and cordon pricing (e.g., congestion fees). Voter-approved measures like county sales tax and bond issues are the most heavily used approaches to source funding for bicycle and pedestrian capital projects, and their successful track record is a sign of the popularity of these projects among the voting public (Riggs and McDade 2016). Table 2. lists state and local ballot measures for active transportation issues in 2019. Nearly all ballot measures passed in favor of improving or adding bicycle and pedestrian facilities. Many of these measures were integrated into funding for parks and recreational facilities. Miller and Coutts (2018) highlight several communities that have used innovative techniques to fund bicycle and pedestrian projects. A local nonprofit in Denver, Colorado used crowdfunding and a grant from the Bill and Melinda Gates foundation to jumpstart long-term municipal investment in downtown bicycle lanes. Salem, Oregon used tax increment financing (TIF) to fund recreational trails. While TIF is not traditionally used to fund recreational infrastructure, the city made a case that recreational tourism would contribute to local economic development efforts.

It is important to note that the non-state jurisdictions listed in Table 2. are all urban, and most are adjacent to major cities. The list includes zero rural places, presumably because such communities don't have the staffing capacity or the sales tax revenue to support their own bicycle and pedestrian initiatives.

Table 2.4 State and local ballot measures for bicycle and pedestrian infrastructure, 2019 (green text = a "win" for active transport)

Place	Ballot Measure	Description	Result
Maine (Statewide)	Question 1	New general obligation bonds for transportation infrastructure, including bicycle facilities	Passed 76%
Texas (statewide)	Prop 5	Sporting goods sales tax to support parks and bicycles	Passed 88%
Washington (statewide)	Initiative 976	A measure to <i>decrease</i> funding for transportation improvements, limit licensing fees for certain vehicles	Defeated 56%
Scottsdale, AZ	Ballot measure 2	Bonds for a new bridge, including bicycle lanes	Passed 68%

Summit County, CO	Measure 1B	Renews property taxes to acquire open space, parks, and trails	Passed 78%
Jupiter, FL	Resolution #85-18	Land acquisition program	Passed 74%
Hollywood, FL	Bond referendum	Improves a country club, including a nature path	Passed 58%
Gwinnett County, GA	MARTA referendum	Would have improved transportation throughout the county, including bicycle infrastructure	Defeated 54%
New Orleans, LA	Parks and Rec Referendum	Allocates funding to improve recreational facilities	Passed 76%
Scarborough, ME	Question 3	Bonds for land acquisition for recreation	Passed 58%
Cary, NC	Bond referendum	Bond reference for parks and recreation	Passed 80%
Mecklenburg County, NC	Tax referendum	0.25% Sales and land use tax to improve parks and greenways	Defeated 57%
Columbus, OH	Issue 8	Funding to improve parks and rec	Passed 77%
Gahanna, OH	Income tax	Income tax increase for parks, rec, and trails	Passed 81%
Tulsa, OK	Improve Our Tulsa	General Obligation bond package to improve bicycle lanes, among other facilities	Passed 85%
Lake Oswego, OR	Bond referendum	Property acquisition for parks and trails	Passed 62%
Metro Portland, OR	Bond referendum	Bond measure to improve open space, trails, and advance racial equity	Passed 67%
El Paso, TX	Proposition A	Land preservation and trail building	Passed 88%
McKinney, TX	Proposition C	Allocation of funding for parks expansion and renovation	Passed 63%
Frisco, TX	Proposition E	Community Parks expansion	Passed 67%
Garland, TX	Proposition D	Parks and trails expansion	Passed 60%
Williamson County, TX	Prop B	Bond measure for parks, recreation, and bicycle infrastructure	Passed 59%
Prince William County, VA	Park improvement Bond	Bond measure for parks, recreation, and bicycle infrastructure	Passed 61%

Source: People for Bikes, 2019. Can be accessed at <https://peopleforbikes.org/2019ballottracker/>

2.7 Conclusions and Next Steps

Active transportation offers a healthy, low-impact solution to the mobility puzzle in US communities. Unfortunately, walking and bicycling as modes of transportation are the exception rather than the rule almost everywhere. Over the past four decades, the share of pedestrian commuters in the US has declined substantially, the share of bicycle commuters has remained below 1%, and a declining share of children take active transportation to and from school. These trends are due to multiple factors, but stem from a cornucopia of policies and incentives that leave households little choice but to navigate cities and regions in a personal vehicle. While different strategies can help encourage individuals to transition from “interested but concerned” to “enthused and confident” bicyclists, this transition will likely be limited by structures of the built environment that cannot be changed by one person or one municipality. Shifts in state and federal policy are critical as well.

In the US and in countries around the world, bicycle transportation is most common where there have been deliberate efforts to build bikeways that are physically separated from vehicular traffic, in areas with high street connectivity, mixed land uses, and high residential density. Walking as a means of transportation is most common where destinations are close, pathways are well connected, and land use is mixed. Surprisingly, the contribution of sidewalks to the likelihood of pedestrian transportation is unclear, although sidewalks appear to stimulate recreational walking across multiple studies in multiple places. Given these characteristics, it is no surprise that active transportation is most common in cities and urbanized regions, and that most active transportation research has focused on urban places.

It is clear that successfully stimulating active transportation will require multidimensional solutions, addressing transportation and land use as two parts of the same system rather than as distinct policy imperatives. Installing and maintaining any type of infrastructure is an expensive, time-consuming process. Elected officials, administrators, and DOT engineers are understandably challenged to pursue active transportation given that a) most commuters (i.e., voters) travel alone in personal vehicles, b) roads and automobile-oriented infrastructure dominate DOT budgets, and c) the return on investment for bicycle and pedestrian infrastructure is not always clear. Yet, linear pathways alone are insufficient stimuli of active transportation. Linear infrastructure is best complemented by corresponding changes in density, connectivity, and land use mix that require contributions from multiple bureaucracies and multiple intersecting policies, likely at different scales of government. Future research can explore whether and the extent to which planning goals from different bureaus and different levels of government work together to create viable active transportation.

Future research also ought to probe the particular challenges that poor, rural communities face accessing resources and planning capacity for active transportation. Existing research shows that non-metropolitan, high-poverty, low-education counties are least likely to access federal funding for active transportation, and that state DOTs can facilitate the distribution of funds to local communities by supplementing matching funds and offering capacity for local planning. While a small number of local governments around the US have begun to use alternative means

of raising revenues for active transportation (e.g., transportation bonds, sales taxes, TIF, and crowdsourcing), rural communities have yet to explore these options.

2.7.1 Recommended Questions for Subsequent Research Tasks

This task has identified the circumstances under which active transportation thrives, and the challenges of planning, funding, and implementing bicycle and pedestrian projects in communities of every size. Subsequent research tasks involve a) interviews with state DOT officials in NC and other states, and b) a survey of state and local officials involved in activity transportation planning and implementation.

- Why are certain communities more successful at obtaining state and federal active transportation funding than others? To what extent is this disparity related to differences in staffing levels, planning capacity, or local politics?
- What are the common characteristics of municipalities that apply for NCDOT's (and similar DOT's) competitive granting program? Does the requirement to hire an approved consultant firm help or hinder the application? How should matching requirements be determined?
- To what extent does state DOT policy for active transportation engage a diversity of stakeholders, at multiple levels?
- Do the priorities of local officials align with the priorities of state officials? If not, how can state DOT policy better complement local plans and development initiatives?
- Is planning for active transportation bi-directional? In other words, do state DOT planners pay attention to local plans, and vice versa?
- Who are the state and local champions of active transportation policy? Which individuals at these different levels are less enthusiastic about pursuing active transportation, and what approaches might encourage them (i.e. education about the benefits of active transportation, easing application processes)?
- Does policy/funding for linear infrastructure like bicycle lanes, shared-use paths, and trails interact or in any way align with land use policy that encourages higher-density, better-connected development (e.g., transit-oriented development, lowering or eliminating parking minimums, road diets, for other examples see Dill et al. (2017))?
- Is state DOT policy sensitive to the qualitative differences between active transportation in urban and rural areas?
- Is state DOT policy sensitive to gender and age disparities in active transportation?
- Does state DOT policy use recreational travel—which is generally more accessible—to stimulate enthusiasm about utility travel? What do state and local officials think about this approach?
- Is the application process for state funding inviting and encouraging to local officials responsible for designing and implementing state-and federally-funded projects? Are guidelines and requirements clear? Are matching requirements too burdensome?
- When applying for funding, how are local officials' experiences different when interacting with DOTs versus with MPOs?

Chapter 3. Interview and Survey Local North Carolina Officials

3.1 Survey Overview

The purpose of the survey is to improve understanding about the demand for future bicycle and pedestrian projects in NC, identify key barriers to local government participation, and determine how NCDOT processes can best accommodate the needs of NC municipalities. The survey is designed to allow and gain insights about what local governments believe is politically and financially feasible for their jurisdiction. The survey contains both quantitative and qualitative questions (open-ended) and includes participation of public officials in a wide variety of localities across the state, including different densities, economies, and populations. The survey questions were derived from Task 1's Scoping Exercise, the literature review findings, and insights from interviews with six different experts/officials. See Appendix A for the survey questions.

3.2 Survey Data Collection and Methodology

The survey was conducted online through SurveyShare from February 28-March 31, 2020, with a total of number of 298³ responses from local government officials and other professionals across NC (referred to as local officials). The non-random sample was selected using a master list of emails from NCDOT of local officials from city and town governments. These emails were then combined with emails pulled by the survey team from county, MPOs, Rural Planning Organizations (RPO), and Council of Governments (COG) websites. The survey team wanted to be inclusive and ensure that as many local governments were represented as possible.

The survey team sent the survey to roughly 1,700 active emails, from which there were 300 responses, making the response rate about 18%. The survey included a diverse set of respondents, 17% of whom had one or more of the following professional certifications: American Institute of Certified Planners (AICP), Professional Engineer (PE), or Institute of Transportation Engineers (ITE). The majority of the respondents had a bachelor's degree or higher (79%), a mix of demographic characteristics, and an average number of years in their current position at 9.7 years. For more information about respondents please see Appendix B.

3.3 Survey Results

The findings for the 32 survey questions (See Appendix A) are presented as a summary of overall respondents. The findings include the type of organization the respondents serve, the nature of the population density they serve, annual bicycle and pedestrian budget allocations

³ Three hundred participants completed the survey. However, two were removed from the sample because they were not valid respondents.

and professional perspectives about their community related to the demand, opportunities, and local needs that may result in increased bicycle and pedestrian policy implementation across the state.

3.3.1 Local Government Respondents

These survey questions provide context about the 298 respondents and their organizations, specifically the type of organization, respondent job title, population served, organization annual budget, and the economic and land use conditions of the jurisdiction (Questions 1 - 9).

Overwhelmingly, most respondents represent a city/town type of government organization at 72.8%, followed by county at 18.8%, and MPOs at 3.4% (Figure 3.1). Department Directors were most common role among respondents reflecting 33.6%, followed by managers/administrators at 21.5%, executive directors at 15.4%, and non-transportation centered planners at 13.4% (Figure 3.2).

The survey results include a wide range of geographic diversity and respondents are located across the state of NC, including western, central and eastern areas. The survey respondents' zip codes are from 87 of the 100 NC counties. Four additional counties are included if we consider the zip codes of MPOs, COGs, and RPOs. Figure 3.3 show the 87 counties that participated in the survey based on the zip code provided by the respondent and indicate the nature of the population density of the county; urban (13%), mixed urban (16%), mixed rural (51%), and rural (20%). The urban rural dynamic is relevant in states such as NC, because of the 100 counties (Figure 3.3): 41% are rural, 45% are mixed rural, 19% are mixed urban, and only 5% are urban based on their population density (Isserman, 2005). The nature of the survey respondents reflects the overall urban- rural population mix in NC.

The counties represented in this survey have land area representations as shown in Figure 3.4. This information was compiled using county data and GIS, this is not survey information.

The most prevalent population range for the respondent's jurisdictions was 10,000-49,999 at 29.3%, followed by 1,000-4,999 at 22.2%⁴ (Figure 3.5). The most common FY2018-2019 operating budget of the respondents is less than \$5 million with 115 of the 298 respondents identifying as such⁵ (Figure 3.6). When asked if their last annual budget included funding for any bicycle and pedestrian policy, 131 said it included bicycle/pedestrian infrastructure, 117 said it included bicycle/pedestrian planning, maintenance, or implementation, and 43 said it included bicycle/pedestrian education, awareness, or outreach (Figure 3.7 and Table 3.1).

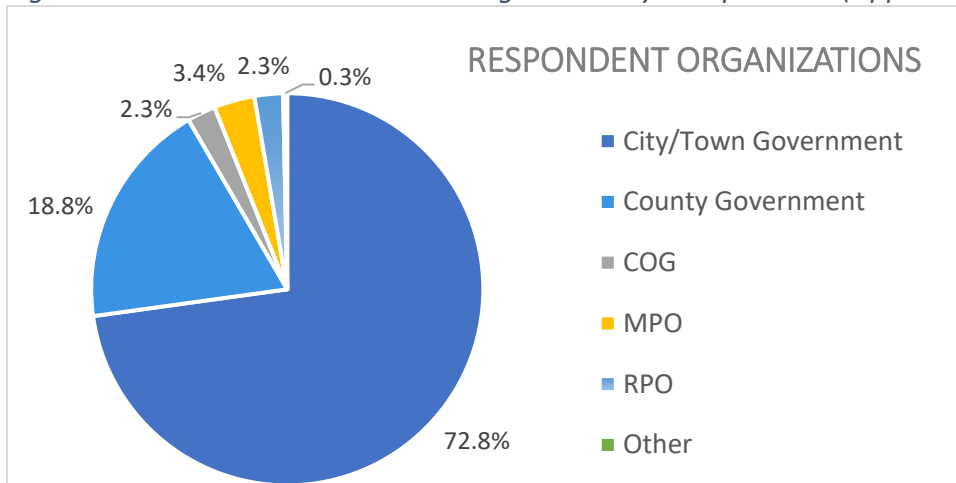
⁴ Note that the population results are comprised of all jurisdiction types together, including city/town and county governments, COGs, MPOs, and RPOs.

⁵ Note that the annual operating budget results are comprised of all jurisdiction types together, including city/town and county governments, COGs, MPOs, and RPOs.

The rural respondents indicate that rural community budgets are limited in their annual bicycle and pedestrian budget fund allocation, and the majority of mixed rural, mixed urban, and urban respondents indicated their annual budget funding includes greater allocation for bicycle and pedestrian planning, maintenance, implementation, and infrastructure as compared to education, awareness, and outreach.

The predominant land use type of the local government respondent’s jurisdiction is residential land, with 73.3% selecting that as their largest land use (Figure 3.8). The second largest land use type is commercial at 46.3% (Figure 3.8). The major mixed land use type indicated by respondents was residential/commercial (131), followed by agricultural/residential (50) and residential/public and government (23). The majority of respondents (157) indicated their economy over the past five years as growing, 104 indicated it was stable, and 37 indicated it was declining⁶ (Figure 3.9).

Figure 3.1 Which best describes the organization you represent? (Appendix A, Q.1)



⁶ Note that data collection ended on March 30th, and therefore would not register economic results of the pandemic COVID-19.

Figure 3.2 Which best describes your role for your organization? (appendix A, Q.2)

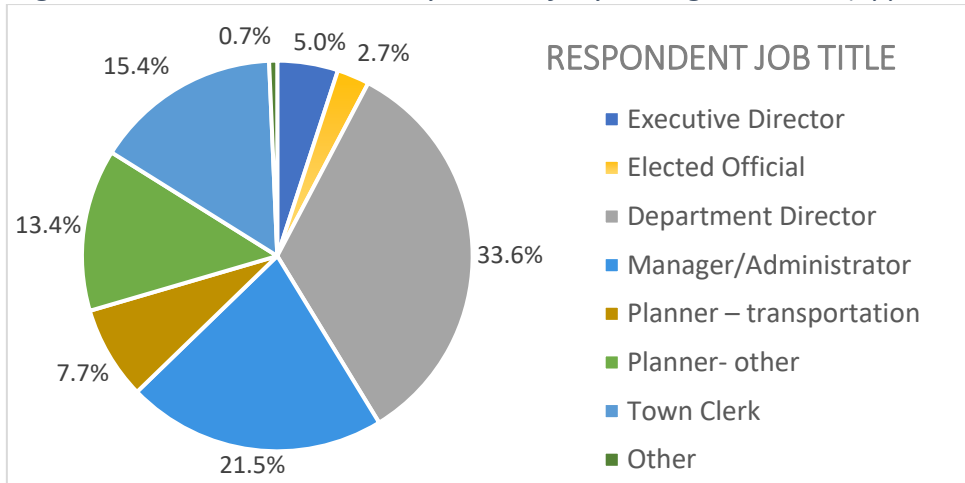
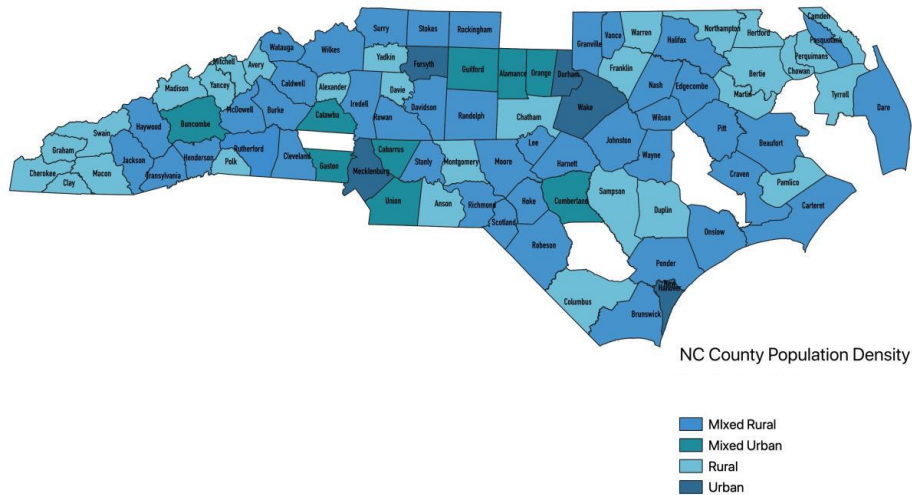


Figure 3.3 County population density type based on respondents' zip code (Appendix A, Q.3)



The respondent zip code information was used to determine which NC counties participated in the survey. Based on unique respondent zip codes, 87 of the 100 counties in the state participated in the survey. The 13 counties of Ashe, Alleghany, Bladen, Caswell, Currituck, Gates, Green, Hyde, Jones, Lenoir, Lincoln, Person, and Washington did not have a respondent zip code match. However, we note that the counties of Ashe, Alleghany, Caswell, and Person are included in the COG, MPO, and RPO service area for some survey respondents, reflecting closer to 91 of 100 counties being represented.

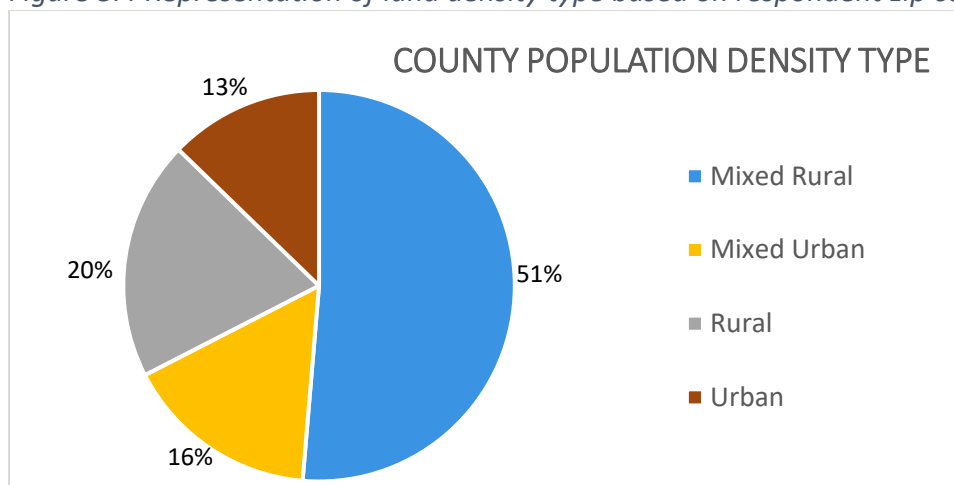
Table 3.2 presents the county-based urban – rural typology using four categories based on: population density, the share of the population living in urban areas (as defined by the

Census), and the presence and size of those urban areas⁷. A county is defined as rural if it has a population density of less than 500 people-per-square-mile (ppsm), 90% of their population in rural areas, and no urban area of 10,000 people. A county is defined as urban if it has a population density of at least 500 ppsm, at least 90% of the population in urban areas, and at least 50,000 people living in the urbanized areas. Counties that meet neither the urban nor rural county criteria are defined as mixed and are subdivided based on a second population density threshold. Mixed rural counties have a population density of less than 320 ppsm, and mixed urban counties have a population density of 320 ppsm or more.

The majority of respondents serve mixed rural counties (159) and rural counties (59) which aligns with the population density of the state. Mixed urban counties (48) and urban counties (38), however, are well represented in the respondent sample.

Figure 3.10 shows the overall economic conditions of the respondent's area over the last five years.

Figure 3.4 Representation of land density type based on respondent zip code



⁷ Isserman, A.M. (2005). In the national interest: Defining rural and urban correctly in research and public policy. *International Regional Science Review*, 28(4), 465-499.

Figure 3.5 Which best describes the population of the geographic area your organization serves? (Appendix A, Q.4)

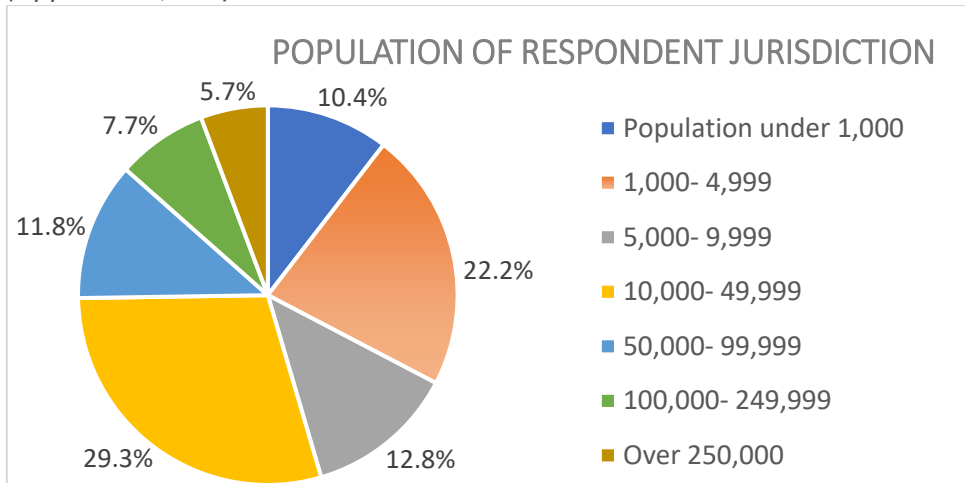


Figure 3.6 Which best describes your organization's FY 2018-2019 operating budget? (Appendix A, Q.5)

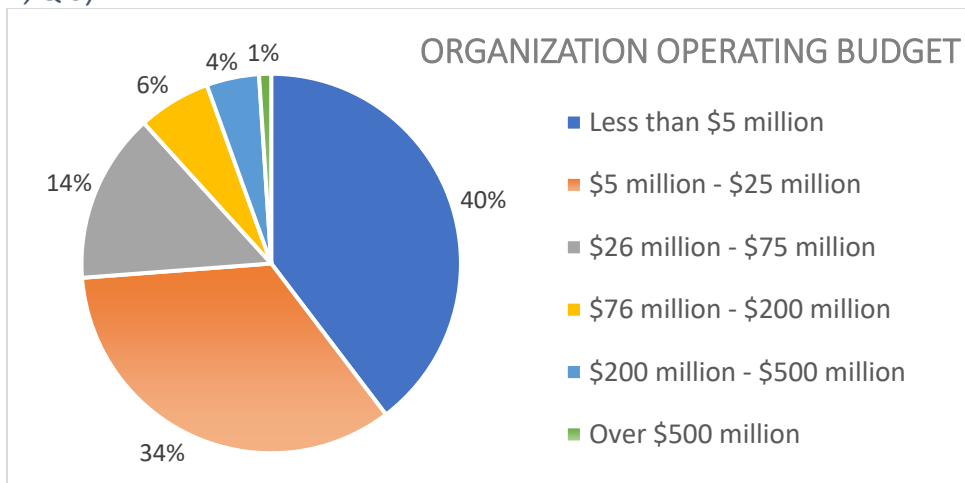


Figure 3.7 Did your last annual budget include funding for any of the following? (Appendix A, Q.6)

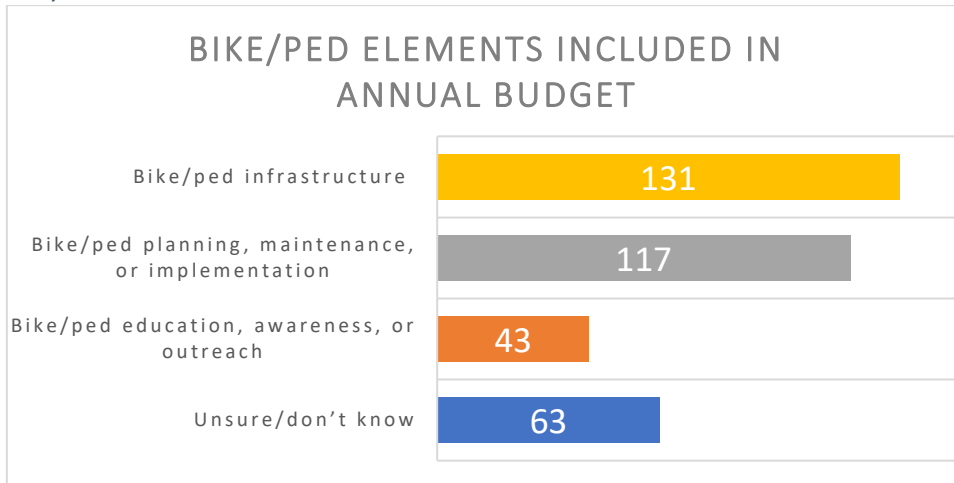


Table 3.1 Annual bicycle and pedestrian funding for organization and county population density type

Q1) Respondent Organization Type	Q6) Did your last annual budget include funding for any of the following? (check all that apply)			
	Bike/ped planning, maintenance, or implementation	Bike/ped infrastructure	Bike/ped education, awareness, or outreach	Unsure/don't know
City/Town Government	90	118	23	42
County Government	10	6	8	19
COG	3	0	3	1
MPO	8	5	7	0
RPO	6	2	2	0
Other	0	0	0	1
Q3) County Population Density Type				
Rural	8	13	1	23
Mixed Rural	58	69	21	30
Mixed Urban	25	23	8	8
Urban	26	26	13	2
Total	117	131	43	63

Figure 3.8 What is the largest land area type in your organization’s geographic area? (Appendix A, Q.7)

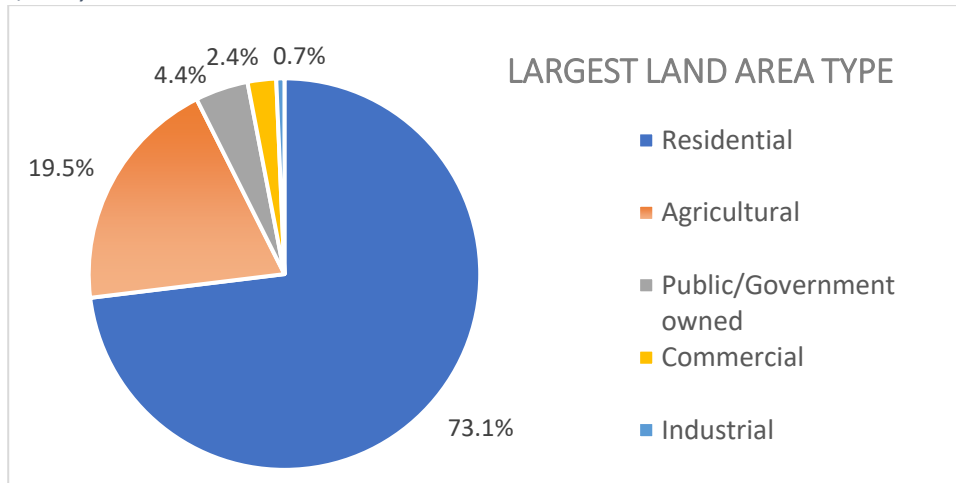


Figure 3.9 What is the second largest land area type in your organization’s geographic area? (Appendix A, Q.8)

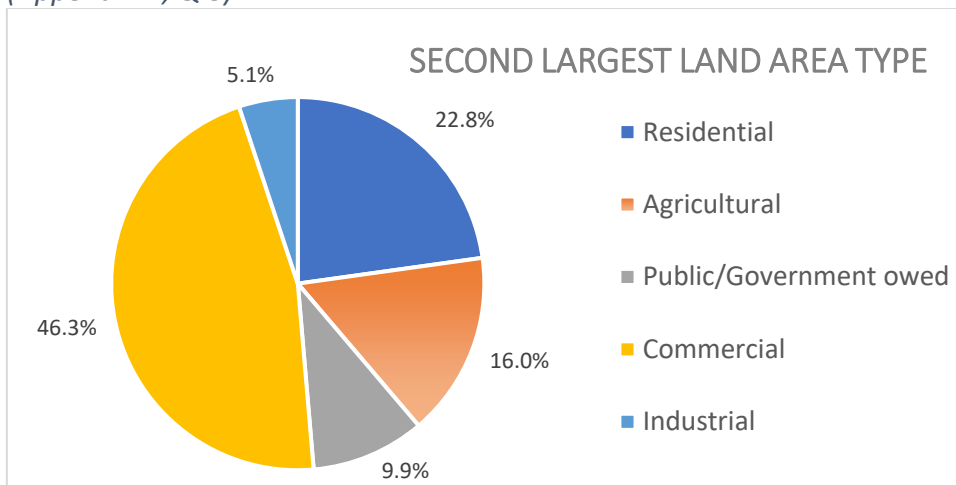
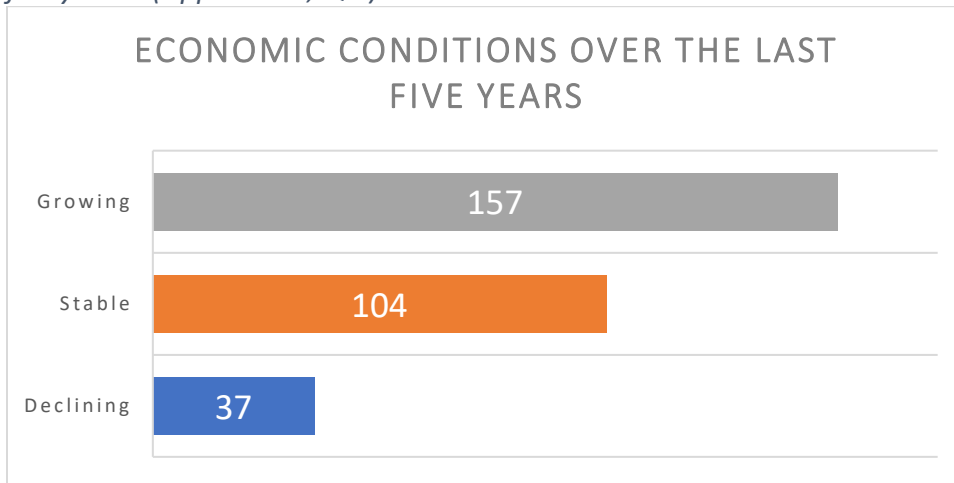


Table 3.2 Respondent organization by population density type

Q1) Respondent Organization	Q3) County population density type based on respondents’ zip code.			
	Rural	Mixed Rural	Mixed Urban	Urban
City/Town Government	38	120	30	29
County Government	20	24	12	0
COG	1	3	1	2
MPO	0	1	5	4
RPO	0	5	0	2
Other	0	0	0	1
Total	59	153	48	38

Figure 3.10 How would you describe the overall economic conditions of your area over the last five years? (Appendix A, Q.9)



**Note: This should be interpreted with caution due to the fact that the survey ran prior to the most economic downturn caused by the pandemic COVID-19.*

3.3.2 Perceptions of Active Transportation (Questions 10-15)

These questions provide information on the local official’s perceptions of bicycling and walking in their jurisdiction. This acts to contextualize the state of walking and biking in these communities.

For walking, most respondents agreed that it was safe to walk in their jurisdiction, with 145 respondents agreeing, and 28 strongly agreeing (Figure 3.11). Similarly, when the respondents were asked if walkability was a priority for the community, 158 respondents agreed that it was, while 83 strongly agreed. Regarding the items that local officials were asked to identify as hindrances to walking in their community, 245 respondents indicated lack of sidewalks and infrastructure as a hindrance, 136 indicated distance, 126 indicated lack of crosswalks, and 104 indicated personal safety concerns.

Almost 10% (9.5) of the respondents indicate they strongly agree that it is safe to walk in the location they serve, while 7.1% of the respondents indicate they strongly disagree that it is safe to walk in the location they serve. Of those that strongly agree, 10.7% serve urban areas, 7.1% serve mixed urban areas, 53.6% serve mixed rural areas, and 28.6% serve rural areas (Table 3.3). None of those that strongly disagree serve urban areas; 28.6% serve mixed urban areas, 61.9% serve mixed rural areas, and 9.5% serve rural areas (Table 3.3).

Figure 3.11 Perceptions of walking safety (Appendix A, Q.10)



Table 3.3 Walking safety perspectives by population density type

	Q10) Based on your professional expertise it is safe to walk in the location you serve.			
Q3) County Population Density Type	Strongly Disagree	Disagree	Agree	Strongly Agree
Rural	2	21	28	8
Mixed Rural	13	48	77	15
Mixed Urban	6	15	24	2
Urban	0	18	16	3
Total	21	102	145	28

Eighty-three respondents (28% of the respondents) indicate they strongly agree that walkability is a priority for the community they serve (Figure 3.12). About 3.7% of the respondents indicate they strongly disagree that walkability is a priority for the community they serve. Of those that strongly agree 14.4% serve urban areas, 18.1% serve mixed urban areas, 49.4% serve mixed rural areas, and 18.1% serve rural areas (Table 3.4). None of those that strongly disagree serve urban areas; 28.6% serve mixed urban areas, 61.9% serve mixed rural areas, and 9.5% serve rural areas (Table 3.4). Figure 3.13 shows what hinders people from walking in their study areas.

Figure 3.12 Perceptions of walkability as a community priority

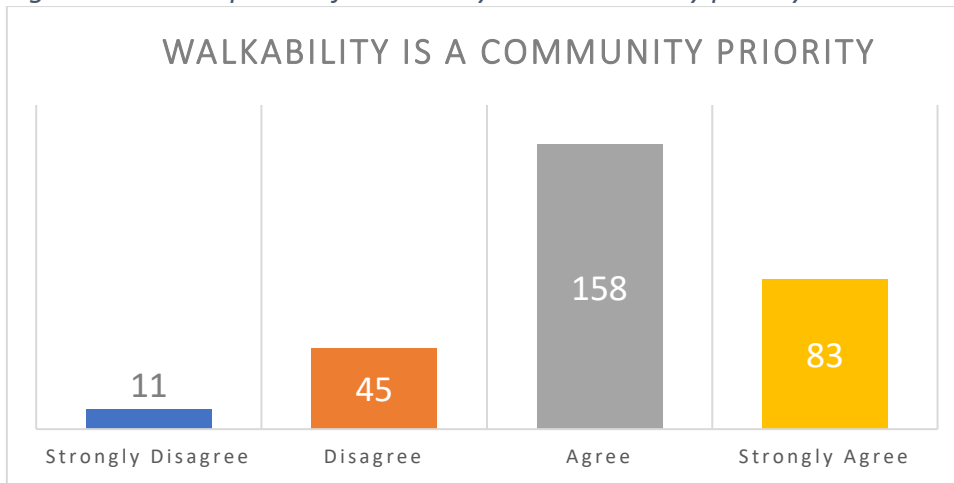
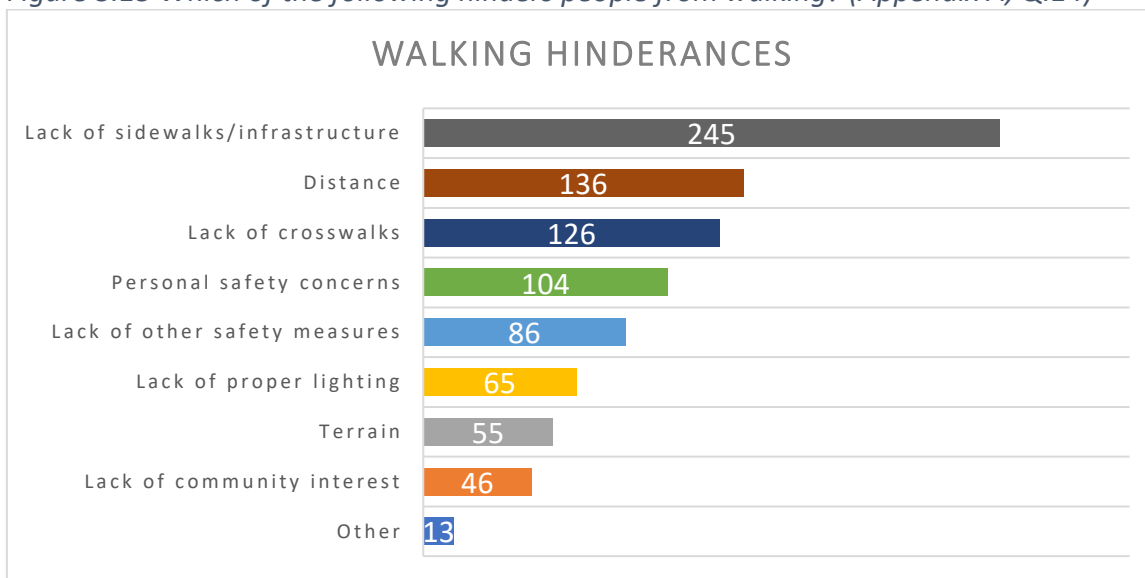


Table 3.4 Walkability as community priority by population density type

Q3) County Population Density Type	Q11) Walkability is a priority for the community you serve.			
	Strongly Disagree	Disagree	Agree	Strongly Agree
Rural	3	18	23	15
Mixed Rural	5	17	89	41
Mixed Urban	3	9	21	15
Urban	0	1	25	12
Total	11	45	158	83

Figure 3.13 Which of the following hinders people from walking? (Appendix A, Q.14)



For biking, most respondents disagreed that it safe to bicycle in their community, with 144 respondents disagreeing, and 40 respondents strongly disagreeing (Figure 3.14). However,

when asked if bicycle transportation was a priority in their community, 138 agreed that it was, while 105 disagreed. Among the respondents who indicate that there are hindrances to biking in their community, 264 describe a lack of bicycle lanes and infrastructure, while 150 indicate personal safety concerns, and 118 indicate lack of other safety measures.

Five percent (5.1%) of the respondents indicate they strongly agree that it is safe to ride a bicycle in the location they serve, while 13.5% of the respondents indicate they strongly disagree that it is safe to ride a bicycle in the location they serve. None of those that strongly agree serve urban areas; 6.7% serve mixed urban areas, 73.3% serve mixed rural areas, and 20.0% serve rural areas (Table 3.5). Of those that strongly disagree 2.5% serve urban areas, 22.5% serve mixed urban areas, 57.5% serve mixed rural areas, and 17.5% serve rural areas (Table 3.5).

Figure 3.14 Perceptions of biking safety (see Appendix A, Q.11)

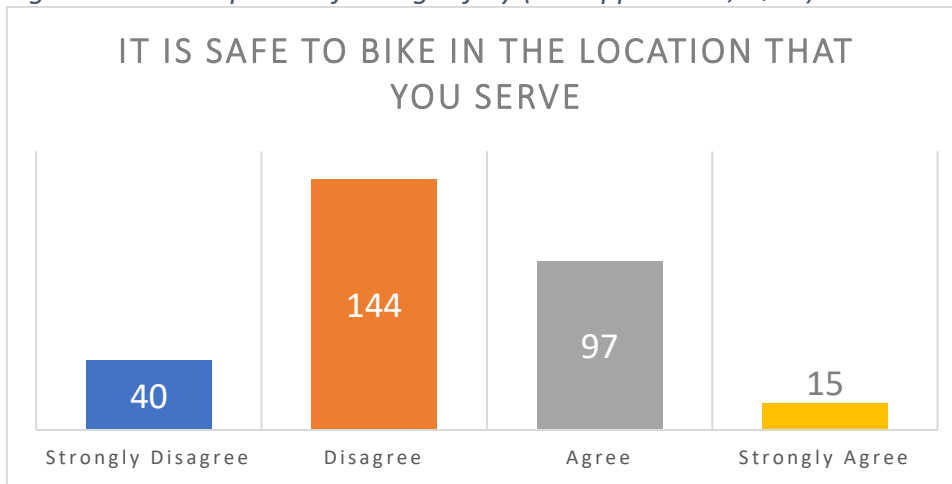


Table 3.5 Perceptions of community bicycle safety by population density type

	Q12) Based on your professional expertise it is safe to ride a bicycle in the location you serve.			
Q3) County Population Density Type	Strongly Disagree	Disagree	Agree	Strongly Agree
Rural	7	26	23	3
Mixed Rural	23	71	47	11
Mixed Urban	9	22	15	1
Urban	1	25	12	0
Total	40	144	97	15

Thirty-six respondents (12.2% of the respondents) indicate they strongly agree that bicycle transportation is a priority for the community they serve, while 5.7% of the respondents indicate they strongly disagree that bicycle transportation is a priority for the community they serve (Figure 3.15). Of those that strongly agree 13.9% serve urban areas, 22.2% serve mixed urban areas, 52.8% serve mixed rural areas, and 11.1% serve rural areas (Table 3.6). Of those

that strongly disagree, 5.9% serve urban areas, 17.7% serve mixed urban areas, 52.9% serve mixed rural areas, and 23.5% serve rural areas (Table 3.6). Figure 3.16 shows what hinders people from bicycling in their areas.

Figure 3.15 Perceptions of bike-ability as a community priority (Appendix A, Q.13)

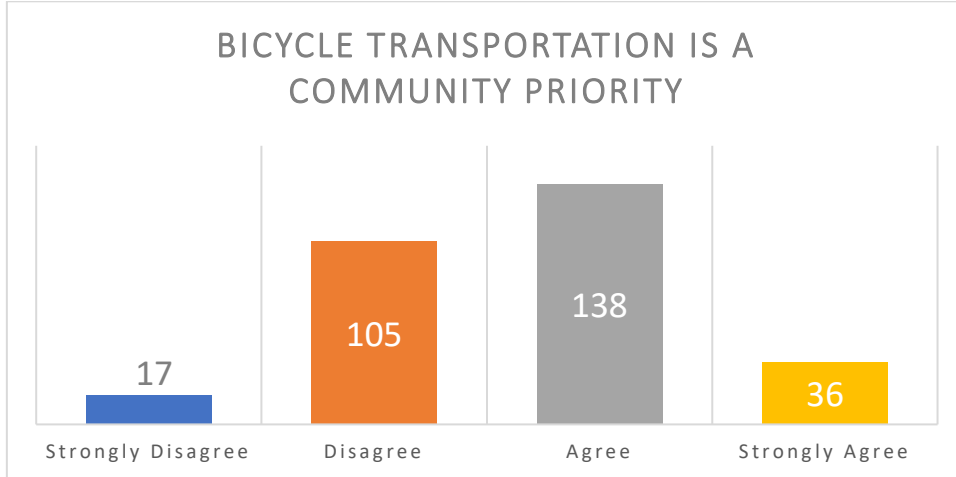
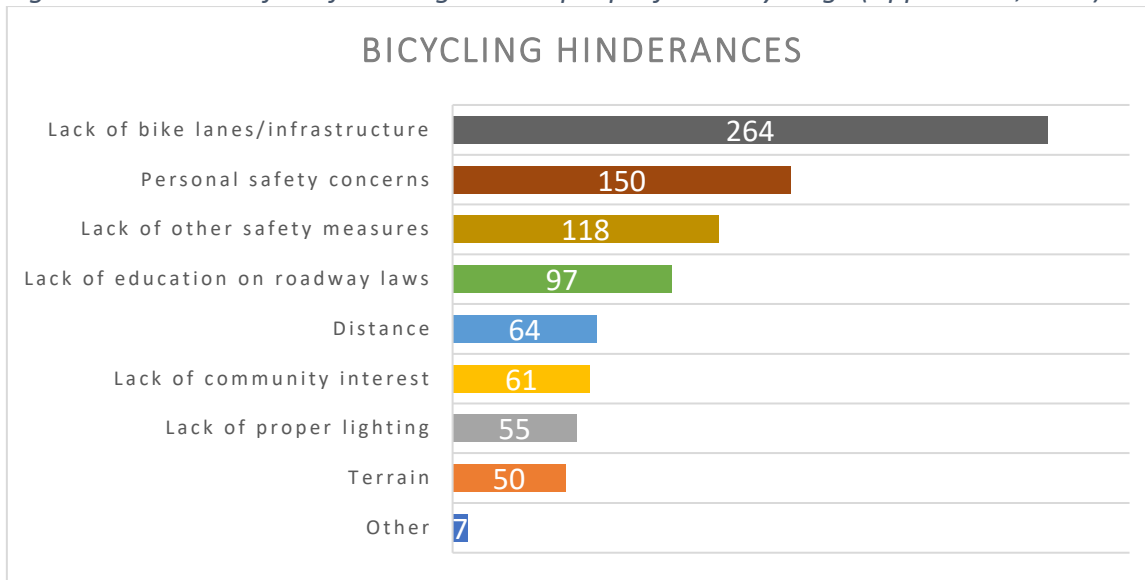


Table 3.6 Perceptions of community bicycle transportation as a priority by population density type

Q3) County Population Density Type	Q13) Bicycle transportation is a priority for the community you serve.			
	Strongly Disagree	Disagree	Agree	Strongly Agree
Rural	4	27	23	4
Mixed Rural	9	54	71	19
Mixed Urban	3	14	22	8
Urban	1	10	22	5
Total	17	105	138	36

Figure 3.16 Which of the following hinders people from bicycling? (Appendix A, Q.15)



3.3.3 Built Environment Perspectives (Questions 16-18)

These questions are designed to get the local officials’ perspective on what can be done to improve walking and biking conditions, what are obstacles to these improvements, and what benefits to walking and biking can be considered priorities for their organization. The results are summarized in figure 3.17, 3.18, and 3.19.

Of the options for potential improvements to walking and biking conditions, the items respondents most frequently agreed would increase walking and biking were improved connectivity of bicycle lanes, sidewalks, etc.; placing more walking infrastructure within the geographic location; widening road shoulders, providing paved bicycle lanes or shared-use paths. The options that respondents most frequently agreed were obstacles to increasing biking and walking were lack of dedicated local funding, lack of access to grant funding, and right-of-way restrictions. Lastly, the top priorities for local officials in terms of bicycle and pedestrian transportation are safer conditions for pedestrian and bicyclists, improved community health, and creating tourism destinations, activities, and opportunities.

Figure 3.17 Indicate the extent to which you agree or disagree that the following would increase walking and biking (Appendix A, Q.16)

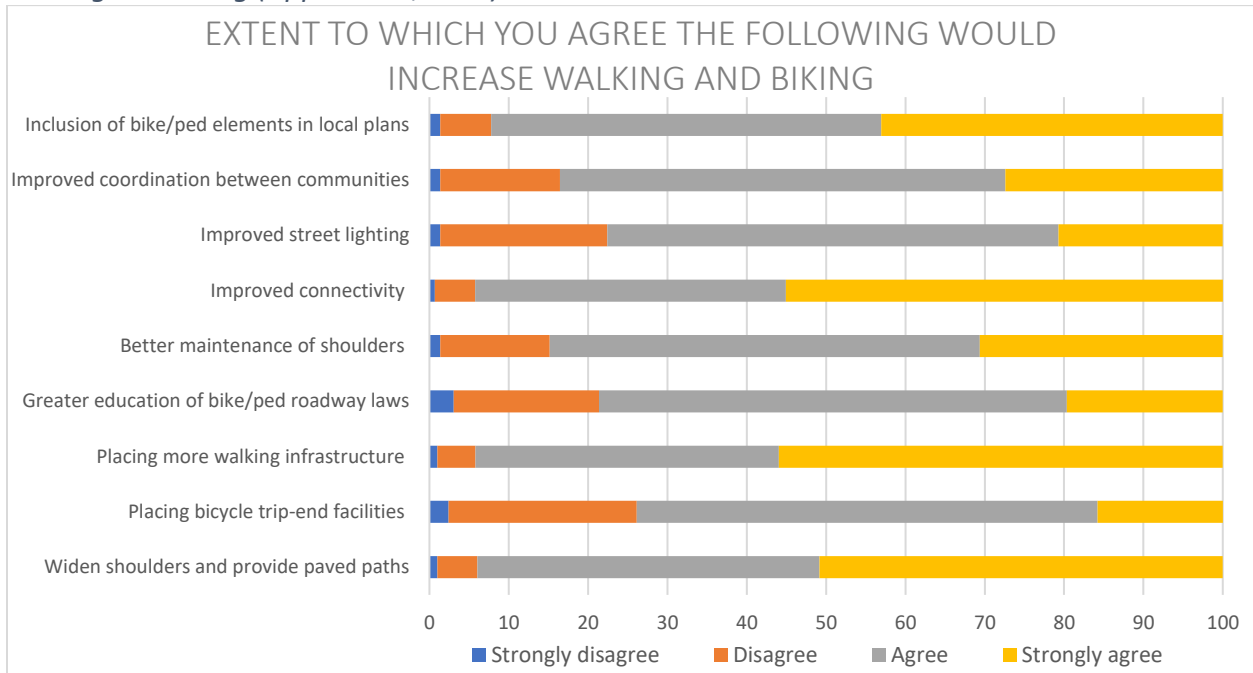


Figure 3.18 Indicate the extent to which you agree or disagree that the following are obstacles to your organization improving bike/ped conditions (Appendix A, Q. 17)

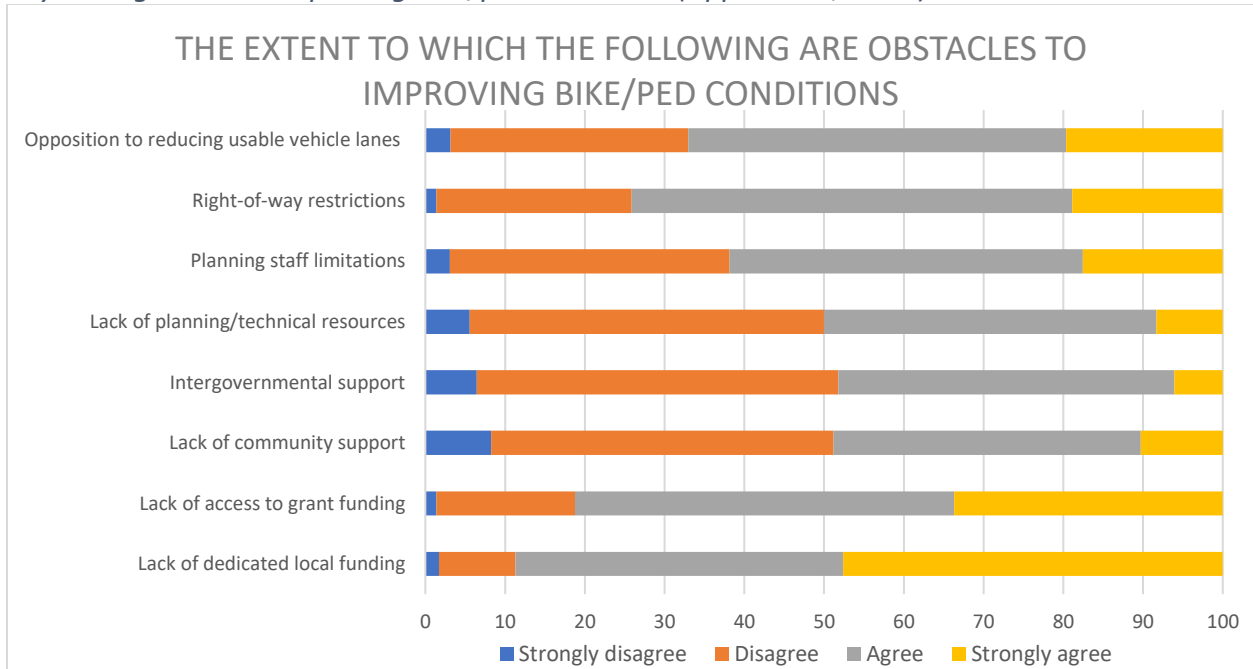
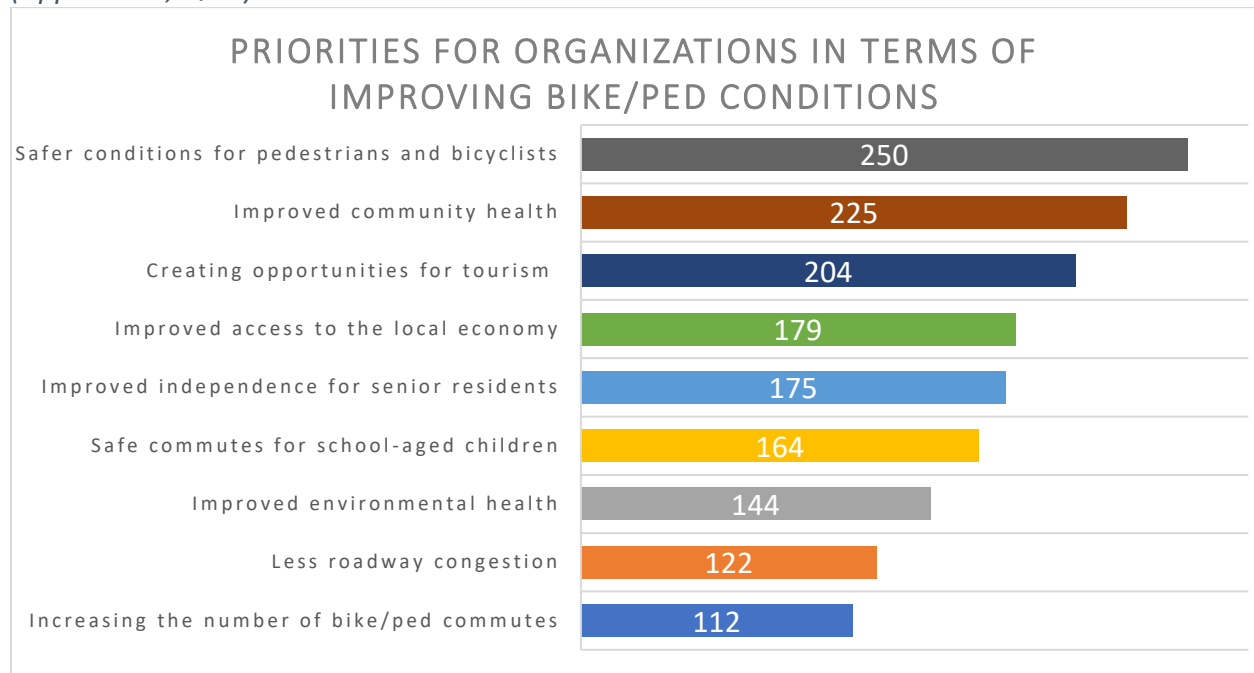


Figure 3.19 Which of the following are priorities in regard to improving bike/ped conditions? (Appendix A, Q.18)



3.3.4 Active Transportation Funding Perspectives (Questions 19-22)

These survey questions serve to determine the likelihood and level of difficulty of applying for state and federal funding for bicycle and pedestrian projects.

One hundred and fifty-five (155) of the respondents, or 53.6%, indicate they were successful in accessing state grant funding for local bicycle or pedestrian projects (Figure 3.20). Twenty-eight (28) respondents, or 9.7%, said they were unsuccessful, and 106 (36.7%) have not applied (Figure 3.21). Of those successful in accessing state grant funding for local bicycle or pedestrian projects, 19.4% serve urban areas, 18.7% serve mixed urban areas, 53.5% serve mixed rural areas, and 8.4% serve rural areas.

Ninety-three (93) of the respondents, or 33.0% indicate they were successful in accessing federal grant funding for local bicycle or pedestrian projects, while 35 (12.4%) were unsuccessful, and 154 (54.6%) have not applied. Of those successful in accessing federal grant funding for local bicycle or pedestrian projects, 30.1% serve urban areas, 21.5% serve mixed urban areas, 41.9 serve mixed rural areas, and 6.5% serve rural areas (Table 3.7). It should be noted that some respondents may believe that funding from the federal government often passes through the state and the state distributes it to the local governments.

The most frequent factor that makes access to grant funding difficult was required matching grant funds, with 188 respondents indicating such (Figure 3.22). One hundred and fifty-five (155) respondents indicated that administrative capacity makes access to grant funding

difficult, 75 indicated presence or absence of design guidelines, 67 indicated political or local support, and 25 respondents indicated other.

Table 3.8 summarizes access to federal grants by organization and population density type, while Table 3.9 summarizes the factors that make access to federal and state grants difficult by organization and population density type.

In terms of factors that could increase the likelihood of applying for grant funding for bicycle and pedestrian projects (Figure 3.23), 189 respondents indicated that assisting staff with technical support could increase the likelihood, 141 respondents indicated better data to support the positive impacts of bicycle and pedestrian infrastructure, 117 indicated clearer design guidelines, 110 indicated more information sessions, and 17 indicated other.

Table 3.10 summarizes the factors that would increase the likelihood of applying for federal and state grants by organization and population density type.

Figure 3.20 Level of success in applying for state grant funding (Appendix A, Q.19)

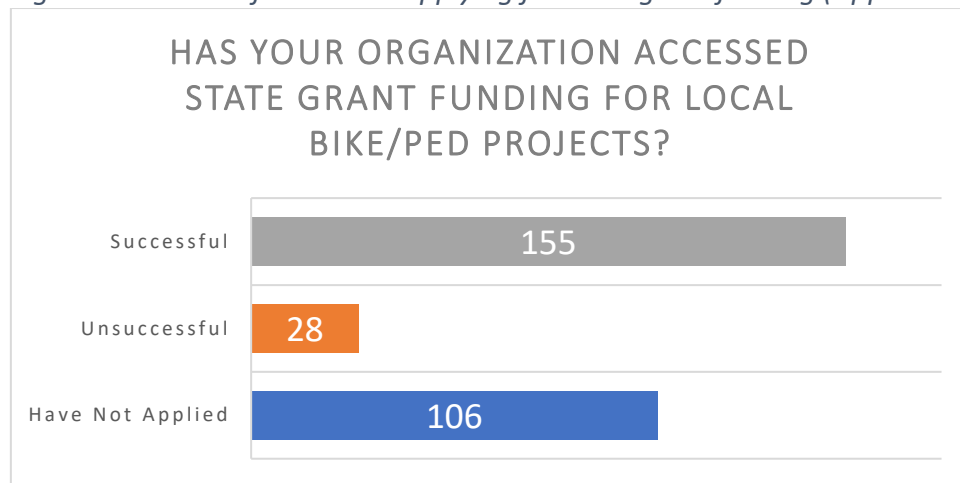


Figure 3.21 Level of success in applying for federal grant funding (Appendix A, Q. 20)

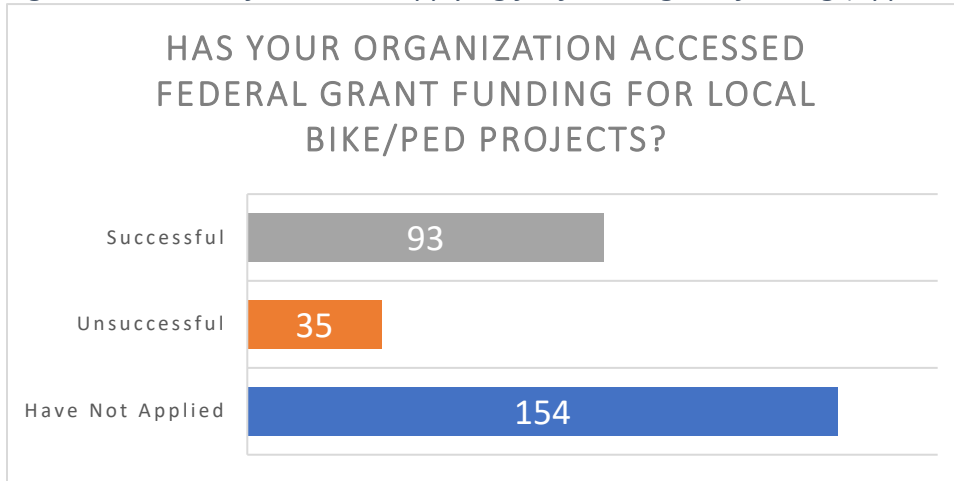


Table 3.7 Access to state grants by organization and population density type

Q1) Respondent Organization Type	Q19) Has your organization accessed state grant funding for local bicycle or pedestrian projects?		
	No: Unsuccessful	Yes: Successful	NA: Have not applied
City/Town Government	19	119	71
County Government	7	15	33
COG	1	6	0
MPO	0	9	1
RPO	1	5	1
Other	0	1	0
Q2) Respondent Role			
Executive Director	1	9	5
Elected Official	2	2	4
Department Director	9	52	37
Manager/Administrator	7	34	22
Planner – transportation	3	18	2
Planner- other	3	24	13
Town Clerk	3	16	22
Other:	0	0	1
Q3) County Population Density Type			
Rural	10	13	34
Mixed Rural	13	83	51
Mixed Urban	5	29	13
Urban	0	30	8
Total	28	155	106

Figure 3.22 Do any of the following make access to state and federal grant funding difficult? (Appendix A, Q.21)

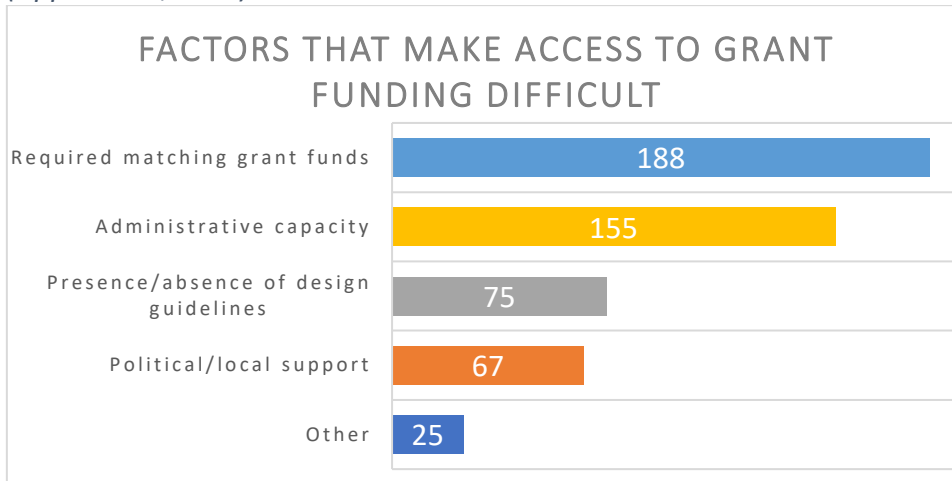


Table 3.8 Access to federal grants by organization and population density type

Q1) Respondent Organization Type	Q20) Has your organization accessed federal grant funding for local bicycle or pedestrian projects?		
	No: Unsuccessful	Yes: Successful	NA: Have not applied
City/Town Government	23	67	112
County Government	7	10	38
COG	1	4	2
MPO	1	8	1
RPO	3	3	1
Other	0	1	0
Q2) Respondent Role			
Executive Director	1	8	6
Elected Official	2	1	5
Department Director	10	31	54
Manager/Administrator	11	17	35
Planner – transportation	4	16	3
Planner- other	4	15	19
Town Clerk	3	5	31
Other:	0	0	1
Q3) County Population Density Type			
Rural	10	6	40
Mixed Rural	17	39	87
Mixed Urban	7	20	19
Urban	1	28	8
Total	35	93	154

Table 3.9 Factors that make access to federal and state grants difficult by organization and population density type

Q21) Do any of the following factors make access to state and federal grant funding difficult for your organization? (check all that apply)					
Q1) Respondent Organization Type	Required matching grant funds	Admin. capacity	Presence/absence of design guidelines	Political/local support	Other
City/Town Government	137	119	62	40	17
County Government	32	22	8	18	5
COG	5	2	1	1	0
MPO	8	8	3	4	2
RPO	6	3	1	4	1
Other	0	1	0	0	0
Q3) County Population Density Type					
Rural	44	30	14	13	2
Mixed Rural	102	72	47	34	13
Mixed Urban	24	27	6	13	8
Urban	18	26	8	7	2
Total	188	155	75	67	25

Figure 3.23 Would any of the factors increase the likelihood of applying for state and federal grant funding? (Appendix A, Q.22)

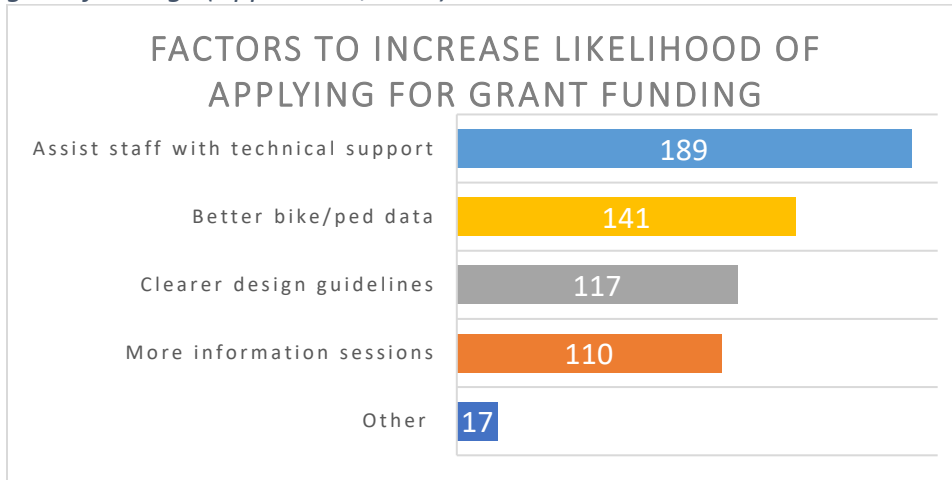


Table 3.10 Factors that would increase the likelihood of applying for federal and state grants by organization and population density type

	Q22) Would any of the following factors increase the likelihood of applying for state and federal grant funds for your organization? (check all that apply)				
Q1) Respondent Organization Type	More information sessions	Assist staff with technical support	Clearer design guidelines	Better bike/ped data	Other
City/Town Government	83	148	92	103	9
County Government	17	27	19	25	6
COG	4	1	1	2	0
MPO	5	6	3	6	2
RPO	1	7	2	5	0
Other	0	0	0	0	0
Q3) County Population Density Type					
Rural	22	40	21	28	1
Mixed Rural	61	99	68	72	7
Mixed Urban	19	28	15	25	8
Urban	8	22	13	16	1
Total	110	189	117	141	17

3.3.5 NCDOT Bicycle/Pedestrian Program Familiarity (Questions 23-24)

These survey questions were included to understand local official’s familiarity with existing NCDOT bicycle and pedestrian related programs. Of the respondents, 169 (57.1%) are familiar with NCDOT’s WalkBikeNC program (2013) (Figure 3.24 and Table 3.11) and 187 (62.8%) are familiar with Complete Streets policy (Figure 3.25 and Table 3.12). Of those familiar with the WalkBikeNC program, 14.8% serve urban areas, 20.7% serve mixed urban areas, 51.5% serve mixed rural areas and 13.0% serve rural areas. Of those familiar with the NCDOT Complete Streets policy (2019), 16.6% serve urban areas, 22.4% serve mixed urban areas, 48.7% serve mixed rural areas, and 12.3% serve rural areas.

Figure 3.24 WalkBikeNC familiarity (Appendix A, Q.23)

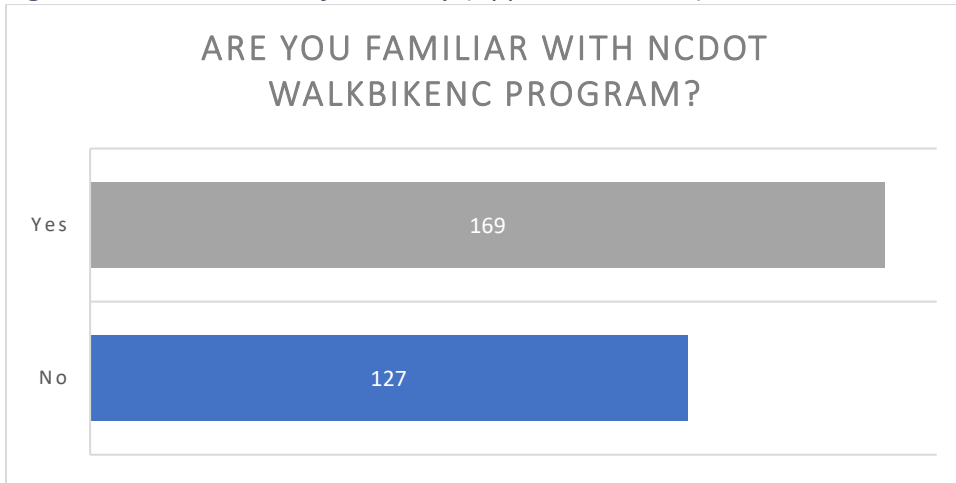


Table 3.11 Familiarity of NCDOT WalkBikeNC program by organization and population density type

	Q23) Are you familiar with the NCDOT WalkBikeNC program?	
	Yes	No
Q1) Respondent Organization Type		
City/Town Government	115	100
County Government	32	24
COG	5	2
MPO	10	0
RPO	6	1
Other	1	0
Q3) County Population Density Type		
Rural	22	37
Mixed Rural	87	64
Mixed Urban	35	13
Urban	25	13
Total	169	127

Figure 3.25 Complete Streets familiarity (Appendix A, Q.24)

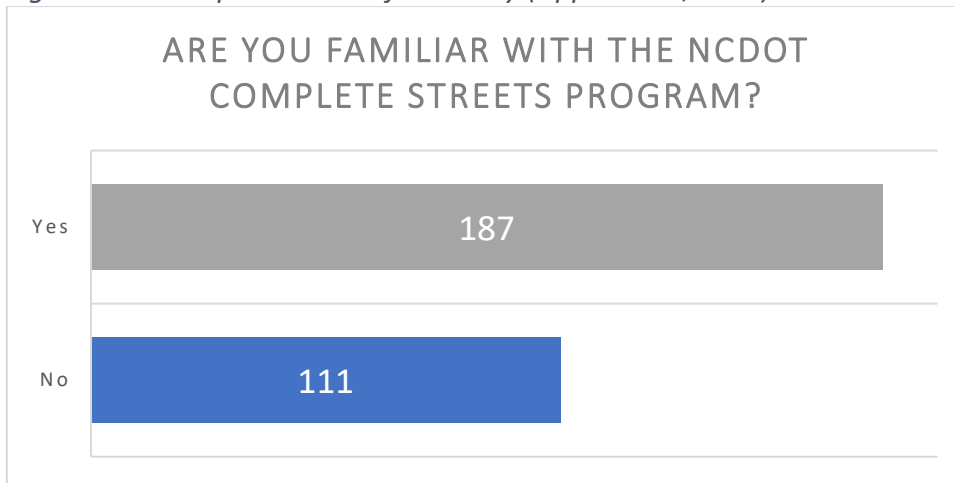


Table 3.12 Familiarity of NCDOT Complete Streets policy by organization and population density type

	Q24) Are you familiar with the NCDOT Complete Streets policy?	
	Yes	No
Q1) Respondent Organization Type		
City/Town Government	126	91
County Government	37	19
Council of Governments (COG)	6	1
Metropolitan Planning Organization (MPO)	10	0
Rural Planning Organization (RPO)	7	0
Other	1	0
Q3) County Population Density Type		
Rural	23	36
Mixed Rural	91	62
Mixed Urban	42	6
Urban	31	7
Total	187	111

3.3.6 Active Transportation Policy Perspectives (Question 32)

This section of the survey provides local officials perspectives from their open-ended responses about bicycle and pedestrian conditions (Q. 32). Ninety-six (96) respondents, or 32%, provided written comments for this question. The nature of the comments may be grouped into three general bicycle and pedestrian policy perspective categories: contextualization, suggestions/needs, and obstacles. The most prevalent comments are associated with contextualization (53). Respondents in this category included specific details about their community, project, or experience as related to bicycle and pedestrian policy. The respondents who provided bicycle and pedestrian policy ideas or recommendations are placed into the suggestions/needs category (29). Respondent comments related to

perceived bicycle and pedestrian policy obstacles (13) within their organization or community are placed into the obstacles category.

Below is a summary of the responses. The complete list of survey comment response details, grouped into these three groups is presented in Appendix C.

Contextualization (53 respondents)

In summary, the prevailing themes for the contextualization comments are associated with:

- limited community amenities and interest;
- disconnect between local and county/state funding, road and sidewalk maintenance protocols, and priorities;
- limited access and plans for rural areas;
- not enough regional plans and coordination resulting in too many disconnects in road, park, greenway, and trail connections;
- need more specific recognition of senior citizens, the disabled population, and economic and tourism in bicycle and pedestrian plans and grant funding; and,
- greater multi-modal thinking and technical assistance is needed.

Suggestions/Needs (29 respondents)

In summary, some needs that respondents indicated are more innovative funding mechanisms for auto and bicycle users and bicycle and pedestrian planning, more information on local bicycle demand, consideration of school-aged children's transportation needs, more education about how to navigate technical assistance and matching grant partners, more support for implementing bicycles and pedestrians into local master and comprehensive plans, and more prioritization of policies and funding for active transportation amenities and multi-modal connectivity.

Obstacles (13 respondents)

Some respondents indicated the following are perceived as bicycle and pedestrian obstacles for their community: lack of capacity, funds, and technical support of small communities, difficult terrain, limited right-of way access and challenges associated with implementing sidewalk/crosswalk improvements, lack of intergovernmental coordination and planning for infrastructure projects, and lack of support for and data on bicycle and pedestrian infrastructure and planning and its benefits.

3.4 Survey Findings of Community Officials and Conclusions

The survey findings summarized next provide context for understanding what local governments see as the demand conditions that may assist with future bicycle and pedestrian projects in NC. They shed light on how local governments perceive opportunities for

overcoming obstacles for their organizations and communities to participate in bicycle and pedestrian policy implementation, and give insight into transportation planning experts' opinions about how NCDOT processes can best accommodate the needs of NC municipalities by sharing their perceptions about the political and financial conditions for their jurisdiction.

Demand

- According to the majority of local officials surveyed, walkability and bike-ability are high priorities across NC communities regardless of population density.
- Two-thirds of local officials said their organization values bicycle and pedestrian policy as a way to create opportunities for tourism and almost two-thirds said their organization values bicycle and pedestrian policy as a way to improve access to the local economy.
- In addition to safety, community health is seen as a top priority for organizations, particularly for more rural and mixed rural municipalities.
- Independence for seniors and keeping them active is also a community priority.
- According to local officials in urban and mixed urban areas, sidewalk, bicycle, and pedestrian lane connectivity would likely increase walking and biking in the areas that the officials serve.

Barriers to Active Transportation

- Rural communities in particular are limited in their annual bicycle and pedestrian budget funding allocation.
- When applying for grant funding for all densities, matching funds are the biggest limitation.
- Matching grant funds is more of a limiting factor for rural and mixed rural respondents as compared to communities with higher population densities.
- Urban and mixed urban respondents indicate administrative capacity as their biggest limitation for accessing state and federal grant funding.
- The majority do agree with the statement that "it is safe to walk in the location you serve."
- Most respondents do not agree that with the statement "it is safe to bike in the location that you serve."
- Lack of sidewalks/infrastructure are the largest hinderances to walking. Distance is second. The lack of community interest is the least hinderance to walking and biking.
- Across all density types, the lack of bicycle lanes/infrastructure are the largest hindrances to biking. Terrain is the smallest hindrance.
- Lack of dedicated funding and lack of access to grant funding were identified as the biggest obstacles to improving bicycle and pedestrian conditions.
- Dedicated funding was not as big of an obstacle in urban and mixed urban areas as it was in rural and mixed rural areas.
- Lack of community support for bicycles and pedestrians, lack of intergovernmental support, and lack of planning and technical resources are least likely to be cited as obstacles for improving bicycle and pedestrian conditions for the area they serve.

- However, lack of community interest is a slightly greater hinderance for biking over walking, though it is still not in the top five hinderances.
- Right-of-ways, infrastructure, and trip-end facilities are seen as more of a limiting factor in urban and mixed-urban areas as compared to mixed-rural and rural areas.
- The majority of respondents thought that lighting, coordination with other communities, and inclusion of bicycle and sidewalk elements in local transportation plans were opportunities to increase biking and walking in the areas that they serve.
- Better maintenance of shoulders, keeping them free of debris and cracks, was viewed as an opportunity to enhance walking and biking in rural and mixed-rural areas.

Expert Opinions on How to Accommodate Municipalities

- Lack of dedicated funding and lack of access to grant funding were identified as local municipality concerns.
- Most respondents have applied for and been successful in receiving state funding. However, most respondents have not applied for federal grant funding.
- Identifying grant matching funds and technical assistance is needed across all density types.
- Most of respondents are familiar with the two state DOT policies, Complete Streets policy and Walk/Bike NC. However, rural respondents were less familiar with both programs compared to other density types.
- When applying for funding, communities desire more assistance with technical support and better data to support the positive impacts of bicycle and pedestrian infrastructure.

Chapter 4 Identify and Survey Comparable State DOTs

This chapter describes the survey questionnaire, survey plan, and results from the survey of state DOTs.

4.1 DOT Survey Questionnaire

A survey questionnaire was developed with 20 questions to gather information from the state DOTs. These questions were aimed to gather information such as the state DOT budget, allocation of funds for bicycle/pedestrian projects, hindrances for walking and bicycling, and bicycle/pedestrian policies and best practices. Most of the questions are single choice/input or multiple-choice questions. The questions to gather information pertaining to policies and practices, successfully executed bicycle/pedestrian projects and organization setup were in the form of a qualitative comprehensive response. Table 4.1 shows the survey questionnaire with response options for each survey question.

Table 4.1 State DOT survey questionnaire

S. No.	Question	Response options
1	Name your state DOT*	
2	Which of the following best describes the FY 2019-2020 operating budget for your state?	<ul style="list-style-type: none"> < \$1 billion \$1 billion - \$3 billion \$3 billion - \$5 billion \$5 billion - \$10 billion \$10 billion - \$20 billion > \$20 billion
3	Did your last annual budget include funding for any of the following? (check all that apply)**	<ul style="list-style-type: none"> Bicycle/pedestrian planning, maintenance, or implementation Bicycle/pedestrian infrastructure (sidewalks, crosswalks, bike racks, etc.) Bicycle/pedestrian education, awareness, or outreach Unsure/do not know
4	Which of the following best describes the FY 2019-2020 independent bicycle/pedestrian projects operating budget for your state?	<ul style="list-style-type: none"> < \$1 million \$1 million - \$5 million \$5 million - \$10 million \$10 million - \$50 million \$50 million - \$100 million \$100 million - \$500 million (\$0.5 billion) \$0.5 billion - \$1 billion > \$1 billion
5	Which of the following best describes the % of the budget allocated for independent bicycle/pedestrian projects for your state?	<ul style="list-style-type: none"> < 0.05% 0.05% to 0.10% 0.10% to 0.50% 0.50% to 1.00% 1.00% to 2.00% > 2.00%
6	Which of the following best describes the % of the budget allocated for bicycle/pedestrian projects (includes independent as well as part of highway projects) for your state?	<ul style="list-style-type: none"> < 0.05% 0.05% to 0.1% 0.10% to 0.50% 0.50% to 1.00% 1.00% to 2.00% > 2.00%

S. No.	Question	Response options			
7	How successful has your state been at working with the federal agency to access funding for bicycle/pedestrian Projects?	Never worked with the federal agency for funding on bicycle/pedestrian projects			
		Not successful			
		Somewhat successful			
		Moderately successful			
		Very successful			
8	Of these potential opportunities, which three would be top priorities for your state, and what is the primary need to fulfill this priority?***	Dedicated funding			
		Planning/technical resources			
		Political/local support			
		Intergovernmental support			
		Public-Private Partnerships			
9	Briefly describe your state's bicycle/pedestrian policies?*				
10	List your state's top three bicycle/pedestrian policy-related best practices?*				
11.	List your state's top three successfully executed bicycle/pedestrian projects in an urban area?*				
12	List your state's top three successfully executed bicycle/pedestrian projects in a suburban area?*				
13	List your state's top three successfully executed bicycle/pedestrian projects in a rural area?*				
14	Which land use type constitutes the first largest land area in your state?	Residential			
		Commercial			
		Public/government-owned			
		Industrial			
		Agricultural			
15	Which land use type constitutes the second-largest land area in your state?	Mixed-use			
		Residential			
		Commercial			
		Public/government-owned			
		Industrial			
16	What type of bicycle route would people in your state be most likely to use?	Agricultural			
		Mixed-use			
		Class 1 bicycle route			
		Class 2 bicycle route			
17	How would you rate the following reasons that people do not WALK more frequently in your state?				
	Reasons listed***		Major reason	Minor reason	Not a reason
	Sidewalks in poor condition				
	Unsafe intersections				
	Bad driver behavior				
	Motorized traffic				
	Personal safety				
	Destinations are too far				
	Bad weather				
No sidewalks					
Street lighting					
18	How would you rate the following as reasons that people do not BICYCLE more frequently in your state?				
	Reasons listed***		Major reason	Minor reason	Not a reason
	No bicycle parking				
	No bicycle lanes				
	Bicycle lanes in poor condition				
	Unsafe intersections				
Bad driver behavior					

S. No.	Question	Response options			
	Automobile traffic				
	Unappealing surroundings				
19	What would be the benefit of strengthening the bicycle/pedestrian infrastructure in your state?				
	Reasons listed***	Agree	Strongly Agree	Disagree	Strongly disagree
	Increased safety for walking				
	Low traffic congestion				
	Increase accessibility				
	Increase mobility and independence for senior residents				
	Allow for safer/faster work/school commutes				
	A greater network of multi-use paths would encourage people to bicycle more				
	Improved community health				
	Improved environmental health				
	Create tourism destinations, activities, and opportunities				
	Create and enhance opportunities for school-aged children to commute to school, recreation, and activities safely				
	Widen road shoulders, provide paved bike lanes, or shared-use paths				
Greater education of bicycle and pedestrian road user laws					
20	Do you think your DOT organizational structure/setup is different from other states? If "yes", how/why?*				

Note:

- * question requiring a comprehensive response (the response is to be filled in a text box).
 - ** question with multiple options (check/select the most relevant option).
 - *** question with a relative rating (agree, strongly agree, disagree, or strongly disagree).
- Others are single choice/input questions.

4.2 DOT Survey Plan and Methodology

The survey questionnaire was used to build a form using the ‘SurveyShare’ platform. An email outlining the intent of this study along with the link to respond was sent to the staff of all 50 state DOTs. While the expectation was to receive as many responses as possible, the target was to at least receive a response from the four selected comparable states (Florida, Georgia, Tennessee, and Virginia) in addition to NC. These comparable states were identified based on characteristics such as population, population density, area type, DOT organizational setup/structure, and highway funding.

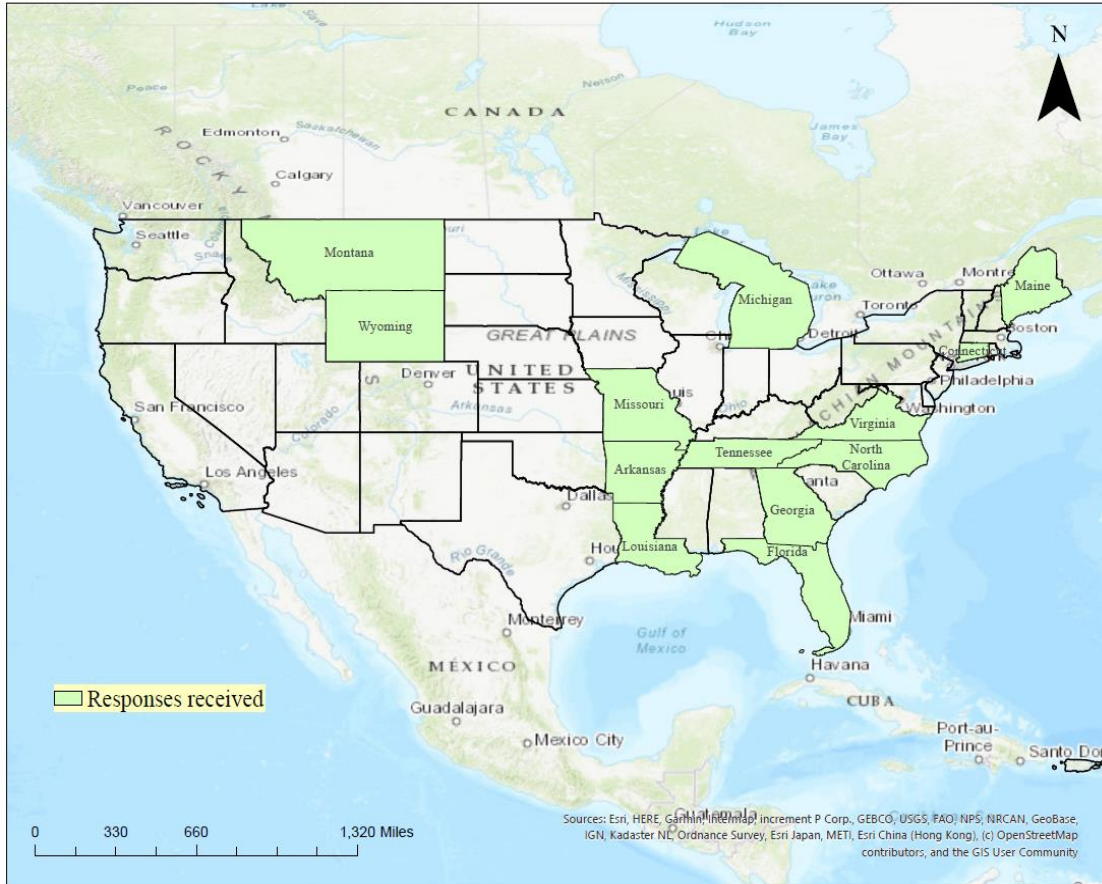
The responses from each state DOT respondent were tabulated and analyzed by categorizing the gathered information into land use, finance, infrastructure, policies, and best practices.

4.3 DOT Survey Results

The survey was sent to the staff of all 50 state DOTs during the first week of April. They were requested to submit their responses to each question by April 17, 2020. This was followed by

phone calls and short conversations to gather some information and ensure that responses from the comparable state DOTs were received. The online ‘SurveyShare’ form was left open until responses were received from the staff of the comparable state DOTs and closed during the last week of May 2020. A total of 13 responses (26% response rate) were received. Figure 4.1 shows the state DOTs that responded to the survey.

Figure 4.1 State DOTs that responded to the survey



Most of the state DOTs that responded to the survey are from the eastern or southeastern US. Only Montana and Wyoming responded to the survey from the western or northwestern US. The responses from the comparable state DOTs are highlighted in bold in the tables.

The percent of responses to a category was computed using Equation (1) and tabulated for selected questions.

$$P_i = \frac{n_i}{N} \times 100 \tag{1}$$

where P_i is the percent of responses of the category “i”, n_i is the number of responses to category “i”, and N is the total number of responses related to a question.

4.3.1 Land Use

The predominant land use type among respondents was agricultural, reported by 12 state DOTs. Mixed-use comprised 41.7% of second largest land use type among respondents, followed by public/government-owned (25.0%), and residential (16.7%). Table 4.2 summarizes the responses received from state DOTs related to the land use.

Table 4.2 Primary and secondary land use

Land use type	Predominant land use (% of responses)		Second largest land use	
	All	Comparable	All	Comparable
Agricultural	100.00	100.00		-
Residential	-	-	Tennessee, Virginia	Tennessee, Virginia
Commercial	-	-	Missouri	-
Public/Government-owned	-	-	Arkansas, Michigan, Montana	-
Industrial	-	-	LA	-
Mixed-use	-	-	Connecticut, Florida, Georgia, Maine, Wyoming	Florida, Georgia

4.3.2 Financial Information

The state DOT respondents felt that their state DOT organization structure is similar to other state DOTs in the US.

Each DOT state budget reflects an estimate of the revenue that is allocated to various DOT units in that fiscal year. This depends on the revenue from various sources (including TAP) and allocated based on DOT unit needs. Reviewing this financial information will help us understand the budget constraints and limitations for maintaining the transportation system, in particular between the comparable state DOTs.

State DOTs typically allocate a percentage of their budget for bicycle/pedestrian projects. This amount could depend on its total operating budget. Also, the budget may be allocated for independent bicycle/pedestrian projects as well as part of highway projects. The percentages allocated for independent projects and as part of highway projects could differ from one state DOT to another state DOT. This information was gathered through the survey and tabulated.

Table 4.3 summarizes the information received from all 13 state DOT respondents related to their financial information.

The NCDOT's FY2019-20 total operating budget is in the same range as Connecticut, Michigan, and Virginia DOTs FY 2019-20 total operating budget. It is less than Florida DOT's but more than Arkansas, Georgia, Louisiana, Maine, Missouri, Montana, Tennessee, and Wyoming DOTs FY 2019-20 total operating budget. However, NCDOT's FY2019-20 bicycle/pedestrian operating

budget is less than Arkansas, Florida, Georgia, Louisiana, Montana, and Tennessee DOTs FY2019-20 bicycle/pedestrian operating budget.

Table 4.3 Financial information

State DOT	FY2019-20 operating budget	FY2019-20 Bicycle/pedestrian operating budget	% allocated for independent bicycle/pedestrian projects	% allocated for bicycle/pedestrian projects (independent plus part of highway projects)
Arkansas	<\$1 billion	\$5 million - \$10 million		0.5% to 1%
Connecticut	\$3 billion - \$5 billion			1% to 2%
Florida	\$10 billion - \$20 billion	\$10 million - \$50 million	>2%	>2%
Georgia	\$1 billion - \$3 billion	\$1 million - \$5 million	0.1% to 0.5%	>2%
Louisiana	\$1 billion - \$3 billion	\$5 million - \$10 million	0.5% to 1%	1% to 2%
Maine	< \$1 billion	< \$1 million	<0.05%	0.05% to 0.1%
Michigan	\$3 billion - \$5 billion			
Missouri	\$1 billion - \$3 billion	< \$1 million	<0.05%	1% to 2%
Montana	< \$1 billion	\$5 million - \$10 million	1% to 2%	>2%
North Carolina	\$3 billion - \$5 billion	< \$1 million	<0.05%	<0.05%
Tennessee	\$1 billion - \$3 billion	\$10 million - \$50 million	0.05% to 0.1%	0.05% to 0.1%
Virginia	\$3 billion - \$5 billion	< \$1 million	>2%	>2%
Wyoming	< \$1 billion	< \$1 million	<0.05%	1% to 2%

The NCDOT seems to spend less than 0.05% of its total operating budget on bicycle/pedestrian projects (independent as well as those that are part of highway projects). It is less than what Florida, Georgia, Louisiana, Montana, Tennessee, and Virginia DOTs spend on bicycle/pedestrian projects. Florida, Georgia, Montana, and Virginia DOTs spend more than 2% of their total operating budget on bicycle/pedestrian facilities (independent as well as those that are part of highway projects).

The high percent allocated for bicycle/pedestrian projects by state DOTs such as Florida could be attributed to their high total operating budget and population and bicycle/pedestrian focus. To account for the differences in population when allocating for transportation projects, the bicycle/pedestrian dollars spent per person was computed using Equation (2).

$$\text{Bicycle/pedestrian dollars spent per person} = \frac{\text{Bicycle/pedestrian operating budget (in million \$s)}}{\text{Total population of the state (in millions)}} \quad (2)$$

The total population for the year 2019 was gathered from the Census Bureau website (United States Census Bureau, 2019). Table 4.4 summarizes the computed bicycle/pedestrian dollars spent per person. It is lowest for NC but reasonably close to bicycle/pedestrian dollars spent per person by Virginia.

The type of bicycle/pedestrian projects typically supported by State DOTs include 1) planning, maintenance, or implementation, 2) infrastructure and 3) education, awareness, or outreach. Table 4.5 summarizes information received from the state DOT respondents on bicycle/pedestrian projects supported through funds from their last annual budget. NCDOT spent funds only on bicycle/pedestrian planning, maintenance, or implementation in their last annual budget, while Arkansas DOT spent only on bicycle/pedestrian infrastructure in their last

annual budget. Louisiana, Tennessee, Virginia, and Wyoming DOTs spent their funds on bicycle/pedestrian planning, maintenance, implementation, and infrastructure in their last annual budget. Connecticut, Florida, Georgia, Maine, Michigan, Missouri, and Montana DOTs also spent their funds on education, awareness, or outreach activities in their last annual budget. Except for the NCDOT, all other state DOTs that responded to the survey have spent their budget on bicycle/pedestrian infrastructure.

Table 4.4 Bicycle/pedestrian dollars spent per person

State DOT	Bicycle/Pedestrian Operating budget	Total Population in 2019 (in millions)	Bicycle/pedestrian \$ spent per person
Arkansas	\$5 million - \$10 million	3.02	\$1.66 - \$3.31
Connecticut		3.57	
Florida	\$10 million - \$50 million	21.48	\$0.46 - \$2.33
Georgia	\$1 million - \$5 million	10.62	\$0.09 - \$0.47
Louisiana	\$5 million - \$10 million	4.65	\$1.08 - \$2.15
Maine	< \$1 million	1.34	< \$0.75
Michigan		9.99	
Missouri	< \$1 million	6.14	< \$0.16
Montana	\$5 million - \$10 million	1.07	\$4.67 - \$9.35
North Carolina	< \$1 million	10.49	< \$0.10
Tennessee	\$10 million - \$50 million	6.83	\$1.46 - \$7.32
Virginia	< \$1 million	8.54	< \$0.12
Wyoming	< \$1 million	0.58	< \$1.72

Table 4.5 Bicycle/pedestrian projects supported in their last annual budget

State DOT	Bicycle/pedestrian planning, maintenance, or implementation	Bicycle/pedestrian infrastructure (sidewalks, crosswalks, bicycle racks, etc.)	Bicycle/pedestrian education, awareness, or outreach
Arkansas		✓	
Connecticut	✓	✓	✓
Florida	✓	✓	✓
Georgia	✓	✓	✓
Louisiana	✓	✓	
Maine	✓	✓	✓
Michigan	✓	✓	✓
Missouri	✓	✓	✓
Montana	✓	✓	✓
North Carolina	✓		
Tennessee	✓	✓	
Virginia	✓	✓	
Wyoming	✓	✓	

4.3.3 Infrastructure

Expanding and enhancing bicycle/pedestrian infrastructure means providing access, increasing safety, and making it comfortable for bicyclists and pedestrians. It indirectly helps by encouraging more people to be physically active and promoting their health. Typical bicycle/pedestrian infrastructure projects include bicycle lanes, sidewalks, crosswalks, trails, shared-use paths, pedestrian overpass or underpass, among others. Assessing the preferences

of bicyclists and pedestrians provides vital insights for planning and for the decision-making about transportation facilities.

Bicycle routes are specially designated roads/paths that are preferred for bicycle travel for either regular commute or recreational purposes. The type of bicycle route plays an important role for a person who is selecting bicycling as a mode of transportation. The design standards and cost to build a bicycle route also varies by the type of bicycle route. These are broadly categorized as follows (City of American Canyon 2020):

Class 1 Bicycle routes: These are paths that are completely separated from streets with a paved/allocated right-of-way.

Class 2 Bicycle routes: These bicycle lanes are typically one-way and are constructed to accommodate bicycle traffic running along the direction of mainline traffic. Stripes are marked to separate the mainline traffic from the bicycle traffic.

Class 3 Bicycle routes: These are bicycle lanes with signage to serve as a designated route. These facilities are shared by pedestrians on a sidewalk.

Based on their knowledge and interactions with local agencies and the general public, state DOTs were asked to indicate what type of bicycle route is preferred by bicyclists in their state. Table 4.6 summarizes the information received from state DOT respondents regarding the preferred bicycle route.

Table 4.6 Bicycle route preference

State DOT	Class 1 Bicycle Route	Class 2 Bicycle Route	Class 3 Bicycle Route	Unpaved Trails
Arkansas	✓			
Connecticut	✓			
Florida				
Georgia	✓			
Louisiana			✓	
Maine			✓	
Michigan	✓			
Missouri				✓
Montana				✓
North Carolina	✓			
Tennessee	✓			
Virginia	✓			
Wyoming	✓			

Eight out of the 12 state DOT respondents indicated that bicyclists in their state prefer Class 1 bicycle routes, while two out of the 12 state DOT respondents indicated that bicyclists in their state prefer Class 3 bicycle routes. Two out of the 12 state DOT respondents indicated that bicyclists in their state prefer unpaved trails. While the Florida DOT did not respond to the question, all other comparable state DOT respondents indicated that bicyclists in their state prefer Class 1 bicycle routes.

4.3.3.1 Hindrance and Possible Reasons for Lower Walking Activity

This part of the survey questions focused on hindrances and possible reasons for lower walking activity (to identify factors that discourage people from walking). The reasons that were asked to be rated include sidewalks in poor condition, unsafe intersections, bad driver behavior, motorized traffic, personal safety, destinations are too far, bad weather, no sidewalks, and street lighting. The state DOT respondents were asked to rate each as (1) a major reason, (2) a minor reason, or (3) not a reason for lower walking activity in their state. Table 4.7 summarizes the information received from each state DOT respondent regarding the rating of possible reasons for lower walking activity. Table 4.8 summarizes the percent of responses received related to the rating of possible reasons for lower walking activity.

Destinations are too far, no sidewalks, and bad driver behavior are major hindrances and possible reasons for lower walking activity in six or more states' that responded to the survey. Sidewalks in poor condition, street lighting, personal safety, and bad weather are minor hindrances and possible reasons for lower walking activity in six or more states' that responded to the survey. Bad driver behavior and destinations are too far followed by unsafe intersections and motorized traffic are major hindrances and possible reasons for lower walking activity in NC and the comparable states. Sidewalks in poor condition is a minor hindrance and possible reason for low walking activity in NC and two comparable states.

Table 4.7 Rating of reasons influencing walking activity

State DOT	Sidewalks in poor condition	Unsafe intersections	Bad driver behavior	Motorized traffic	Personal safety	Destinations are too far	Bad weather	No sidewalks	Street lighting
Arkansas	2	2	2	2	1	1	3	1	2
Connecticut	2	2	2	2	2	1	2	2	2
Florida	3	3	2	2	2	1	1	2	3
Georgia	2	2	1	2	2	1	3	1	1
Louisiana	2	1	1	1	2	1	2	1	2
Maine	2	1	1	1	3	2	2	1	2
Michigan	2	2	2	2	3	1	2	1	2
Missouri	1	1	1	1	1	1	2	1	1
Montana	2	2	3	3	2	1	2	2	3
North Carolina	2	1	1	1	3	1	3	2	2
Tennessee	1	1	1	1	1	1	2	1	2
Virginia	2	1	1	1	2	2	1	1	3
Wyoming	1	2	2	2	2	1	1	2	2

Table 4.8 Percent of responses summarizing reasons influencing walking activity

Reason	All States (% of responses)			Comparable States (# of responses; max. is 4)		
	Major reason	Minor reason	Not a reason	Major reason	Minor reason	Not a reason
Sidewalks in poor condition	23.08	69.23	7.69	1	2 (NC)	1
Unsafe intersections	46.15	46.15	7.69	2 (NC)	1	1
Bad driver behavior	53.85	38.46	7.69	3 (NC)	1	0
Motorized Traffic	46.15	46.15	7.69	2 (NC)	2	0
Personal safety	23.08	53.85	23.08	1	3	0 (NC)
Destinations are too far	84.62	15.38	0.00	3 (NC)	1	1
Bad weather	23.08	53.85	23.08	2	1	1 (NC)
No Sidewalks	61.54	38.46	0.00	3	1 (NC)	0
Street lighting	15.38	61.54	23.08	1	1 (NC)	2

NC in the table indicates their staff rating of the possible reason for lower walking activity in NC.

4.3.3.2 Hindrances and Possible Reasons for Lower Bicycling Activity

This part of the survey questions focused on an assessment of hindrances and possible reasons for lower bicycling activity (to identify factors that discourage people from bicycling). The reasons that were asked to be rated include no bicycle parking, no bicycle lanes, bicycle lanes in poor condition, unsafe intersections, bad driver behavior, motorized traffic, and unappealing surroundings. The state DOT respondents were asked to rate each as (1) a major reason, (2) a minor reason, or (3) not a reason for lower bicycling activity in their state. Table 4.9 summarizes the responses received from each state DOT respondent regarding the rating of possible reasons for lower bicycling activity. Table 4.10 summarizes the percent of responses received regarding the rating of possible reasons for lower bicycling activity.

Table 4.9 Rating of reasons influencing bicycling activity

State DOT	No bicycle parking	No bicycle lanes	Bicycle lanes in poor condition	Unsafe intersections	Bad driver behavior	Motorized traffic	Unappealing surroundings
Arkansas	2	1	2	2	2	1	3
Connecticut	2	2	2	2	2	2	3
Florida	3	3	3	3	2	2	3
Georgia	2	1	1	2	1	2	3
Louisiana	2	1	3	1	1	1	3
Maine	3	1	2	1	1	1	3
Michigan	3	2	2	1	1	1	3
Missouri	2	1	1	1	1	1	2
Montana	3	2	3	3	2	3	3
North Carolina	2	2	2	1	1	1	3
Tennessee	2	1	2	1	1	1	1
Virginia	2	1	1	1	1	1	2
Wyoming	2	2	3	3	1	2	3

Bad driver behavior, motorized traffic, unsafe intersections, and no bicycle lanes are major hindrances and possible reasons for lower bicycling activity, while no bicycle parking is a minor hindrance and possible reason for lower bicycling activity in six or more states. Bad driver behavior, unsafe intersections, and motorized traffic are major hindrances and possible reasons

for lower bicycling activity in NC and the comparable states. No bicycle parking, no bicycle lanes, and bicycle lanes in poor condition are minor hindrances and possible reasons for low bicycling activity in NC.

Table 4.10 Percent of responses summarizing reasons influencing bicycling activity

Reason	All (% of responses)			Comparable (% of responses)		
	Major reason	Minor reason	Not a reason	Major reason	Minor reason	Not a reason
No bicycle parking	0.00	69.23	30.77	0	3 (NC)	1
No bicycle lanes	53.85	38.46	7.69	3	0 (NC)	1
Bicycle lanes in poor condition	23.08	46.15	30.77	2	1 (NC)	1
Unsafe intersections	53.85	23.08	23.08	2 (NC)	1	1
Bad driver behavior	69.23	30.77	0.00	3 (NC)	1	0
Motorized traffic	61.54	30.77	7.69	2 (NC)	1	1
Unappealing surroundings	7.69	15.38	76.92	1	1	2 (NC)

NC in the table indicates their staff rating of the possible reason for lower bicycling activity in NC.

4.3.3.3 Benefit of Strengthening Strategies/Solutions to Enhance Bicycling and Walking

This section of survey questions focused on the benefit of strengthening strategies/solutions to enhance bicycling and walking directly or indirectly. The elements that were asked to be rated include 1) increase safety for walking, 2) multi-use paths to encourage people to bicycle more, 3) widen shoulders, provide paved bicycle lanes, or shared-use paths, 4) educate users about bicycle and pedestrian road user laws, 5) increase mobility and independence for senior residents, 6) create and enhance opportunities for school-aged children to commute to school, recreation, and activities safely, 7) allow for safer/faster work/school commutes, 8) create tourism destinations, activities, and opportunities, 9) low traffic congestion, 10) increase accessibility, 11) improve community health, and 12) improve environmental health. The state DOT respondents were asked whether they strongly agree, agree, disagree, or strongly disagree with each of these strategies/solutions and associated benefits. Table 4.11 summarizes the responses received from each state DOT respondent.

Seven state DOT respondents strongly agreed that increased safety for walking and provision of multiple paths can improve bicycle/pedestrian activity. Eight state DOT respondents agreed that increasing safer mobility to senior residents can improve bicycle/pedestrian activity, while nine state DOT respondents agreed that creating tourism destinations and widening of road shoulders, providing paved bicycle lanes, or shared-use paths can improve bicycle/pedestrian activity. Ten state DOT respondents agreed that creating opportunities and enhancing safety for school-aged children or related travel can improve bicycle/pedestrian activity. Seven state DOT respondents agreed that provision of safer and adequate bicycle/pedestrian facilities can improve community and environmental health. All the comparable state DOT respondents including NC agreed that increased safety for walking, increased accessibility, increased mobility, safer/faster/work/school routes, usage of multiple paths, increased community and environmental health, and tourism destinations to enhance bicycle/pedestrian activity. NC, Georgia, and Virginia DOT respondents agreed that low congestion and educating the public about bicycle/pedestrian laws may improve bicycle/pedestrian activity.

Table 4.11 Rating of strengthening strategies/solutions to enhance bicycling and walking directly or indirectly

Strategy / solution	Strongly agree	Agree	Disagree
Increase safety for walking	Arkansas	Florida	
	Connecticut	Louisiana	
	Georgia	Missouri	
	Maine	Montana	
	Michigan	North Carolina	
	Tennessee	Virginia	
	Wyoming		
Multi-use paths to encourage people to bicycle more	Connecticut	Arkansas	
	Georgia	Florida	
	Louisiana	Michigan	
	Maine	Missouri	
	North Carolina	Montana	
	Tennessee	Wyoming	
	Virginia		
Widen shoulders, provide paved bicycle lanes, or shared-use paths	Georgia	Arkansas	
	Maine	Connecticut	
	North Carolina	Florida	
	Tennessee	Louisiana	
		Michigan	
		Missouri	
		Montana	
		Virginia	
	Wyoming		
Educate bicycle and pedestrian road user laws	Connecticut	Arkansas	Florida
	Georgia	Louisiana	Tennessee
	Maine	Missouri	
	Michigan	Montana	
		North Carolina	
		Virginia	
		Wyoming	
Increase mobility and independence for senior residents	Georgia	Arkansas	
	Maine	Connecticut	
	Michigan	Florida	
	Tennessee	Louisiana	
	Wyoming	Missouri	
		Montana	
		North Carolina	
		Virginia	
Create and enhance opportunities for school-aged children to commute to school, recreation, and activities safely	Connecticut	Arkansas	
	Michigan	Florida	
	Wyoming	Georgia	
		Louisiana	
		Maine	
		Missouri	
		Montana	
		North Carolina	
		Tennessee	
	Virginia		
Allow for safer/faster work/school commutes	Arkansas	Connecticut	Montana
	Georgia	Florida	
		Louisiana	
		Maine	

Strategy / solution	Strongly agree	Agree	Disagree
		Michigan	
		Missouri	
		North Carolina	
		Tennessee	
		Virginia	
		Wyoming	
Create tourism destinations, activities, and opportunities	Arkansas	Florida	
	Connecticut	Georgia	
	Wyoming	Louisiana	
		Michigan	
		Missouri	
		Montana	
		North Carolina	
		Tennessee	
Low traffic congestion	Virginia	Arkansas	Florida
		Connecticut	Maine
		Georgia	Montana
		Louisiana	Tennessee
		Michigan	Wyoming
		Missouri	
		North Carolina	
Increase accessibility	Georgia	Arkansas	
	Louisiana	Connecticut	
	Maine	Florida	
	North Carolina	Missouri	
	Tennessee	Montana	
	Wyoming	Virginia	
Improve community health	Connecticut	Arkansas	
	Georgia	Florida	
	Louisiana	Maine	
	Michigan	Michigan	
	Tennessee	Missouri	
	Wyoming	Montana	
		North Carolina	
	Virginia		
Improve environmental health	Connecticut	Arkansas	Montana
	Louisiana	Florida	
	Tennessee	Georgia	
	Wyoming	Maine	
		Michigan	
		Missouri	
		North Carolina	
	Virginia		

4.3.4 Policies and Practices

Apart from the single choice/input and multiple-choice questions, the state DOT respondents were requested to provide their input on bicycle/pedestrian policies and best practices in their state. The responses received are summarized in Table 4.12.

Table 4.12 Bicycle/pedestrian policies and best practices

State DOT	Briefly describe your state's bicycle/pedestrian policies?	List your state's top three bicycle/pedestrian policy-related best practices?
Arkansas	1) Typically, only uses transportation alternatives and recreational trails programs funds that get sub-awarded to local sponsors. 2) Bicycle/pedestrian accommodations are included in highway projects in urban areas, but only as part of an existing highway project. 3) On a case-by-case basis, allow local agencies to build bicycle/pedestrian facilities within their right-of-way.	
Connecticut	1) Design to allow the safe movement of all non-motorized traffic in a safe and cohesive way. 2) Ensure the network is up-to-date and compliant with federal requirements including but not limited to ADA compliance.	1) Complete Streets Committee. 2) Full project design reviews for bicycle/pedestrian projects by Policy and Planning staff. 3) Active transportation plan.
Florida	1) Dedicated funding to help accomplish the goals and as intergovernmental support. 2) Priority is planning and technical resources; data-driven decisions.	1) Safety of bicyclists and pedestrians is the key focus. 2) Many policies in place to support the key focus (for example, complete streets policy which is supported in the Florida Design Manual). Additional information can be found at www.AlertTodayFlorida.com/Home/About.
Georgia	1) Vision zero, reduce pedestrian and bicycle fatalities to zero. 2) Bicycle and pedestrian accommodations/safety improvements for all Georgia DOT projects. 3) Recommend following the updated Pedestrian & Streetscape Guide as a best practice multimodal design.	1) 3-foot passing law. 2) Vision zero policy. 3) Statewide ADA implementation plan.
Louisiana	1) Complete streets policy requiring bicycle and pedestrian accommodations within the context in all projects. 2) Make exceptions when needed. 3) Do not maintain any sidewalks and rather requires agreements with local agencies.	1) Accessible pedestrian signals at locations where pedestrian signals are warranted. 2) Complete streets policy considers accommodations on all projects. 3) Local agencies' plans are considered and coordination with local agencies is done on all non-preservation/spot projects.
Maine	1) Existing complete streets policy, currently being updated. 2) Updated ADA compliance policy. 3) Traffic movement permit process updated to include more multi-modal components. 4) Light capital paving policy includes striping guidelines developed in cooperation with statewide bicycle/pedestrian advocacy group. 5) Bicycle and pedestrian facilities considered local interest items are included within larger road projects that can be implemented with no or a limited local cost share.	1) Cost-share policy. 2) ADA accommodations incorporated within all projects. 3) Bicycle/pedestrian needs to be considered within all TMPs.
Michigan	1) Many different policies ranging from a statewide DOT complete streets policy and a DOT context-sensitive solutions policy to technical documents related to signing, crosswalks, pavement markings and pedestrian overpasses.	1) NACTO as a supplement for ideas and innovation in coordination with AASHTO and the MUTCD. 2) Complete streets policy. 3) Context-sensitive solutions policy.
Missouri	1) Working on ADA Transition Plan (by 2027). 2) For every project, consider bicycle/pedestrian improvements and incorporate them, as necessary.	1) ADA upgrades to a complete transition plan. 2) Combining projects into one contract to get the best return on investment. 3) Design-build projects related to ADA improvements.
Montana	1) Pedestrian & Bicycle Plan: https://www.mdt.mt.gov/pubinvolve/pedbike/docs/MontanaPedestrianandBicyclePlan_2019.pdf .	1) Context Sensitive Solutions - finding the right fit for the context is key.
North Carolina	1) Complete Streets Policy (2019)	

State DOT	Briefly describe your state's bicycle/pedestrian policies?	List your state's top three bicycle/pedestrian policy-related best practices?
Tennessee	1) Multimodal access grant funds bicycle and pedestrian projects (about \$15M per year). 2) Pedestrian road safety initiative for spot pedestrian improvements in high crash areas. 3) Multimodal design guidelines and access policy allowing them to plan/build bicycle/pedestrian infrastructure where feasible.	
Virginia		1) Major funding sources are mode neutral: revenue sharing, SMART SCALE, CMAQ, and regional surface transportation program. 2) Local agencies or MPOs can apply for highway projects or bicycle/pedestrian projects with that money so there is no dedicated money towards it. If an MPO wants to allocate all their new construction money to bicyclists/pedestrians, they could.
Wyoming	1) Bicycles are legally classified as vehicles and can be ridden on all public roads. 2) Law requires drivers to maintain a minimum of 3-feet of distance when passing legally operating bicycles. 3) Both bicyclists and pedestrians are required to obey all traffic control devices and motor vehicle operators are required to yield the right-of-way to pedestrians with crosswalks.	1) Education and enforcement of laws and policies related to bicycle and pedestrian facilities. 2) Pedestrian traffic control devices to enhance pedestrian safety. 3) Facility maintenance and upgrades.

Connecticut, Louisiana, Maine, Michigan, and NC DOT's recommend adopting Complete Streets policies. Per this policy, streets are designed to be safe, accessible, and comfortable for all users, including pedestrians, bicyclists, and motorists of all ages (NCDOT, 2019). These streets should have sidewalks, bicycle lanes, transit stops, and appropriate street widths and speeds which are well-coordinated and integrated with the land use. A similar policy supported in the Florida Design Manual is adopted by Florida DOT. Connecticut DOT also uses the services of the Complete Streets Committee and their policy/planning staff in reviewing project designs.

Other planning and design policies/guidelines adopted by state DOTs to accommodate bicycle/pedestrian facilities include Americans with Disabilities Act (ADA) compliance policy or implementation plan (Georgia, Connecticut, Maine, and Missouri DOTs), multimodal design guidelines such as Pedestrian & Streetscape Guide (Georgia and Tennessee DOTs), traffic movement permit process (Maine DOT), light capital paving policy with striping guidelines developed in cooperation with bicycle/pedestrian advocacy group (Maine DOT), context-sensitive solutions policy (Michigan and Montana DOTs), and access policy (Tennessee DOT).

The Florida DOT's policy is to focus on dedicated funding, intergovernmental collaborations, and data-driven decision-making to prioritize and implement projects such as "Alert Today Alive Tomorrow." The Georgia DOT has a vision zero policy. Its goal is to reduce pedestrian bicycle fatalities to zero. With this goal, Georgia DOT and Wyoming DOT implemented 3-foot passing law (vehicles must give three feet when passing bicyclists). According to the National Conference of State Legislatures (NCSL, 2020), NC has a 2-foot passing requirement for motorists and allows passing in a no-pass zone if a motorist leaves 4-feet of clearance. All the comparable states' have a 3-foot passing requirement for motorists while Pennsylvania has a 4-

feet passing requirement for motorists. Five states require a motorist to completely change lanes when passing a bicyclist on a road with more than one lane in the travel direction, while South Dakota has a 3-foot passing requirement on roads with posted speed limits less than or equal to 35 mph and a minimum of 6-feet on roads with posted speed limits greater than 35 mph. New Hampshire has a 3-foot passing requirement when the passing vehicle is traveling at 30 mph or less and one extra foot of clearance for every 10 mph over 30 mph (for example, 4-foot clearance at 40 mph, 5-foot clearance at 50 mph, etc.) (New Hampshire Bike/Ped, 2015).

The Georgia DOT emphasizes and requires bicycle/pedestrian accommodations and safety improvements in all their funded projects. Bicycle/pedestrian accommodations are included as part of an existing highway project by the Arkansas DOT. On a case by case basis, they allow local agencies to build bicycle/pedestrian facilities within their right-of-way.

The NCDOT uses the TAP, surface transportation program, congestion mitigation and air quality (CMAQ), and highway safety improvement program for funding bicycle and pedestrian transportation projects (NCDOT, 2020). The Arkansas DOT uses the TAP and recreational trails program funds to support local agencies and implement bicycle/pedestrian projects. Maine adopts a cost-share policy and allows local agencies to include bicycle/pedestrian facilities within larger road projects for implementation with no or limited local cost-share. The Tennessee DOT funds bicycle and pedestrian projects through multimodal access grants. On the other hand, Virginia DOT’s major funding sources are mode neutral. They include revenue sharing, SMART SCALE, CMAQ, and regional surface transportation programs. The Florida DOT uses TAP, HSIP, and National Highway Traffic Safety Administration (NHTSA)’s 402 and 405(H) funds to implementation bicycle and transportation projects.

4.3.5 Successfully Executed Bicycle/Pedestrian Projects

As a part of the survey, the state DOT respondents were requested to list their three successfully executed bicycle/pedestrian projects in urban areas, suburban areas, and rural areas. The responses received are summarized in Table 4.13. Most of these projects are aimed at the connectivity, accessibility, and safety of bicyclists and pedestrians. Trails and paved roads/shoulders are commonly implemented in rural areas, while road safety audits, road diets, safe routes to schools, sidewalks, bicycle lanes, bridges, and greenways/trails are commonly implemented in urban areas.

Table 4.13 Successfully executed bicycle/pedestrian projects

State DOT	List your state's top three successfully executed bicycle/pedestrian projects in an urban area?	List your state's top three successfully executed bicycle/pedestrian projects in a suburban area?	List your state's top three successfully executed bicycle/pedestrian projects in a rural area?
Arkansas	1) Razorback Regional Greenway in Northwest Arkansas. 2) Hot Springs Creek Greenway in Hot Springs. 3) River Trail in Little Rock.		

State DOT	List your state's top three successfully executed bicycle/pedestrian projects in an urban area?	List your state's top three successfully executed bicycle/pedestrian projects in a suburban area?	List your state's top three successfully executed bicycle/pedestrian projects in a rural area?
Connecticut	1) Community Connectivity Grant Program. 2) Road Safety Audits 3. Safe Routes to School.	1) Work closely with local agencies and support with prioritization and project selection.	1) Trail Gap Program. 2) Community Connectivity Program. 3) Rails to Trails Program.
Florida	1) Bicycle tracks in Tampa and Orlando. 2) Provide necessary support to local agencies.	1) Fletcher Avenue project in a suburban lower socioeconomic area, Tampa, FL. More about this project at https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/fdot-bdv25-977-29-rpt.pdf?sfvrsn=f6c85b27_2 https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/d7rrfbev-aluation1.pdf?sfvrsn=d715f19b_2.	1) Project implemented in a rural coastal area (Destin, FL) to improve pedestrian safety. More about this project at https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/fdot-bdv25-977-43-rpt.pdf?sfvrsn=b3b0ec71_2.
Georgia			
Louisiana	1) Transportation alternatives program funds to initiate the Bike-Share program in Baton Rouge. 2) Reconfigure roadway to reduce lanes and provide bicycle lanes. 2) Installing protected bicycle lanes on major routes.	1) Closing the urban gap between South Portland and Scarborough along the Eastern Trail Construction of the Brunswick Androscoggin River Trail Construction of the Kennebec River Rail Trail.	1) Lighting for pedestrian safety. 2) Requiring berm/sidewalks at all roundabouts regardless of existing sidewalks. 3) Requiring 4' shoulders at a minimum on all new/reconstruction projects.
Maine	1) Route 1 Bridge over Main St. in Yarmouth Development and extension of the Bangor/Brewer River Walks along the Penobscot River. 2) Development of the Auburn River Walk.	1) Kalispell Alternate Route.	1) Development of the Lisbon Rail Trail Development and construction of the Mountain Division Trail. 2) Development of and signage for the US Bike Route 1 from Kittery to Calais Maine.
Michigan	1) Partnering with the City of Detroit to do a reconfiguration of the road lanes to include separated bicycle lanes. 2) Coordinate with the City of Grand Rapids regarding a redesign of a road (Division Street) to include bicycle lanes, subsequently, MDOT turned over jurisdiction of the road to the City of Grand Rapids allowing them to convert the standard bicycle lanes to separated bicycle lanes. 3) Use the Planning and Environmental Linkages (PEL) process to study transportation needs in the cities of Kalamazoo and Traverse City ultimately resulting in plans or concrete actions addressing the bicyclists'/pedestrian' needs of citizens in these communities.	1) Funding master plans for these areas. 2) Installing sidewalks via the Safe Routes to Public Places Program.	1) Sign and designate nearly 1,000 miles of U.S. Bicycle Routes. 2) The construction of more than 3,000 miles of paved shoulder 4' or greater. 3) Partnerships with local county road commissions on the development of shared-use pathways in many rural areas across the state.
Missouri	1) Bicycle/pedestrian bridge over the Missouri River in Jefferson City		1) Not a Montana DOT project, but done through the

State DOT	List your state's top three successfully executed bicycle/pedestrian projects in an urban area?	List your state's top three successfully executed bicycle/pedestrian projects in a suburban area?	List your state's top three successfully executed bicycle/pedestrian projects in a rural area?
	connecting downtown to the Katy Trail. 2) Using the bicycle trailer and educating students about safe bicycling practices. 3) The City of Columbia received a federal earmark in 2005 to implement \$30 million of bicycle/pedestrian improvements throughout the area.		Department of Natural Resources, is the Missouri M-K-T (Katy) Trail system that goes from Kansas City to St. Louis. 2) Designated US Bike Routes 66 and 76 going through southern Missouri.
Montana	1) Van Buren Interchange. 2) Higgins Ave Bridge. 3) Madison St Bridge.	1) City of Evanston - Aspen Elementary School Safe Routes for non-drivers. 2) City of Douglas - Richards St to Robin Ln Multi-use Path. 3) City of Cheyenne - Saddle Ridge Greenway Connector.	1) All projects that include shoulder widening.
North Carolina			
Tennessee		1) Road Safety Audits. 2) Community Connectivity Grant Program. 3) Safe Routes to School	
Virginia	1) Wilson Bridge Path.	1) Fairfax County - 30 miles of bicycle lanes a year in repaving alone (https://www.virginiadot.org/programs/resources/bike/BPAC_170717_FCDOTResurfacingFlexibilityBikePed.pdf). (Virginia DOT)	1) Virginia Capital Trail.
Wyoming	1) City of Casper - Midwest Avenue separated bicycle lane construction (in progress). 2) Town of Jackson - Scott Ln/Maple Wy bicycle/pedestrian/ADA Improvements (in progress). 3) Town of Jackson - Hwy 191/189 multi-use path and bicycle lanes.		1) Lincoln County - Hwy 233 multi-use trail. 2) Town of Big Piney - Piney Drive bicycle path. 3) Town of Alpine - Grays River Rd pathway (in progress).

4.3.6 Funding and Opportunities

As a part of the survey, the state DOT respondents were requested to indicate how successful they have been in procuring funding from federal agencies for accommodating bicyclists and pedestrians. The responses received are summarized in Table 4.14. While the Louisiana, NC, and Tennessee DOTs were somewhat successful, the Arkansas, Connecticut, Georgia, and Michigan DOTs were moderately successful in procuring funding from the United States Department of Transportation (USDOT) for accommodating bicyclists and pedestrians. Florida, Missouri, Montana, Virginia, and Wyoming DOTs have been very successful in procuring funding from USDOT for accommodating bicyclists and pedestrians.

Dedicated funding for bicycle/pedestrian accommodations is seen as an opportunity by all state DOTs that responded to the survey. Planning/technical resources are seen as an opportunity by the Arkansas, Connecticut, Florida, Louisiana, Michigan, Missouri, Tennessee, and Virginia DOTs, while public-private partnerships are seen as an opportunity by the Connecticut, Georgia,

Montana, and Wyoming DOTs. Intergovernmental support is seen as an opportunity by the Florida, Georgia, Maine, Montana, and Tennessee DOTs, while political/local support is seen as an opportunity by the Arkansas, Maine, Michigan, Missouri, NC, Virginia, and Wyoming DOTs.

Table 4.14 Funding, opportunities, and priority

State DOT	Dedicated Funding	Intergovernmental Support	Planning/Technical Resources	Political/Local Support	Public-Private Partnerships
Arkansas	✓		✓	✓	
Connecticut	✓		✓		✓
Florida	✓	✓	✓		
Georgia	✓	✓			✓
Louisiana	✓	✓	✓		
Maine	✓	✓		✓	
Michigan	✓		✓	✓	
Missouri	✓		✓	✓	
Montana	✓	✓			✓
North Carolina	✓			✓	
Tennessee	✓	✓	✓		
Virginia	✓		✓	✓	
Wyoming	✓			✓	✓

4.4 Discussion

This section summarizes key findings and recommendations based on the state DOT survey.

Priority

- Bike-ability and walkability are high priorities across all state DOT respondents regardless of population density, land use, state DOT budget, organization setup, or other criteria.
- Safety, accessibility, and multi-use paths followed by community health are top priorities for the state DOT respondents.
- Shoulders, bicycle lanes, or shared-use paths are a priority for NC and two other comparable state DOT respondents.
- Most of the state DOT respondents opined that Class 1 bicycle routes are preferred by bicyclists in their state.

Hindrances/barriers

- Destinations are too far, no sidewalks, and bad driver behaviors are hindrances and major reasons for low pedestrian activity.
- Bad driver behavior, motorized traffic, unsafe intersections, and no bicycle lanes are hindrances and major reasons for low bicycling activity.

Opportunities – financial, policies, and practices

- NCDOT’s bicycle/pedestrian operating budget (for independent projects as well as those that are part of highway projects) is lower than the bicycle/pedestrian operating budget

of other state DOT's. Increasing the funds allocated for independent bicycle/pedestrian projects and as those that are part of highway projects by four to five times will contribute to active transportation.

- Dedicated funding is a concern and seen as an opportunity by all the state DOT respondents. This is followed by planning/technical resources and political/local support. Setting aside and having dedicated funding for integrated mobility, multimodal needs, and safety of bicyclists and pedestrians will improve related activity levels.
- Most state DOT respondents have indicated that they had applied for and been moderately or fully successful in receiving federal grant funding, while the NCDOT had been somewhat successful in receiving federal grant funding. Exploring opportunities to procure federal funding (often through the state) for planning, construction, and maintenance of bicycle and pedestrian facilities in NC will have an indirect and positive influence on active transportation.
- In addition to planning, maintenance, and implementation, the NCDOT should allocate funds for bicycle/pedestrian infrastructure support as well as for education, awareness, or outreach activities.
- Partnering with local agencies, leveraging available research/educational/technical expertise, and making data-driven decisions will have a catalytic effect and positive influence on bicycling and walking in NC.
- Respondents from other state DOTs indicated that they emphasize and use ADA compliance policy, access policy, context-sensitive design solutions, and multimodal design guidelines in addition to the Complete Streets policy and WalkBikeNC (NCDOT, 2013). Recommending local agencies to adopt/implement these policies and increasing the familiarity that rural agencies have with these policies will have a positive influence on active transportation.
- Trails and paved roads/shoulders in rural areas and road safety audits, road diets, safe routes to schools, sidewalks, bicycle lanes, bridges, and greenways/trails in urban areas are best practices for active transportation.

Chapter 5. Recommendations and Conclusions

The research team held a series of meetings to discuss best practices derived from all three components of the report: scoping study and literature review, local official survey, and the information gathered from the state DOTs (including comparable state DOTs). Below are the best practices identified and recommended for implementation by NCDOT.

1) Invest in matching funds for federal grants and build administrative capacity with municipal government to leverage more federal funding since local officials see walking and bicycling as a priority for their communities.

Allocate four to five times more funding to be on par with most comparable states.

Set dedicated funding (similar to Tennessee's multimodal access grant) aside for bicycle/pedestrian projects.

In addition to TAP, Surface Transportation Program, CMAQ, and HSIP, explore NHTSA's 402 and 405(H) funds, National Cooperative Highway Research Program (NCHRP), and other federal grants for planning, designing, and building bicycle/pedestrian facilities.

2) Leverage local government and regional support for active transportation that creates economic development opportunities.

States have increased urban, suburban, and rural economic development via bicycle and pedestrian connectivity projects that incorporate public lands, greenway connectors, rail trail, and river front projects.

Tourism, which is steadily rising as a portion of the state's economy, is also an opportunity. Investing in bicycling and walking projects associated with tourism would likely see a return on their investment.

As we have concluded this report, the worldwide pandemic has stimulated the demand for bicycling and walking in lieu of public transportation. This needs to be accounted for in planning and implementation.

3) Support the installation of infrastructure designed specifically for bicycling and walking. Infrastructure that is designated for these means of transportation stimulates more walking and bicycling.

As an example, trails and paved roads/shoulders in rural areas and road safety audits, road diets, safe routes to schools, sidewalks, bicycle lanes, bicycle/pedestrian overpasses, and greenways/trails in urban areas are best practices for active transportation.

In addition to planning, maintenance, and implementation, the NCDOT should allocate funds for bicycle/pedestrian infrastructure support as well as for education, awareness, or outreach activities.

4) Encourage the development of infrastructure that supports all modes, ages, and abilities by taking advantage of more multimodal, ADA, and context sensitive policies. Continue emphasizing Complete Streets policy.

Leveraging available research/educational/technical expertise, providing training to make data-driven decisions, and expanding public-private partnerships will have a catalytic effect on bicycling/walking.

5) Capitalize on local priorities for bicycle and pedestrian safety.

Communities of all density types perceive that bicycling is dangerous, and that dangerous conditions hinder individuals from using active transportation. Safety continues to be a top priority in improving bicycling and walking.

Safety, accessibility, and multi-use paths are top priorities for the state DOT respondents.

Adopt data-driven decision-making for allocation of resources (based on activity and safety level).

In addition to infrastructure improvements, a 4-foot (3-foot minimum) passing requirement for motorists and consideration for a higher passing requirement on higher speed roads is a best practice to enhance safety and encourage active transportation.

Investigating and adopting a statewide education, law enforcement, and safety awareness program to achieve Vision Zero goals and reduce roadway fatalities and crashes.

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Appendix A: NC Local Officials Survey Questions

- 1) Which of the following best describes the organization you primary represent?**
 - a. City/Town Government
 - b. County Government
 - c. Council of Governments (COG)
 - d. Metropolitan Planning Organization (MPO)
 - e. Rural Planning Organization (RPO)
 - f. Other

- 2) Which of the following best describes your role for the primary organization you represent?**
 - a. Executive Director
 - b. Elected Official
 - c. Department Director
 - d. Manager/Administrator
 - e. Planner-transportation
 - f. Planner-other
 - g. Town Clerk
 - h. Other

- 3) For classification purposes only, what is the zip code for your organization?**

- 4) Which of the following best describes the population of the geographic area that your organization serves?**
 - a. Population under 1,000
 - b. 1,000-4,999
 - c. 5,000- 9,999
 - d. 10,000- 49,999
 - e. 50,000- 249,999
 - f. Over 250,000

- 5) Which of the following best describes the FY 2018-2019 operating budget for your organization?**
 - a. Less than \$5 million
 - b. \$5 million-\$25 million
 - c. \$26 million- \$75 million
 - d. \$76 million- \$200 million
 - e. \$200 million- \$500 million
 - f. Over \$500 million

- 6) Did your last annual budget include funding for any of the following? (check all that apply)**

- a. Bike/pedestrian planning, maintenance, or implementation
- b. Bike/pedestrian infrastructure (sidewalks, crosswalks, bike racks, etc.)
- c. Bike/pedestrian education, awareness, or outreach
- d. Unsure/don't know

7) Which constitutes the LARGEST land area type in the geographic area that your organization serves?

- a. Public/Government owned
- b. Commercial
- c. Agricultural
- d. Industrial
- e. Residential

8) Which constitutes the SECOND largest land area type in the geographic area your organization serves?

- a. Commercial
- b. Residential
- c. Agricultural
- d. Industrial
- e. Public/Government owned

9) How would you describe the overall economic conditions of the geographic area that you serve over the past five years?

- a. Declining
- b. Stable
- c. Growing

10) Based on your professional expertise it is safe to walk in the location you serve.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly Agree

11) Walkability is a priority for the community you serve.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

12) Based on your professional expertise it is safe to ride a bicycle in the location you serve.

- a. Strongly disagree
- b. Disagree
- c. Agree

- d. Strongly agree

13) Bicycle transportation is a priority for the community you serve.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

14) Thinking about the community you serve, which of the following hinders people from walking? (Select top three)

- a. Distance
- b. Terrain
- c. Lack of sidewalks/infrastructure
- d. Lack of proper lighting
- e. Personal safety concerns
- f. Lack of crosswalks
- g. Lack of other safety measures
- h. Lack of community interest
- i. Other

15) Thinking about the community you serve, which of the following hinders people from biking? (Select top three)

- a. Distance
- b. Terrain
- c. Lack of bike lanes/infrastructure
- d. Lack of proper lighting
- e. Personal safety concerns
- f. Lack of other safety measures
- g. Lack of education on roadway user laws
- h. Lack of community interest
- i. Other

16) Please indicate the extent to which you agree or disagree that the following statement would INCREASE biking or walking in the area you serve.

	Strongly disagree	Disagree	Agree	Strongly agree
Widen road shoulders, provide paved bike lanes, or shared-use paths				

1. Placing bicycle trip-end facilities within the community/geographic location (i.e. bike racks, lockers, etc.)

2. Placing more walking infrastructure within the geographic location (crosswalks, sidewalks, walk signs, etc.)

3. Greater education of bicycle and pedestrian roadway user laws

4. Better maintenance of shoulders free of debris and cracks

5. Improved connectivity of bike lanes, sidewalks, etc.

6. Improved street lighting

7. Improved coordination between nearby communities

8. Inclusion of bike and sidewalk elements in local comprehensive plans and transportation plans.

17) Please indicate the extent to which you agree or disagree that the statements below are OBSTACLES to improving bicycle and pedestrian conditions for the area you serve.

	Strongly disagree	Disagree	Agree	Strongly agree
1. Lack of dedicated local funding				
2. Lack of access to grant funding				
3. Lack of community support				
4. Intergovernmental support				
5. Lack of planning/technical resources				
6. Planning staff limitations				
7. Right-of-way restrictions				
8. Opposition to reducing usable lanes for motorized vehicles				

18) Which of the following are priorities for the organization you serve in regard to improving bicycle and pedestrian conditions? (Check all that apply)

- a. Safer conditions for pedestrian and bicyclists
- b. Less roadway congestion
- c. Improved community health
- d. Improved environmental health
- e. Improved access to the local economy
- f. Creating tourism destinations, activities, and opportunities

- g. Increasing the number of bike/pedestrian commutes
- h. Creating and enhancing opportunities for school-aged children to commute to school, recreation, and activities safely
- i. Improved mobility and independence for senior residents

19) Has your organization accessed state grant funding for local bicycle or pedestrian projects?

- a. No: Unsuccessful
- b. Yes: Successful
- c. NA: Have not applied

20) Has your organization accessed federal grant funding for local bicycle or pedestrian projects?

- a. No: Unsuccessful
- b. Yes: Successful
- c. NA: Have not applied

21) Do any of the following factors make access to state and federal grant funding difficult for your organization? (check all that apply)

- a. Required matching grant funds
- b. Administrative capacity
- c. Presence/absence of design guidelines
- d. Political/local support
- e. Other

22) Would any of the following factors increase the likelihood of applying for state and federal grant funds for your organization? (check all that apply)

- a. More information sessions
- b. Assist staff with technical support
- c. Clearer design guidelines
- d. Better data to support the positive impacts of bicycle/pedestrian infrastructure
- e. Other

23) Are you familiar with the NCDOT WalkBikeNC program?

- a. Yes
- b. No

24) Are you familiar with the NCDOT Complete Streets program?

- a. Yes
- b. No

25) Do you identify as:

- a. Male
- b. Female

- c. Other
- d. Prefer not to say

26) What is the highest level of education you have completed?

- a. High school or less
- b. Associate degree/some college
- c. Bachelor's degree
- d. Post-graduate degree

27) Do you have any of the following professional certifications? (check all that apply)

- a. American Institute of Certified Planners (AICP)
- b. Institute of Transportation Engineers (ITE)
- c. Professional Engineer (PE)

28) Which of the following most accurately describes your race or ethnicity?

- a. Caucasian/white
- b. African American/black
- c. Latino or Hispanic
- d. Asian/Pacific Islander
- e. Native American
- f. Mixed race
- g. Other

29) Which of the following best describes your age range?

- a. Under 24
- b. 25-34
- c. 35-44
- d. 45-54
- e. 55-64
- f. 65 or over

30) Which of the following best describes your political ideology?

- a. Conservative
- b. Moderate
- c. Liberal
- d. Prefer not to say

31) Approximately how many years have you worked in your current position?

32) Finally, do you have any comments about bike/ped policy in your community that you think would be useful to this project?

Appendix B: NC Local Officials Survey Results Demographic Profile

Provides context about the demographics, educational obtainment, professional certification and experience level of the 298 local government officials and professionals that completed the individual demographic survey questions (Survey Questions 25 through 31).

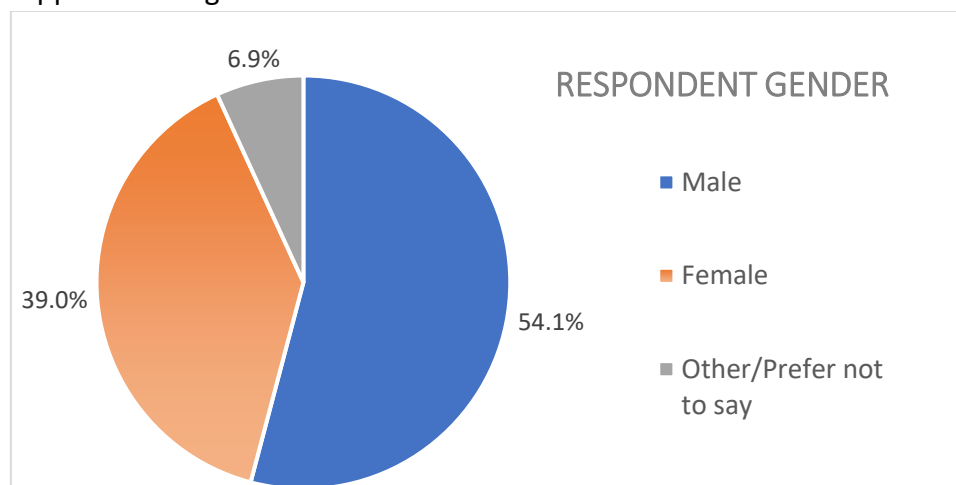
Over half of the respondents are male (54.1%) and 39.0% are female, with the most common age bracket of 45-54 (31.0%) and the second most common being 35-44 (27.2%). Most respondents are Caucasian/white (87.1%), 7.0% are African American/black, 1.7% replied that they are mixed race, and 4.2% of respondents selected another race. For respondent educational attainment, 42.9% had a postgraduate degree, 36.1% had a bachelor's degree, 18.4 had an associate degree or some college, and 2.7% had a high school diploma or less.

In regard to respondents with professional certifications, 44 respondents were AICP (American Institute of Certified Planners) certified, 5 were PE (professional engineer) certified, 2 had both the AICP and the ITE (Institute of Transportation Engineers) certifications, and 1 had both the ITE and the PE certifications. Lastly, the average years of experience was 9.7 years, with the overall range of experience at their current organization is between one year or less and fifty-one years.

Gender: Do you identify as: (q.25)⁸

- Male, Female, Other, Prefer not to say

Appendix A: Figure 1.

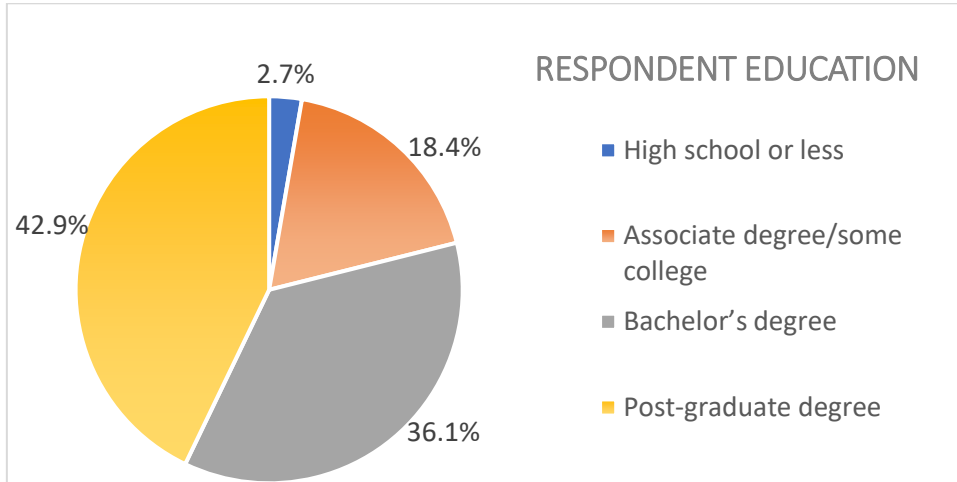


What is the highest level of education you have completed? (q.26)

⁸ Note in the survey the respondent answer choices Other and Prefer not to say were two different answer choices but were combined for the graphic.

- High School or less, Associates degree/some college, Bachelor’s degree, Post-graduate degree

Appendix A: Figure 2.



Do you have any of the following professional certifications? (q. 27)

- (Check all that apply) American Institute of Certified Planners (AICP), Institute of Transportation Engineers (ITE), Professional Engineer (PE)

Appendix A: Figure 3.

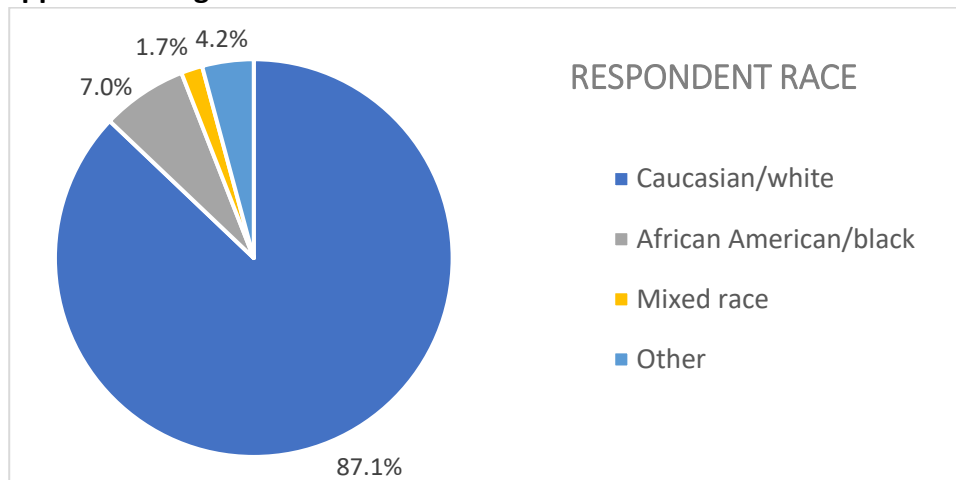


Which of the following most accurately describes your race or ethnicity? (q.28)⁹.

⁹ Note that Latino or Hispanic, Asian/Pacific Islander, and Native American were combined with other for the graphic.

- Caucasian/white, African American/black, Latino or Hispanic, Asian/Pacific Islander, Native America, Mixed Race, Other

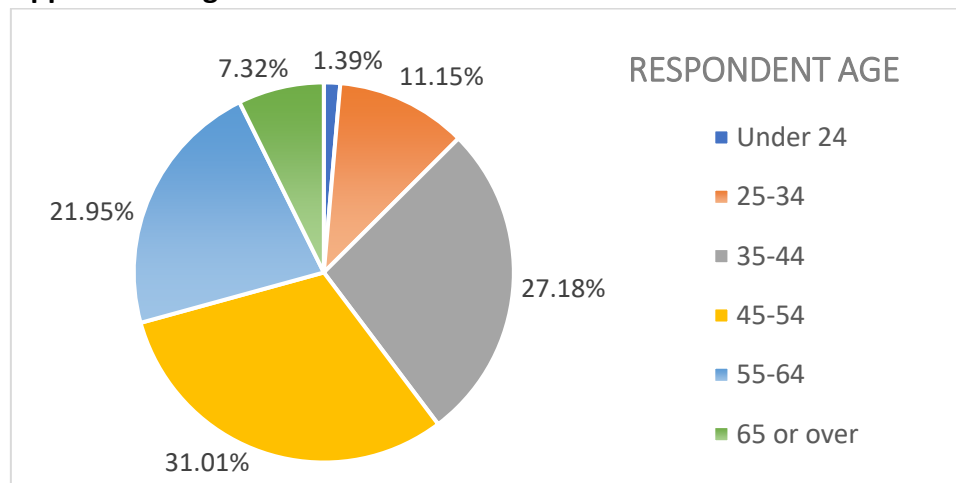
Appendix A: Figure 4.



Which of the following best describes your age range? (q.29)

- Under 24, 25-34, 35-44, 45-54, 55-64

Appendix A: Figure 5.

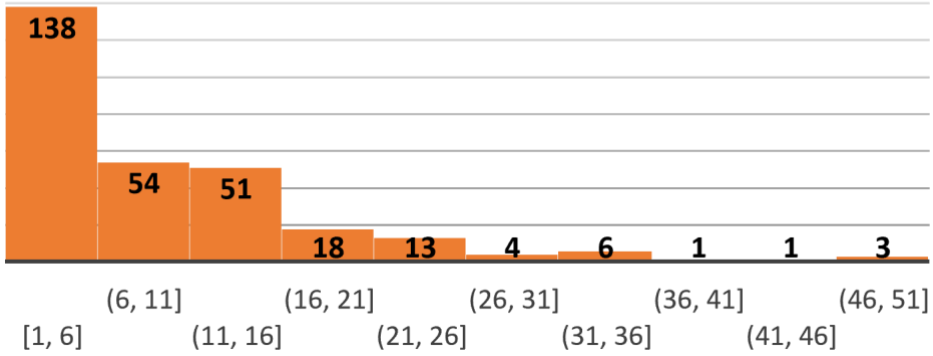


Approximately how many years have you worked in your current position? (q.31)

- Open ended

Appendix A: Figure 6.

Years Of Service At Current Position



Appendix C: NC Local Officials Active Transportation Policy Perspectives (Q. 32 open-ended responses)

Finally, do you have any comments about bike/ped policy in your community that you think would be useful to this project? (q.32)

- Open ended

Contextualization (53 respondents)

1. I currently work in a "bedroom community". There are few people who actually live and work in the town. Bicycling will not likely ever be a commuting option in the near future; however, there are several people in town who like to walk. We have 7 miles of narrow sidewalks that were put in the 70's and never have been maintained. It has been a struggle to maintain these due to ADA compliance and other factors. Really, I mostly need technical assistance!
2. On question 5 your range does not go low enough. My organization gets less than \$150,000 per year for transportation planning of all modes!
3. The City of Hickory realized the huge positive economic impact that bike/ped facilities create and have moved forward with several multi-use trail projects in the past couple of years.
4. We were one of the "Fit Communities" when that program was in place. As the town continues to grow, we have more local residents and visitors that are interested in walking and biking in our area due to our green ways and parks.
5. From my limited time in local county government, it seems as though there are large barriers to bike/pedestrian infrastructure in the county setting (particularly when compared to the municipal setting). Since we do not maintain streets/sidewalks, and instead, rely on municipalities to take care of their roads and sidewalks within the town/city and NCDOT to take care of those outside of incorporated areas, the opportunity for counties to build and maintain bike/pedestrian infrastructure is very difficult, especially when not coupled in development of new areas (since retrofitting low-density areas is largely cost prohibitive). The cost match element is tough, especially with lower tax base as compared to municipal counterparts, but there are also large swaths of the county for whom bike/pedestrian connectivity--particularly separated uses like greenways and sidewalks--is not the most pressing issue (and not just because of economic feasibility) and is not welcomed on private property (that will never be condemned for a public trail). Without eliminating the

local cost-match component of the equation (beyond the politics), the price of putting in bike lanes, walking paths or new sidewalks is just not something that we can afford with the existing paradigm.

6. We have applied for fun to put in sidewalks but did not get any.
7. The Town is currently moving forward on a pedestrian plan. They would be interested in a bike plan only if bicyclists would be able to reach our town via bike friendly roads as that has not historically happened.
8. Our community likes to bike and walk but safety is a major concern. We have no sidewalks or bike paths for the citizens to use. Part of our streets don't have curb and guttering so that serves as another hindrance.
9. The current trend has been to enhance the pedestrian ability to help improve community health and provide safe walking spaces for adults and seniors in areas where it is safe for the kids to play.
10. Our municipalities are really trying to become more bike and pedestrian friendly. However, our counties have not followed suit, including our largest county, who maintains they "do not want to get into that business".
11. In NC county jurisdictions, NCDOT owns the roads. The impact of Complete Streets in rural areas is yet to be known. Few local govts have the ability to pay local match. There are loopholes in the language with regard to "betterment" and density, access to transit, etc. While CS is a step in the right direction, I am skeptical that it will do anything to better serve rural state-maintained roads.
12. We are a mountainous county with winding, narrow roads. The only safe road that is not curvy and is somewhat level is 226 from Spruce Pine to Bakersville. It would be awesome to see a bike lane on this road. There is a wonderful walking trail in Spruce Pine and in Bakersville. The one in Bakersville you have a cross walk that is extremely dangerous! People DO NOT slow down and do not realize that pedestrians have the right of way. I cross this walkway when I walk after work and people will actually speed up if they see you about to cross of crossing. This walkway needs extra signage and education. TOTALLY NOT MY COUNTY ... But Yancey county has on old narrow gage RR bed that would be a wonderful bike trail (like Creeper and Tweetsie trails in TN) The old Yancey RR bed going from Burnsville to Micaville would be absolutely awesome!!! Please help them develop this. It runs beside beautiful trout streams. Would be an absolute awesome tourist attraction for both Mitchell and Yancey counties. Both counties need the tourist revenue.

13. Due to lack of planning, bike/ped efforts have been disjointed in the past, using immediately available funding to complete stand-alone projects instead of parts of an overall plan. We are working to change that approach.
14. waste of money when all of our communities have people who don't have anything to eat, or places to stay, etc. you should be more concerned with that than bike lanes.
15. Live in a mostly senior community.
16. The town attempts to use complete streets in future plans, especially for walking. Many residents are hesitant about bicyclists (expensive bikes, etc), not bicycling.
17. Equal Opportunity for Bicyclists, Senior Citizens, Community & Tourist Participation!
18. I am excited to be a part of the Planning Grant that the Town of Cameron was awarded this past year and our Board has currently signed the paperwork which will be submitted this week. We are an antique town that attracts antique businesses from several states. The planning grant gives us the opportunity to plan for sidewalks and safety. We are growing and two businesses have applied for permitting to open with one being an event planning business that will bring people in from throughout the State
19. There is interest to improve sidewalks ... adding more, connecting the existing ones, etc. It will be one of the areas I focus on in my position
20. This community has made walking, bicycling and transit a priority and puts these modes above automobile.
21. In rural locations such as ours it would be nice to have access or better ways to commute throughout town
22. The Town is a small rural town in a tier 1 county. There is a small University in Town, more sidewalks and bike paths would help the Town be more connected to business district, the schools, historical district and the river front.
23. I would love to see bike lanes required, everywhere.
24. Being a partner to the Carolina Thread Trail helps promote the bike/ped initiatives and allows smaller jurisdictions to be part of the regional goals.

25. The vocal support is there, but words don't build infrastructure.
26. We are just now working on a bike ped plan (funded via grant money from DOT's bike/ped program). Implementation of the plan will remain to be seen based on available funding and political will in the future
27. The community in which I serve utilize state highways as the main corridor. These highways are already too narrow for general vehicle purposes. It is hard to establish bike lanes with the topographic restrictions in this community. There are places of opportunity, but funding is an issue.
28. Without a police department our community has problems with speeders in the community.
29. Our county elected officials are unlikely to support a bike/ped project that requires a local match.
30. Our municipality supports multimodal pathways. Terrain plays a large part in slowing down the progress of expansion of those pathways. Dependence on NCDOT to follow through with future plans that will affect expansion of the Town's plans for sidewalks and bike lanes.
31. We are in a very small community with a small budget, so success in dramatically improving walking and bike paths is heavily dependent on the county. Unfortunately, the county's revenue is limited to the point that they cannot help with the projects.
32. Wilson is lacking bike/ped policy on a city and county level. For a start, we need our elected officials to start and keep the momentum of improving our bik/ped abilities community wide.
33. The public is very supportive of trails. This issue crosses generations.
34. pedestrian transportation is a critical element in the transportation network. bicycle transportation is an important element. a lot more people walk than bicycle, and it is important that that be kept in mind in planning for multimodal infrastructure needs.
35. for such a small town with 3 schools in a mile apart. someone could raise a family here and good life. and bicycles and walkways would be such a great access.

36. Having access to these capabilities will help eliminate dangers in the community and add mobility to many different age groups
37. The culture in rural America is ruled by the automobile. Above all, it is a cultural shift that needs to happen before real progress for bikers and walkers can begin. Currently if you are seen walking you are automatically grouped into a lower socioeconomic status.
38. The town has just adopted a comprehensive bicycle and pedestrian master plan. Among plans policy recommendations is to amend the town's development regulations to required sidewalk installation in new subdivisions.
39. We have an elderly population which are unable to bike, but sidewalks are valuable
40. Weldon is a Tier 1 county with limited funds; however, we see the need of providing bike lanes for our children and adults that will offer recreation/ healthy opportunities for a healthier lifestyle.
41. The NCDOT grant program for development of bike and pedestrian plans has been tremendously beneficial, especially for smaller communities who don't have the resources to either complete one in-house or pay full price for a consultant. Ours is coming up on 10 years old and I'm hopeful that we will be applying for grant assistance to update the plan in the next year or two.
42. Great opportunity for communities to work together. There is strong interest and support in our County and several projects are being reviewed for grants and/or submitted by municipalities. Strongly support their initiatives and hope they receive funding.
43. It's hard to bike and ped to desired destinations far away. Creating a cultural shift in society to having everything you need within short distances of your home would create more appetite for funding these sorts of projects.
44. The community would like to take advantage of utilizing a bicycle plan for the purposes of promoting tourism. There are also concerns about safety issues due to the majority of roads not designed to handle bicycle traffic. Local matching dollars are hard to obtain when there are more pressing issues that need to be addressed by the local jurisdiction.
45. I think if the bike lanes were made for bicycles and the area lighting was better it would be an awesome for our area.

46. I biked to work regularly when I lived in downtown Raleigh. It was convenient and encouraged.
47. As I moved further out of the city center, biking became difficult due to distance and was far less recreational and more taxing and time consuming.
48. Town's Comprehensive Plan supports increased connectivity (trails, sidewalks), but some citizens who don't want to invest thwart the efforts. High-income demographic doesn't meet needy-community grant parameters, but Summerfield has a very small budget. Low-density housing also doesn't score well with some biped projects.
49. We wholeheartedly believe in the creation of more pedestrian oriented activities in our area and have adopted plans and studies that mandate it.
50. I appeared before the city council in 1974 to request bike lanes. I bicycle and support sharing of the public right-of-ways.
51. There are bikers in this community, but the roads and sidewalks are in terrible condition and very destructive on any kind of bike. The lack of room for bikes on the highways along with all of the semitrucks deters anyone from becoming a biker, whether for exercise or as a mode of transportation.
52. The success of our greenways system. . . started late, still emerging, and only reaches the central part of our community, but growing. . . moving in the right direction. As is often the case, the strongest support for greenways comes from folks who at one time spoke out against them. About 7 miles now, but 12 years ago only about 1 mile.
53. Live in a rural community, it is hard to get support for bike projects.

Suggestions/Needs (29 respondents)

1. We need enough funding to include these amenities in the many road improvements we are currently doing. There are orange barrels everywhere! This should be something that is easy to add in!

2. I believe bicycles should have to pay an annual DMV registration fee similar to vehicles, especially if motor vehicles are being asked to share the same road. This would create a new revenue stream to help expand bike and pedestrian access.
3. We see growing frustrations with both motorists and bicyclists on roads without widened/paved shoulders or other amenities. While there is often a focus on motorist's behavior, we also have issues with bicyclists not obeying the laws for them. Common courtesies like going single file to allow cars to pass, etc, just make the flashpoints for conflict increase and create safety concerns for all involved. Clarity for both users on the law and protocol would help make co-use better as would increasing facilities that make it easier to both uses.
4. Data on local demand for biking as transportation (not recreation) would be of great help. The expense of building bike lanes and other facilities is not justified for purely recreational purposes. How many people want to bike to work, but don't/can't?
5. We have tremendous support for bicycle and pedestrian improvements in our community. Despite adoption of a comprehensive pedestrian plan and local government commitment to funding and maintenance, we have spent over \$2.5 million in local funds over the past three years on bicycle/pedestrian improvements and not received one penny of matching funding or other assistance from NCDOT. This inequity should change as NCDOT can spread its limited funding further by partnering with local communities willing to contribute financially.
6. Yes, something needs to be done to educate people to respect crossings on State routes. They are so busy texting they do not look up, so I get off the bike and walk on the cross walks which access our trails. We have paid to install flashing beacons and it is still dangerous to cross in three location.
7. When NCDOT roads are built or rehabbed (except resurfacing) protected bike lanes, sidewalks, streetlights, crosswalks, RRFBs should be built into project and funded 100% by NCDOT. Additionally, the continuous center turn lanes should continue to be phased out. They are the number one reason for accidents and fatalities in our municipality.
8. I think NCDOT should not fund any bike/ped projects in a county or municipality that allows parents to drop off/pick up children from schools. Once a local government commits to that, use STIP \$ or SRTS \$ to fund bike/ped improvements to the schools. I don't think NCDOT should fund any bike/ped projects unless local government commits to enough ROW so that sidewalk or bike path has at least 4' separation from roadway. I think NCDOT spending on bike/ped projects should be driven by

quantified existing bike/ped traffic counts and crashes I think the motor fuels tax should be raised by \$1/gallon in addition to implementation of a VMT tax

9. We will be taking steps toward revising our 2030 comprehensive plan soon which includes pedestrian and bicycle routes. We have a local bike club that strongly supports bike routes. We also have a senior organization that supports walkability in our community. We need staff and funds in order to continue to maintain our sidewalk infrastructure and bike lanes. We need additional funding to provide for bike lanes, bike paths, and shared-use paths on all new roads (and renovated roads).
10. Stanly County is a large rural county. I think your target should be the specific cities within the county as they could benefit individually for your ideas. The county government could of course be of support, but I think in our county the specific city governments would generate more interest and response.
11. We are currently working with NC DOT and AECOM on a Comprehensive Pedestrian Plan. Would love some technical assistance on how to put the plan into action once complete in late Spring 2020.
12. More government grants to assist with multi-use pathways.
13. We need help identifying available grants funds and info about deadlines for reoccurring grants. Oftentimes, we learn of grant funding too closely to the deadline and don't have time to pull a competitive application together.
14. Greater need for NCDOT to integrate complete streets at the time of maintenance activities like repaving. Little spending on right of way improvements outside the urban areas, thus the projects many of us created through grant funded Plans never get triggered unless we simply spend 10% local monies on them.
15. There needs to be better education that a large portion of people don't have a license or want to drive.
16. NCDOT should more directly administer projects, even when local match is provided.
17. There should be more focus on areas with latent demand and what barriers (high speed roadway facilities) are in the way of people making more trips by walking or biking. Very little analysis seems to be done when deciding on appropriate strategies and infrastructure in the bike/ped realm.

18. Complete streets will hopefully, provide funding for separated facilities for ped/ bike. Until facilities are barrier separated, we will not see high levels of bike and pedestrian usage.
19. improve funding priorities for small cities (15k or less population) and rural, economically distressed local governments.
20. Make it more understandable and easier to apply for grants. Make funding more available to small towns like ours and help with funding throughout the process instead of having the town pay all of the project up front and then wait to get reimbursed. Many small towns do not have the funding to cover the entire projects. I realize there needs to be checks and balances, so the system does not get abused. Make it more affordable for small towns to not only obtain grants but also to see the project through.
21. Moved from Colorado where I was Manager of three communities for 25 years. NC and NCDOT is about five to ten years behind. Difficulty stems from NCDOT's control of entire system and the State's reliance on state control of the roadway. Local control would allow more buy-in. Greenway systems in Raleigh metro area is good; but the lack of neighboring communities working together to coordinate, prioritize, and way-finding systems lead to inconsistency.
22. More information distributed to the local governments would be helpful. Results of the survey should be disclosed if possible. Outreach to the Council of Governments (COG) and Metropolitan Planning Organizations (MPO) may be beneficial.
23. It is important to think about the different types of bike users. Family with children on bikes are going to need different types of facilities than adult bike commuters. Analysing biking needs, and anticipated users for specific small areas is going to be much more effective than having blanket complete street policies which may only be geared towards commuters.
24. Continue to educate the residents of your community about the master plans for bike/Ped projects and promote the economic opportunities, healthy living, improving quality of life.
25. Funding is needed to address both roadway congestion and multi-model infrastructure.
26. A design for smaller communities.

27. municipal and/ or county lines should not decide a project. Should be based on continuity and benefits
28. NCDOT is woefully behind in bike infrastructure planning and construction compared to other States. Funding is a big issue.
29. NCDOT needs to take a greater lead in improving these amenities, as they are the road owners. Nothing gets done without their approval and they operate at a glacial pace.

Obstacles (13 respondents)

1. I do believe that smaller communities have a disproportionate amount of difficulty utilizing state grants and federal highway funds due to the requirements for administration compliance and the inability to combined PE and Construction Administration.
2. Bike-ped projects are priorities for many Carteret County municipalities. The competition for NCDOT funds is fierce and few projects get funding.
3. Small towns have a difficult time understanding that bike/ped investments generally show a return to the community, especially ones with economies dominated by tourism. That has been a big obstacle to gaining local support.
4. In CAMPO, bike/ped grant funds are very highly sought after, and small municipalities lose out to larger cities with more staff and administrative capacity to use the money for planning and construction.
5. Planning and discussion, looking for right-of-way acquisition has been explored several times. Engineered plan not available (funding), no construction funding available without the planning/right-of-way acquisition.
6. Funding is the biggest issue. We did an updated plan for our community, but honestly, the money would have been better spent installing improvements. to make a large impact, we need more money. also, there is a strong disconnect between NCDOT and regular state maintenance items and bicycle implementation. for example, roads will be re-stripped but NCDOT doesn't follow adopted plan for bicycle improvements so bike lanes or sharrows are not installed as part of their work. we literally do not find out about a restripe project until the work is being done and then it's too late. there are other examples, but this shows what we are up against. NCDOT is a great partner on large projects, but they need to implement

throughout the organization so that when plans are completed and adopted, they are implemented by all levels of NCDOT.

7. We currently have two projects in the STIP that will have sidewalks. One will have bike lanes. We build sidewalk sections every opportunity we see, but budget constraints, terrain, and right-of-way make it difficult.
8. I would love to see our City do more sidewalks projects to be more walkable. Funding is probably the largest obstacle. The City has many infrastructure needs including paving and sidewalks and the amount of Powell Bill money the City receives is not adequate to maintain all the streets the City is responsible for.
9. 2 significant obstacles weren't addressed in this survey: 1. restrictions by state on providing state \$ for ped \$ bike infrastructure within existing revenue streams; 2. restrictions by state on the tools local governments can use to generate revenues for (and private sector provision of) local ped and bike infrastructure. without significant funding or standards for private sector developer provision, all the rest is just tweaking the margins.
10. Reduction in Powell Bill Funds over past several years, limits City's ability to add sidewalk and bike lanes. DOT grants requirements, takes most of funds for planning and design, leaving few dollars for Infrastructure improvements.
11. Small communities that have commercial districts along state-controlled roads are having limited/no success in obtaining crosswalks because of the cost of NCDOT designed crosswalks are not being funded in Division budgets. My community lacks a fund source for the required intersection improvements and cannot install needed crosswalks. One intersection improvement is more than all the Powell Bill money allocated to us. There needs to be state funding specifically for pedestrian projects.
12. We have pretty good planning documents in place for bike/ped infrastructure. Some of our bigger issues now are right of way width in some areas, sections of sidewalk with gaps due to development in different areas, and limited funding due to high traffic volumes and the cost to widen existing roads.
13. NCDOT makes bike/ped projects so expensive that it is almost impossible to engage in the construction of new facilities without State funding. The whole process is so slow and drawn out and pricing becomes so high that it is very difficult to justify spending money on a sidewalk/bike path when there are so many other competing needs.