

ND Moves

active & public transportation plan

NDDOT

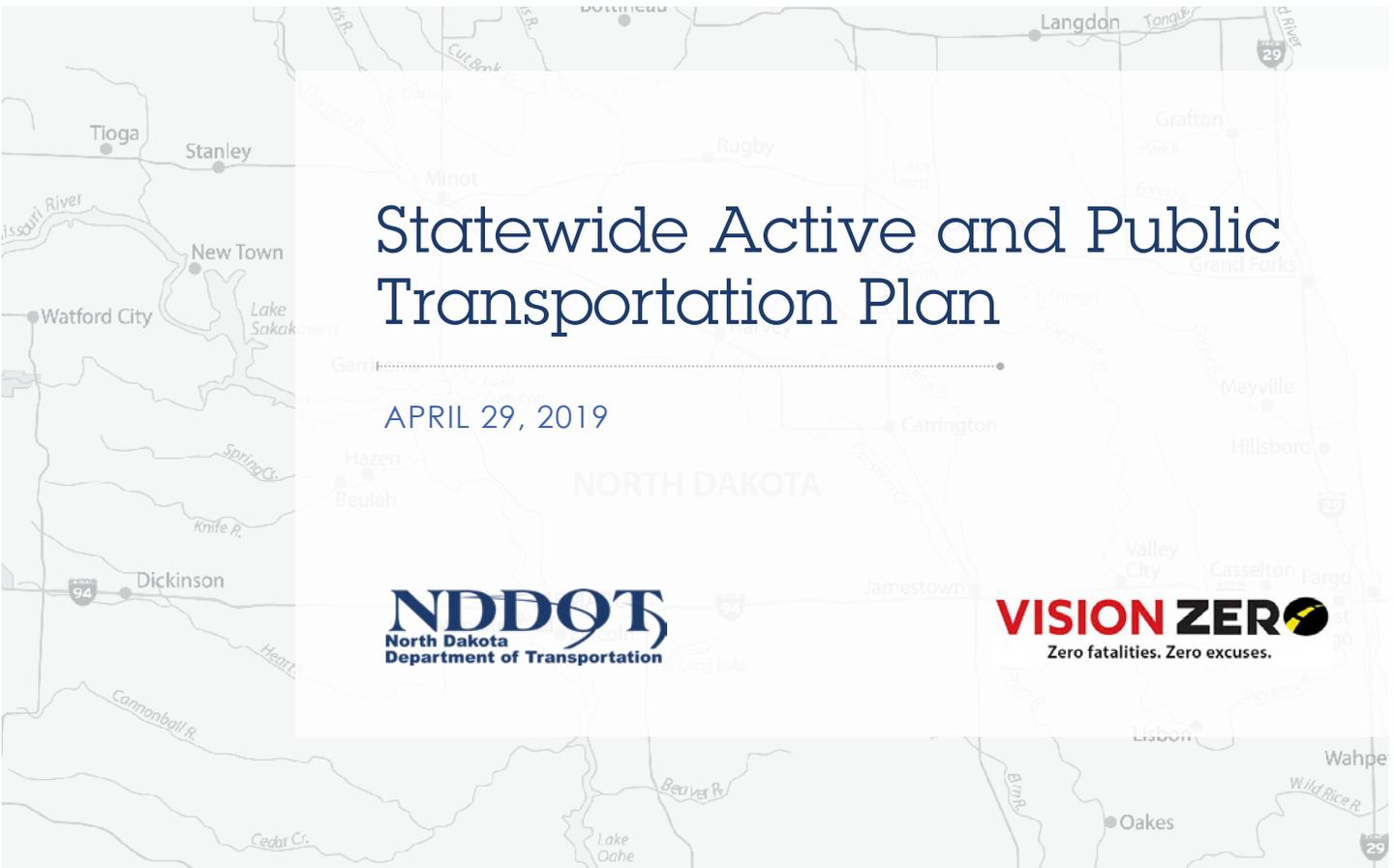


Statewide Active and Public Transportation Plan

APRIL 29, 2019

NDDOT
North Dakota
Department of Transportation

VISION ZERO
Zero fatalities. Zero excuses.





North Dakota Department of Transportation

Thomas K. Sorel
Director

Doug Burgum
Governor

April 25, 2019

Fellow North Dakotans,

The development of this Statewide Active and Public Transportation Plan, or **ND Moves**, was a collaborative effort of the North Dakota Department of Transportation (NDDOT), North Dakota Department of Health, and North Dakota State Parks and Recreation. Public engagement was used to shape every aspect of this plan. We are greatly appreciative of our partners, the public, and **ND Moves** stakeholders for providing valuable input in shaping this document.

Consistent with the NDDOT statewide strategic transportation plan, **TransAction III**, and Vision Zero Initiative, alternative modes of travel are being assessed and included as important elements in our integrated transportation system. **ND Moves** reviews and identifies existing and emerging needs and recommended strategies for the future of biking, walking, and public transit across the state.

NDDOT presently manages approximately 7,400 miles of highway throughout the state and leveraging these assets for additional public benefit is in every North Dakotan's best interest. Public transit, bike, and pedestrian systems provide an opportunity to increase citizen options by integrating additional uses safely into those statewide rights-of-ways. Public benefits, such as health and economic opportunity, are enhanced due to improved transit and trails systems.

Knowing public desires and needs is critical to devising a vision for these modes that is practical, valuable, safe, and flexible. State, regional, and local stakeholders were engaged in this process to help identify needs and opportunities and provide direction on the overall vision for North Dakota's transportation system. Ultimately, **ND Moves** provides recommendations on ways to update or establish guidance on NDDOT design, programming, and policies to help improve walking, biking, and transit systems and services; additionally, it provides support and guidance recommendations to local communities wishing to improve their own systems and services in these modes.

THOMAS K. SOREL, DIRECTOR

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Table of Contents

Executive Summary

Chapter 1: Introduction and Plan Development

What is ND Moves?	1
Vision, Goals, and Objectives	1
Decision-Making Structure	7
Public Engagement	7

Chapter 2: Existing and Projected Conditions

Active Transportation Destinations and Opportunities	14
Health and Demographic Analysis	15
Existing Active Transportation Infrastructure and Systems	22
Existing Public Transit Systems: Public Transit Provider Profiles	25
Safety Analysis	26
Public Transit Demand	33
Public Transit Asset Management	37
Emerging Issues and Trends	42

Chapter 3: Infrastructure and Network Recommendations

Active Transportation Recommendations	53
Active Transportation Facility Considerations	58
Public Transportation Recommendations	80
Winter Maintenance	84

Chapter 4: Strategic Action and Implementation Plan

Planning	86
Funding Programs	89
Statewide Active Transportation Task Force	91
Emerging Trends	92
Barriers	96
Active Transportation Design	98
Connections and Linkages	106
Public Transit Mobility	109
Traffic Laws and Statutes	112
Safety, Education, and Encouragement Programs	120
Active Transportation in Work Zones	129

Chapter 5: Performance Management Plan

Defining Performance Management	131
Vision	131
Performance Management for Active Transportation	132
Performance Management for Public Transportation (Public Transit)	137
Future Performance Measures	140

Appendix items are located in separate Appendix document.

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Executive Summary



Executive Summary

Introduction

What is ND Moves?

The North Dakota Department of Transportation (NDDOT), together with project partners, has developed a Statewide Active and Public Transportation Plan branded as ND Moves. This plan is intended to serve as a guide and a resource for accommodating active and public transportation in the development of state and local transportation systems and programs. It establishes recommendations and an implementation framework to address the identified needs and opportunities of active and public transportation in North Dakota. The plan addresses multiple modes of mobility including public transit, walking, and bicycling—identifying needs and opportunities across the transportation spectrum for all users. This combined assessment of active transportation and public transportation is also intended to leverage existing state assets (namely right-of-way and facilities) and better integrate these two system types to provide greater public benefits.



The plan considers needs and improvements over the next **20 years**. It is intended to be used as a guide by state, regional, and local transportation providers, but also as a resource for local jurisdictions interested in developing or revising active and public transportation plans and facilities. Figure 1 is a summary of Plan elements.



Figure 1 - Summary of Plan Elements

Vision, Goals, and Objectives

To meet the guidance established by Fixing America's Surface Transportation (FAST) Act, ND Moves was developed with a performance management element. The FAST Act established a set of national goals to guide the development of transportation investments and focuses on a performance-based approach to transportation planning. These goals are discussed further in the Chapter 5: Performance Management Plan in the ND Moves Final Plan.

Through existing conditions analyses and public engagement, primary issues were identified for the active and public transportation network in North Dakota. These issues were compared to national planning goals to develop a set of modal specific (active and public transportation) goals.

Goals and Objectives

The resulting active and public transportation goals cover a range of measures, including accessibility, asset management and sustainability, marketing and communications, safety, data and technology, and community health.

Active Transportation Goals

Eight goals (listed in Table 1) were identified for active transportation. For each goal, objectives and performance measures were developed to monitor system performance. For each performance measure, long-term performance goals were identified based on the 20-year horizon of this plan.

Table 1 - Active Transportation Goals

GOAL THEME	GOAL
Mobility and Accessibility	Increase active transportation use in North Dakota
Modal/Funding Priority	Dedicate appropriate funds to promote active transportation infrastructure, education, and encouragement programming
Asset Management and Sustainability	Maintain the state's existing active transportation network and grow these resources to encourage environmental and economic sustainability
Marketing and Communications	Proactively communicate with North Dakota citizens, other public agencies, transportation advocates, and other stakeholders to implement the plan
Modal Integration	Coordinate the growth of active and public transportation networks to enable seamless multimodal travel throughout the state
Safety	Facilitate a system in which all users feel safe
Technology	Leverage transportation technologies to advance active and public transportation
Community Health	Increase the use of active transportation to improve community health outcomes

Vision

The North Dakota DOT will support the safe integration of active and public transportation facilities and services into and connecting to state facilities; offering transportation choices that connect to a variety of geographies and other transportation modes that are accessible to all North Dakotans.

Public Transportation Goals

Six goals (listed in Table 2) were identified for public transportation.

Table 2 - Public Transportation Goals

GOAL THEME	GOAL
Mobility and Accessibility	Improve public transit opportunities within and between communities
Modal/Funding Priority	Maintain or increase the amount of transportation funding dedicated to public transit
Asset Management and Sustainability	Maintain public transit assets in a state of good repair
Marketing and Communications	Increase communications and promote public transit as a viable and important mode of travel
Data Management/ Agency Coordination	Increase communication, collaboration, and coordination within the statewide public transit network
Safety	Improve public transit safety across the state

Public Engagement

Two rounds of public engagement took place between November 2017 and August 2018. The first round included a series of public open houses and an online survey asking participants to identify the biggest barriers to more successful pedestrian, bicycle, and public transit systems in their area. The top three barriers for each system include:



Along with a number of localized issues, stakeholders called for active and public transportation systems to be safe, accessible, and connected.

Round 2 focused on collecting input on the draft State Bike Network. It also served to confirm the vision and goals developed through Round 1 of engagement, and asked users to prioritize goals and share thoughts on the best ways to measure performance of the active transportation and public transit systems.

Demonstration Projects

Demonstration projects were installed on a short-term, trial period in nine North Dakota cities, using communities' designs for bicycle and pedestrian improvements. City staff and partners collected baseline and during-project data, solicited public and stakeholder feedback, and developed summary reports to be used as guides for similar projects in the future.



Bismarck demonstration project

More than 1,500 people took the online survey to provide feedback about the demonstration projects. Survey respondents who reported using active or public transportation felt safer as a result of the projects. Respondents who drive noticed that the installations narrowed the roadway and required people to drive more slowly past the site, consistent with the project's traffic calming goals. Similarly, several projects saw an increase in motorists yielding to pedestrians in crosswalks during the time the projects were installed.

ND Moves demonstration projects have resulted in residents talking about active transportation and telling community decision makers about a desire for more opportunities to walk and bike safely. However, some residents were confused about what the projects might look like should they become more permanently installed. Clarifying these ideas would be important for any future projects conducted by communities, NDDOT, or others.

A lessons learned document was developed to be a continuing resource for NDDOT and other agencies as demonstration projects are deployed in the future.

Existing and Projected Conditions

Existing and projected conditions for North Dakota were analyzed to gain insight on factors influencing and impacting active and public transportation across the state. Considerations included proximity of active transportation destinations to state routes, health and demographics, condition of existing systems, safety, and asset management. Emerging trends were also studied, in addition to projected conditions for the active transportation and public transit systems.

Active Transportation Destinations and Opportunities

The active transportation destinations analysis confirmed the importance of state and federal roadways for accessing education, employment, recreation, and basic services throughout North Dakota. Approximately 95 percent of all jobs in North Dakota are in census blocks within one mile of a state or federal roadway, and 85 percent are within half a mile.

As would be expected, destinations are more concentrated in more populated areas. In rural areas, destinations are sparser but spread evenly throughout the state.

Health

Community health indicators were analyzed at the county level, the smallest geographic level for which health data exists in North Dakota. Four counties have rates above the average on three or more health factors: Sioux, Rolette, Benson and Ransom. Three of those counties overlap with tribal lands, and all four include areas with high concentrations of populations likely to rely on active transportation options. Table 3 below shows a high-level summary of the findings for each community health indicator.

Table 3 - Community Health Indicators Analysis Summary

COMMUNITY HEALTH INDICATOR	HIGH-LEVEL SUMMARY OF FINDINGS
Obesity	High rates of adult obesity in North Dakota (31 percent compared to the national rate of 27.5 percent) are contributing to six of the top ten leading causes of death in the state.
Diabetes	Diabetes has been increasing in North Dakota over the past 10 years and is the seventh leading cause of death in North Dakota. Urban counties overall tend to have lower rates of adult diagnosed diabetes than rural counties.
Heart Disease Mortality	Three counties have heart disease mortality rates significantly above the state average rate of 284 per 100,000 people: McIntosh (641 per 100,000), Griggs (544 per 100,000) and Nelson (526 per 100,000).
High Blood Pressure	The prevalence of high blood pressure in North Dakota is slightly less than the United States, but still effects one in every four North Dakotans. Divide County has the highest blood pressure prevalence rate in the state at 46 percent, nearly double the state average of 24.9 percent.
Frequent Mental Distress	In North Dakota, approximately nine percent of adults report experiencing frequent mental distress. Three counties (Sioux at 16 percent, Rolette at 16 percent, and Benson at 14 percent) report a significantly higher percentage than the state average and all three overlap tribal lands.
Unintentional Injury Mortality	Unintentional injury is the fourth leading cause of death in the state of North Dakota, with the American Indian population experiencing a disproportionate rate of unintentional injury mortality. Motor vehicles and falls are the leading causes.
Pedestrians Killed by Motor Vehicles	North Dakota's pedestrian motor vehicle crash mortality rate is 2.1 per 100,000 (lower than the United States rate of 3.1 per 100,000). Benson, Steele, Sioux, and Adams Counties have the highest rates and a total of 43 people walking in North Dakota were killed by motor vehicles from 2011 to 2015.



Table 3 - Community Health Indicators Analysis Summary (continued)

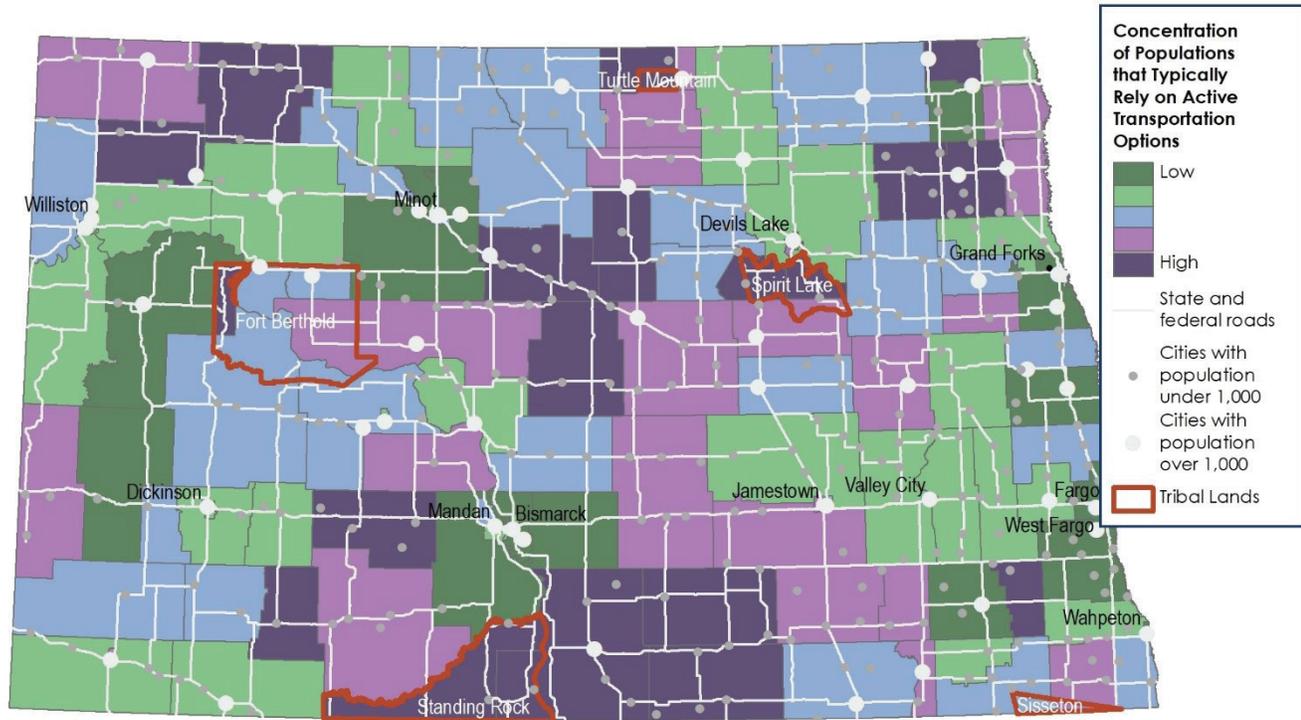
COMMUNITY HEALTH INDICATOR	HIGH-LEVEL SUMMARY OF FINDINGS
Physical Inactivity	In North Dakota, the number of adults who engaged in no physical activity outside of work is slightly higher than the national average. Divide County has the highest level of physical inactivity, whereas Cass County has the lowest.
Commute via Walking or Biking	The rate of walking or biking to work in North Dakota, 4.3 percent, is higher than the national average of 3.4 percent.
Food Access	In North Dakota, 29.4 percent of the population is considered to have low food access, higher than the national rate of 22.4 percent. The highest rates of low food access occur in Billings, Golden Valley, Hettinger, Burke, Kidder, and Nelson Counties.

Demographics

To develop an ND Moves plan that effectively serves all residents of North Dakota, populations that have heightened sensitivity to the presence and quality of active transportation facilities were analyzed. The objective was to determine where there are concentrations of populations likely to use active transportation to meet every day needs. Table 4 below shows a high-level summary of the findings for each demographic studied. Figure 2 - Concentration of Populations that Typically Rely on Active Transportation Options shows the concentrations of populations (largely in rural areas) that typically rely on active transportation options.

Table 4 - Demographics Analysis Summary

DEMOGRAPHIC CHARACTERISTICS	HIGH-LEVEL SUMMARY OF FINDINGS
Older Adults	The statewide mean of people over age 65 is 16 percent. The highest percentage of older adults are found in rural areas of the state as well as pockets of Bismarck, Devils Lake, and Valley City. The lowest concentrations are generally in major cities and tribal lands.
Children	The statewide mean of youth is 22 percent. Youth comprise larger portions of the population in census tracts near North Dakota's major cities, as well as in tribal lands and rural areas in the southwest corner of the state.
Access to a Motor Vehicle	The statewide mean of households without access to a motor vehicle is five percent. These households are largely located within North Dakota's major cities, as well as in tribal lands and rural census tracts scattered throughout the state.
Education	The statewide mean of people without high school diplomas is 10 percent. The highest concentrations of this demographic are found in rural areas of the state, including tribal lands. The lowest concentrations are generally found in and around major cities.
Poverty	The statewide mean of people living under 200 percent of the poverty line is 62 percent. The highest concentrations of this demographic are found in in census tracts that overlap with tribal lands and within Fargo, Grand Forks, Bismarck, Devils Lake, Minot, Jamestown and Valley City.
Disability	77,000 people in North Dakota are living with a disability, or about 10 percent of the population. No clear geographic pattern emerged as people with disabilities are scattered throughout the state.
Language	Populations with limited English proficiency ranges from zero percent of a census tract's population to five percent in North Dakota, with a mean of less than one percent.



ND moves active transportation & transit plan

Figure 2 - Concentration of Populations that Typically Rely on Active Transportation Options

Existing Active Transportation Infrastructure and Systems

A key component of the Urban System Analysis was to ensure a transition between the urban and rural portions of North Dakota for active transportation mobility. With data from each of the 12 urban areas across the state, ND Moves established an understanding of existing and missing active transportation infrastructure adjacent to the State Highway System in urban areas. Through resulting analysis, the project team identified a 101.9 mile gap along the Urban State Highway System in North Dakota. They determined that 45.5 percent of system gaps were related specifically to a bike gap and 54.5 percent were related to a bike + walk gap.

Limited data is available to identify gaps in non-urban incorporated areas (communities with a population less than 5,000) and rural areas. It is a recommendation of this plan to develop a system for obtaining data regarding existing facilities in these areas, and a determination of gaps and needs.

Existing Public Transit Systems

Performance metrics for the 35 urban and rural North Dakota transit providers were evaluated, to determine the existing conditions in each of these (urban and rural) systems. Among the many metrics used in this analysis, three important metrics were used to evaluate the following characteristics:

- **Service performance** was analyzed using revenue hours per capita to provide insight on how much service is provided in time relative to the amount of people living in the service area.
- **Ridership** was analyzed using passengers per revenue hour to provide insight regarding the effectiveness and on how much service is provided in time relative to the number people using the service.
- **Cost-Effectiveness** was analyzed using cost per revenue hour to measure how efficiently the services are being provided in time relative to the cost of the service.

A summary of the results for the metrics above are shown in Table 5. Results for additional metrics are included in Chapter 2 and in the ND Moves Transit Provider Profiles, June 2017.

Table 5 - Summary of Existing Public Transit Systems Analysis

SYSTEM CHARACTERISTICS	METRIC	RESULT
Service – Urban Providers	revenue hours per capita	0.21 to 0.54 hours
Service – Rural Providers	revenue hours per capita	0.02 to 2.73 hours
Ridership – Urban Providers	passengers per revenue hour	6.74 to 23.15 passengers
Ridership – Rural Providers	passengers per revenue hour	0.7 to 6.8 passengers
Cost-Effectiveness – Urban Providers	cost per revenue hour	\$37.77 to \$78.30
Cost-Effectiveness – Rural Providers	cost per revenue hour	\$21.58 to \$114.21

Safety Analysis

Since 2013, crashes involving people walking and bicycling have increased by 19 percent in North Dakota. It is unclear if this is due to an increase in pedestrian and bicycle traffic and, thus, a greater exposure to crashes. The analysis of high-risk roadways suggests that crashes are much more likely to occur in urban areas. Within urban areas, crashes are most likely to occur at intersections and on arterial roadways. While there are fewer crashes in rural areas, they tend to result in greater injury and are most likely to occur at non-intersection locations across the network.

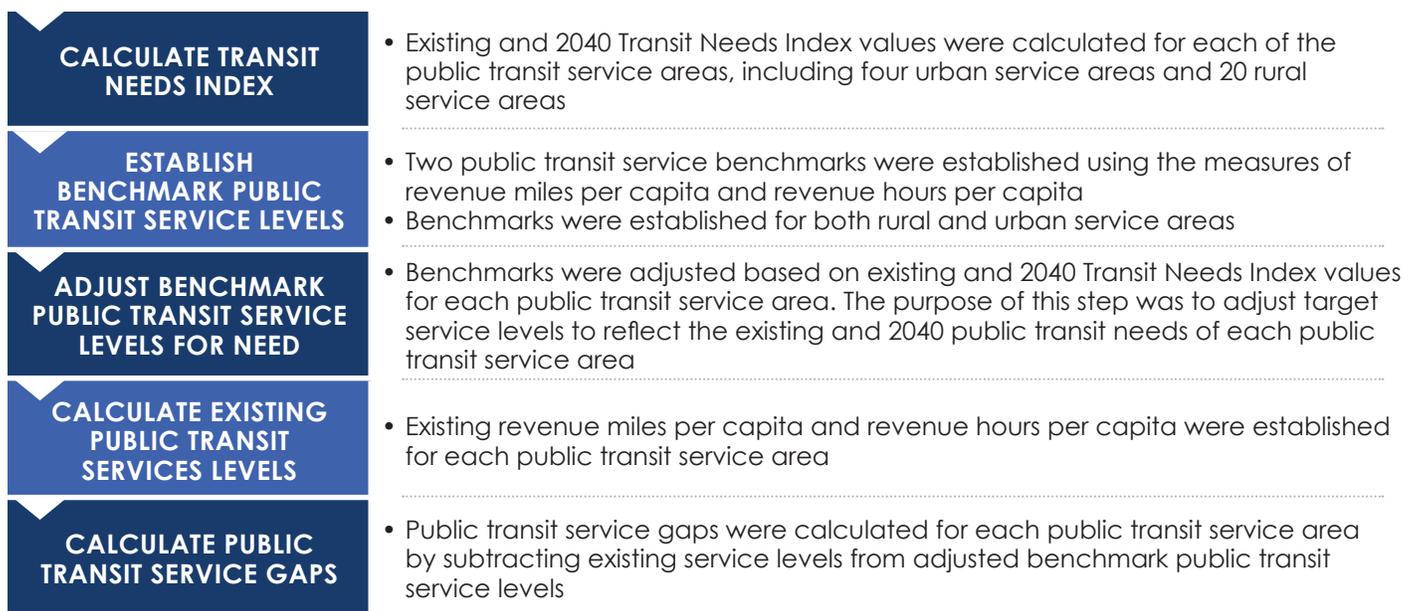
Analyses revealed that youth (age 17 or younger) are more likely to be involved in bicycle and pedestrian crashes, accounting for 32 percent of bicycling crashes and 23 percent of walking crashes. The majority of

crashes have “no clear factor” reported, but failure to yield was the most commonly reported contributing factor.

Public Transit Demand

Population growth and demographic trends are impacting the need for public transportation service across North Dakota. A five-factor Transit Needs Index was developed to identify the existing and projected need for public transit services and evaluate whether existing public transit service levels will address identified need now and in the year 2040. This process is summarized in Figure 3 - Public Transit Service Gap Calculation. Additional information on this methodology can be found in the ND Moves Existing and Projected Demand Memo.

Figure 3 - Public Transit Service Gap Calculation





The largest variations in need from the present to 2040 are visible in counties expected to experience large population changes.

Six (33%) rural public transit service areas show public transit service gaps both in the present and in 2040 when measured against both service level benchmarks. Three urban public transit service areas (Grand Forks, Bismarck, and Minot) have service gaps both in the present and 2040 when measured against either benchmark. Fargo-West Fargo (MATBUS), shows service gaps now and in 2040 when measured against the benchmark of vehicle revenue miles per capita but presents no existing or 2040 gaps when measured against the benchmark of vehicle revenue hours per capita. Summary maps for urban and rural transit service gaps are shown in Figure 4-Figure 7.

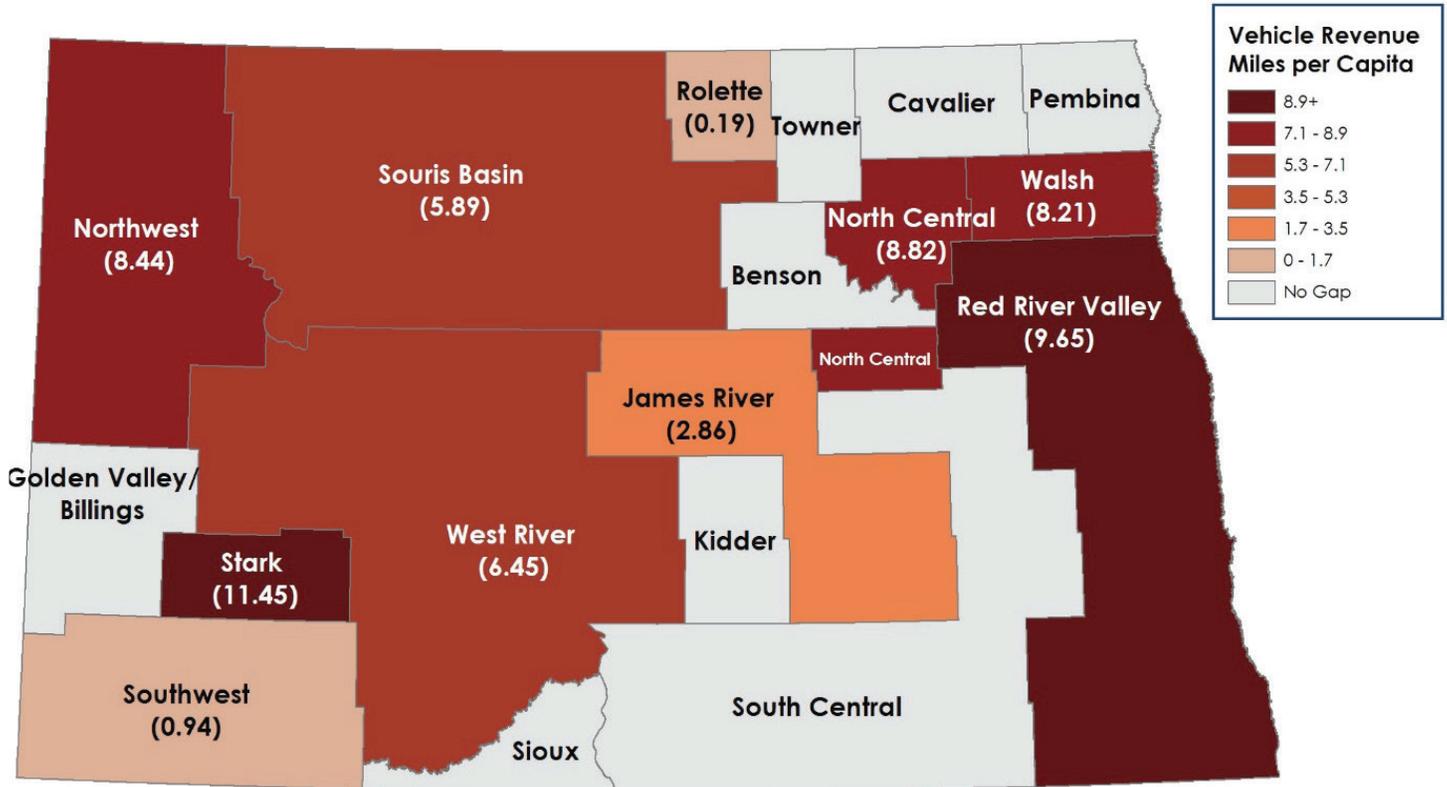


Figure 4 - 2040 Public Transit Service Gaps by Rural Transit Service Area (Vehicle Revenue Miles per Capita)

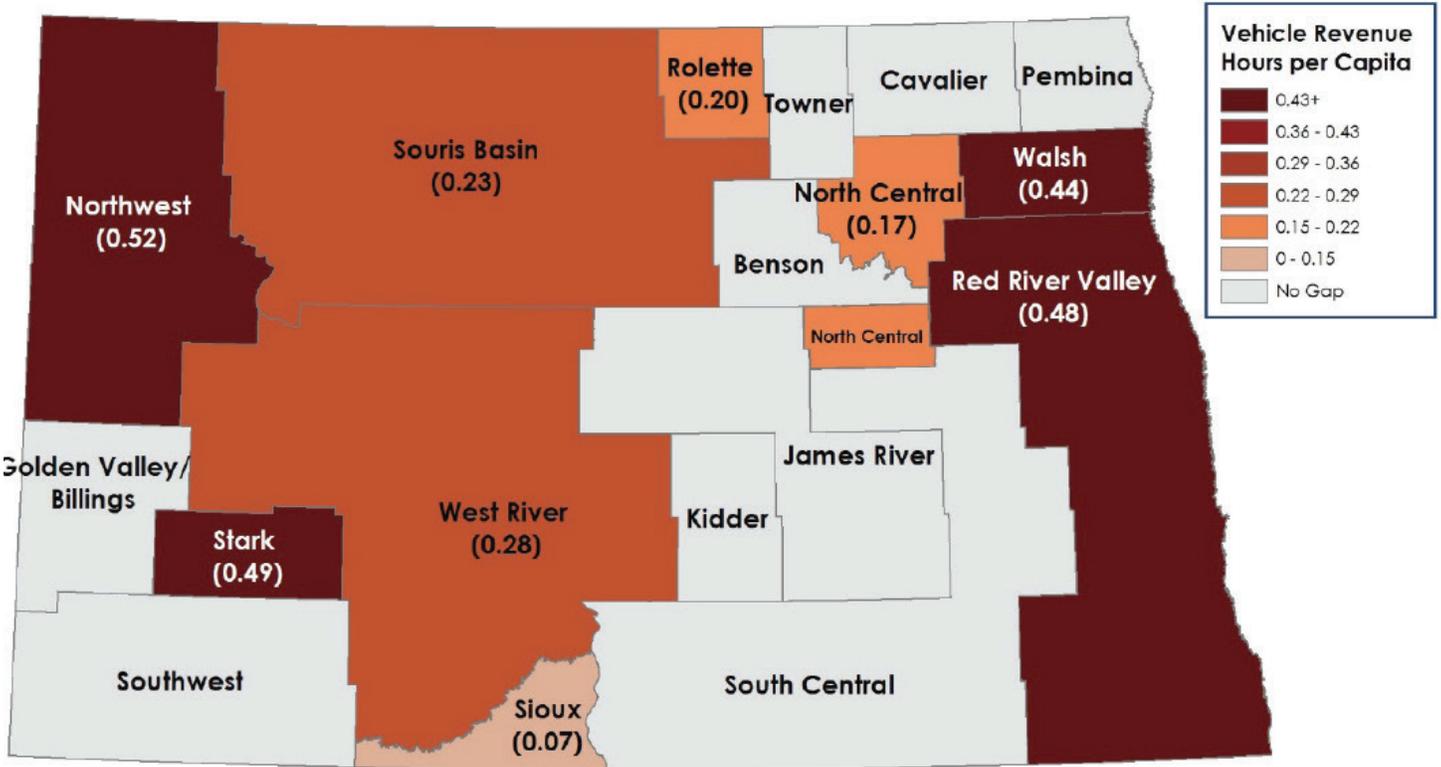


Figure 5- 2040 Public Transit Service Gaps by Rural Public Transit Service Area (Revenue Hours per Capita)

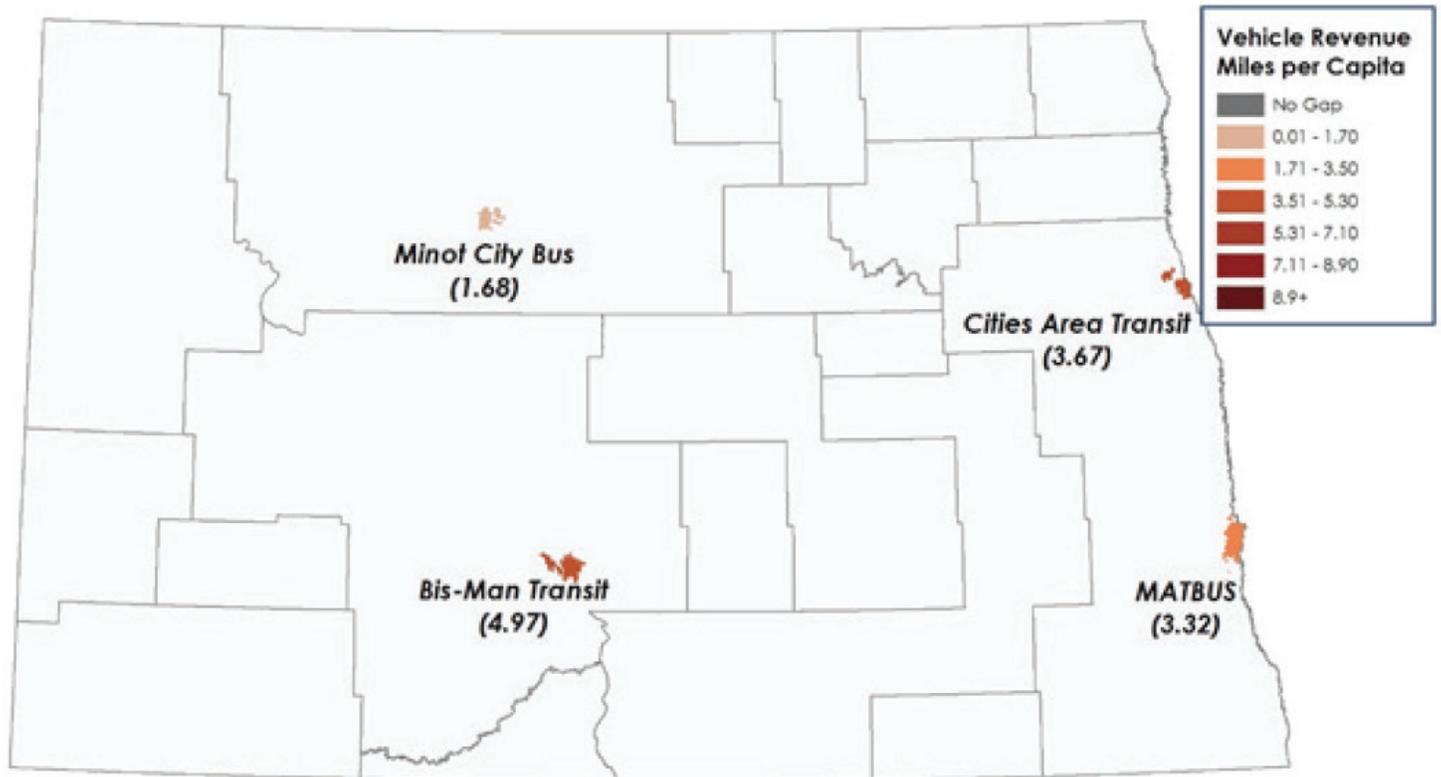


Figure 6 - 2040 Public Transit Service Gaps by Urban Public Transit Service Area (Vehicle Revenue Miles per Capita)

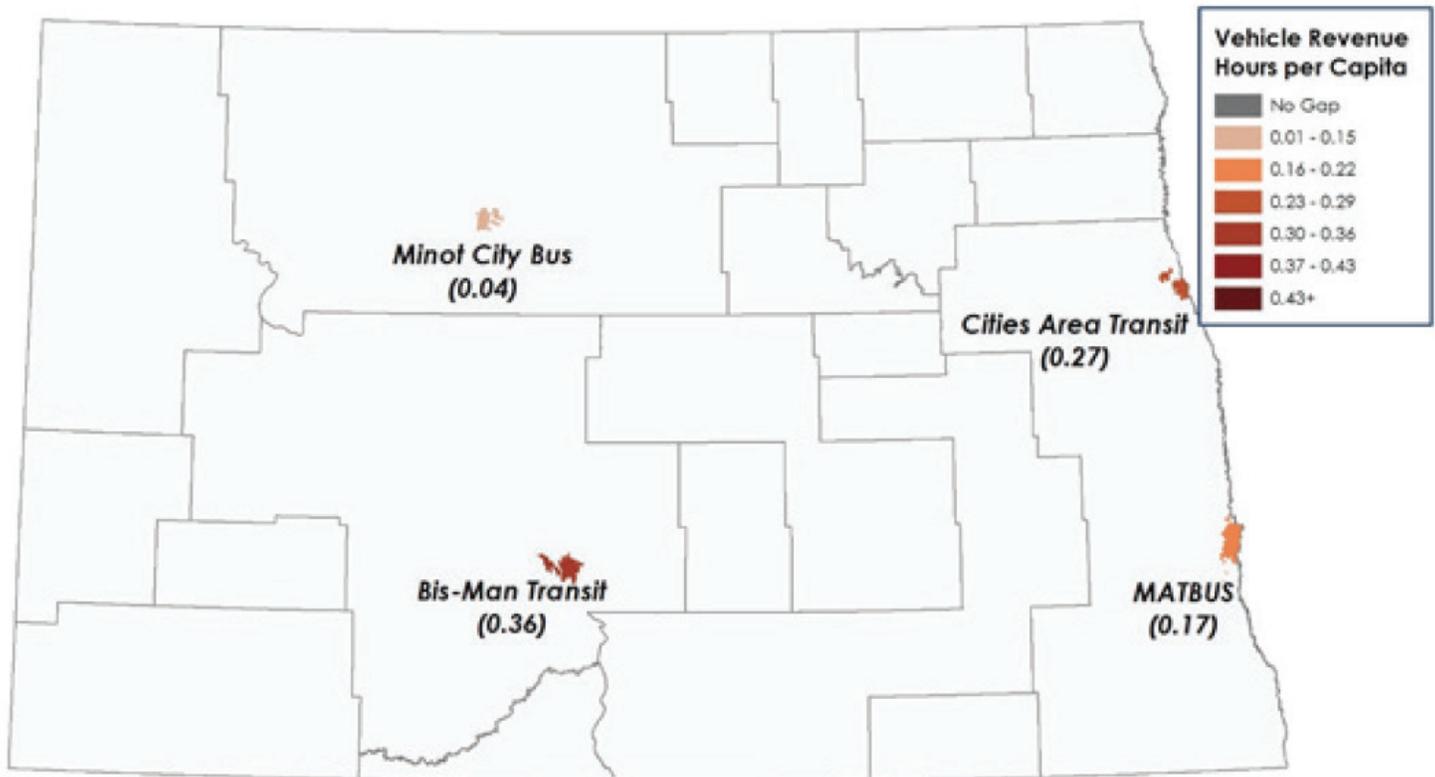


Figure 7 - 2040 Public Transit Service Gaps by Urban Public Transit Service Area (Vehicle Revenue Hours per Capita)

Public Transit Asset Management

Maintaining and replacing public transit assets is essential to the successful operations and financial sustainability of public transit in North Dakota. The existing replacement value of North Dakota's public transit system capital assets is \$62.6 million. Vehicles make up the largest single asset type at \$51.3 million in value. Facilities make up about 18 percent of asset value and systems is less than one percent of total assets. Based on the provided inventory, 33 percent of the total value of North Dakota's public transit system is in backlog, or beyond their useful life and ready to be replaced. This is largely reflective of all public transit facility assets (buildings and storage yards) being in a state of good repair, but 39 percent of vehicle assets being beyond their useful life. The current total asset value in backlog is \$20.0 million

The ND Moves Final Plan details funding and backlog management scenarios to address this gap. The models used consider a range of funding scenarios. Key takeaways from this analysis are presented, including the finding that maintaining current and/or constant funding levels will result in an increasing backlog over time.

Emerging Issues and Trends

Dynamics within North Dakota's largest communities are shifting quickly and differ greatly from conditions in smaller less urban areas of the state. In responding to these changes, it is recommended that NDDOT focus on these areas:

- **Renewed demand for walkable, revitalized communities with strong downtowns and main streets** – supported by the State of North Dakota's Main Street Initiative, with pillars of smart, efficient infrastructure and healthy, vibrant communities
- **Changing demographics and geographies** – growth in urban area population, aging rural communities, and the recent energy boom in western North Dakota all present unique challenges and opportunities
- **Shared mobility and technology** – Bikeshare, carshare and ridesharing, ridesourcing, shuttles and micro-transit, commercial delivery options, and public transit are all becoming possible on a range of technology platforms
- **Movement toward automating vehicles** – private sector technology is evolving, and governments are beginning to grapple with the safety, legal, ethical, environmental, social, and other impacts that may arise

Infrastructure and Network Recommendations

Active Transportation Recommendations

The Active and Public Transportation Facility Planning Best Practices and Recommendations document was developed as part of ND Moves to provide a reference for best practices in active and public transportation facility planning in North Dakota. This document provides an expanded range of facility design guidance and tools related to active and public transportation facilities and highlights key considerations when planning for active and public transportation infrastructure.

ND Moves also provides a framework for determining whether and which type of active transportation infrastructure is appropriate in a given context. This process (Figure 8) starts with matrices to evaluate need based on the development context (urban, suburban/commercial, rural) and the type of facility to consider. It also provides considerations for whether a facility should be installed on one or both sides of a roadway.



Figure 8 - Steps in the Facility Consideration Process

State Bike Network

As part of ND Moves, NDDOT has developed a planned State Bike Network (Figure 9). The State Bike Network is a 20-year vision to connect key transportation and recreation destinations across the state. It is primarily meant for long-distance bicycle trips, with the understanding that some network segments may be used for shorter connections between urban areas and destinations outside of built up areas, such as State Parks. As a result, the State Bike Network will primarily follow rural roadways. The identification of the State Bike Network is designed to address needs of users currently traveling longer distance across North Dakota on bike. It is not meant for casual or inexperienced bicyclists.

There are three tiers of bike corridors identified in the State Bike Network. The purpose of this categorization is to ensure that NDDOT's limited resources are used most effectively to improve bicycling conditions where improvements are needed the most. Tier designations also indicate the level of infrastructure that is desired. For example, Tier 1 and 2 bikeways follow low traffic roadways that are generally suitable for confident bicyclists. The primary design recommendation for rural Tier 1 and 2 bikeways is signage. The primary design recommendation for rural Tier 3 bikeways is a shoulder bikeway. The intent of these facilities is to provide a comfortable bicycling experience for recreational bicyclists as speeds and volumes increase.

Recommendations to Address Active Transportation Network Gaps

Total urban system need is estimated at approximately \$31,900,000 to address the range of identified gaps. While the cost to address these gaps is high, most of these costs are likely to be accounted for as part of regular ongoing NDDOT and/or LPA investments in the urban state highway system.

For non-urban incorporated areas (communities with a population less than 5,000), there are 261 miles of state highway. Availability of data to identify gaps is limited, but as data continues to be collected, gaps will be identified and quantified.

Active Transportation Safety Countermeasures

ND Moves identifies a variety of countermeasures for pedestrian and/or bicycle-involved collisions. Some countermeasure treatments have the potential to reduce specific types of motor-vehicle crashes, such as left turn or rear end collisions. Treatments include a variety of bike lane types, sidewalks, shared use paths, shoulder designs, high visibility crosswalks and colored pavement treatments, mode-specific signals, and larger lane reconfigurations or roundabouts. In addition to a brief description and application guidance, relative treatment costs are also included. These relative costs are highly variable, as many pedestrian and bicycle treatments can be integrated into routine maintenance or capital projects at minimal costs.

Public Transportation Recommendations

Through the Active and Public Transportation Facility Planning Best Practices and Recommendations document, ND Moves provides best practices for transit facility design. These considerations address adjacent land use, boarding and alighting options, reliable and comprehensive service information, community context, and multimodal connections. In addition, there are best practices relating to roadway design, bus stops, platforms, stations, depots, and transit signal priorities.

Recommendations to Address Public Transportation Network Gaps

An estimate of existing and future system resources to support public transit in North Dakota was developed using both existing and projected needs. Resource needs were based on revenue hours per capita by both urban and rural systems separately. While urban and rural systems individually show a wide variation in service gap, the overall system resource needs were banded together to provide an overall aggregate assessment of system needs for both urban and rural systems (see 3).

Table 6 - Existing and Projected Resources Needed for Public Transportation in North Dakota

STATEWIDE		
Total Statewide Revenue Hour - Service Gap	106,440	332,797
Additional Resources Needed to Address Statewide Gap¹	\$5,546,680	\$17,538,290
Total Resources Needed (Includes Existing Funding)²	\$27,163,440	\$39,155,057

Assumes \$47.00 per revenue hour (Rural) and \$64.00 (Urban) based on state averages from 2016 data from the National Transit Database

Winter Maintenance

Designing and building facilities with winter and seasonal maintenance in mind provides high-quality, comfortable facilities for people walking, biking, and taking public transit year-round. Separated facilities like sidewalks, protected bike lanes, and trails require separate equipment to maintain, but are ultimately easier to maintain to a high standard. Providing adequate buffer space for these facilities is key to year-round use as it provides space to store snow. Facilities placed back of curb or directly on the roadway are difficult to maintain and can become narrow or impassable in winter.

For public transit users and operators, a stop, platform, or station benefits from a small area dedicated to emergency snow storage. Heavy snowfalls may not be adequately cleared immediately, but the public transit

facility shall be made fully operational soon after the weather event (28 CFR §35.133). Additionally, spacing amenities apart from each other on platforms and stations allows for a rotary power brush to clear snow between them.

In addition to design, anti-icing pre-treatment, timely plowing, and clear communication between agencies and with the public are important to efficient and effective snow removal. Establishing a winter prioritization network ensures that the best access is provided to the greatest number of people possible following a heavy storm event. It is important for state and local agencies to understand their maintenance responsibilities, best specified through a maintenance agreement.

¹ Does not include additional funding that will be needed for urban paratransit service.

² Includes existing funding for urban paratransit service but does not include additional funds needed for this service in the future

Strategic Action and Implementation Plan

The Strategic Action and Implementation Plan specifies potential next steps to implement ND Moves by outlining specific plans to address each of the following broad issue areas:

Planning – Expand efforts to improve continuous planning at the statewide, regional/MPO and local level to support active and public transportation, and local decision-making tools.

This includes partnering with other state agencies (North Dakota Indian Affairs Commission, North Dakota Parks and Recreation, North Dakota Department of Health, etc.) to achieve mutual health goals.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Planning category:

- Planning Readiness
- Limited Right-of-Way and Environmental Issues
- Integrate Active Transportation into Corridor Management

Funding Programs – Strengthen and improve funding programs to support active and public transportation across North Dakota.

An action plan (including timeframes and responsible parties) was developed for the following issue within the broader Funding Programs category:

- Programming Practices

Statewide Task Force – Develop a committed statewide advisory committee to support the efforts of NDDOT in implementing ND Moves across the State of North Dakota.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Statewide Task Force category:

- Statewide Active Transportation Task Force Membership
- NDDOT Coordinating Committee

Emerging Trends – Proactively address changing trends in the areas of active and public transportation in North Dakota.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Emerging Trends category:

- Changing Context Around the State System
- Rapidly Changing Technology
- Downtowns and Walkable Areas



Emerging Trend – Downtowns and walkable areas (photo from Fargo, North Dakota)

Barriers – Address barriers to mobility in several contexts across the State of North Dakota.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Barriers category:

- State System as a Transportation Backbone
- Limited Mobility on Urbanizing Corridors
- System Connectivity

Connections and Linkages – Strengthen the coordination between state and local transportation systems and improve access to the state’s natural and cultural resources.

This includes the development of the State Bike Network.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Connections and Linkages category:

- State Bike Network
- Regional Connections
- Cultural and Historic Connections

Public Transit Mobility – Improve public transit-based mobility across the State of North Dakota, through improved intercity and regional bus systems, development of new small urban systems and expansion and preservation of existing systems.

Action plans (including timeframes and responsible parties) were developed for each of the following issues within the broader Public Transit Mobility category:

- Public Transit System Development
- Intercity (or Interregional) Public Transit Connections
- Demonstrating the Value of Public Transit

Safety, Education, and Encouragement Programs

– Continue to improve safety for active and public transportation users in North Dakota through both legal and engineering-based solutions. Enhance existing programming with new safety education and encouragement programs.

In this section, program evaluation and recommendations are provided for:

- Existing Safety Programs
- North Dakota Statewide Education and Encouragement Program
- Improving Safety
- Improving Existing Programs

An action plan (including timeframes and responsible parties) was developed for:

- Role of State DOTs in Education and Encouragement Program Delivery



Grand Forks demonstration project

In addition to the above broad issue areas, the following items are discussed in this chapter:

Active Transportation Design – A review and recommendations for incorporating ND Moves ideas into the processes, policies, and documents NDDOT uses in current design practices are provided in the following areas:

- Design Guidance Review and Recommendations
- Design Guidelines, Investment Strategy, and Design Exceptions

Traffic Laws and Statutes – There are opportunities for the North Dakota Legislature and NDDOT to further define how policies and statutes impact walking and biking

and reevaluate current policies to provide better guidance to roadway users, planners, designers, and law enforcement officials. Considerations are provided for:

- Statute Recommendations
- Policies and Funding Strategies Not Recommended

An action plan (including timeframes and responsible parties) was developed for:

- Funding Considerations

Active Transportation in Work Zones – Considerations for evaluating and maintaining travel for people walking and biking through and around construction areas on state roadways are provided.



Grafton demonstration project

Performance Management Plan

The 2015 Fixing America's Surface Transportation (FAST) Act establishes a set of national goals to guide the development of transportation investments and focuses on performance-based approach to transportation planning. To align the goals and objectives of this plan with the FAST Act, ND Moves was developed with a performance management element which relates this plan's modal specific goal themes to one or more of the seven National Planning Goals established by the FAST Act.



Defining Performance Management

Terminology used to guide the development of the Performance Management Plan includes the following:

- **Goal** — Overall guiding result or outcome related to the active and public transportation system
- **Objective** — Desired action or initiative that is perceived as meeting the intent of the overall goal. Further, the objective is designed to assist in achieving the defined performance level
- **Performance Measure** — Measure used to evaluate system performance
- **System Performance** — Current level of the performance measure
- **Long-Term Performance Goal** — Desired level of the performance measure
- **Consistency Monitoring** — Effort used to monitor, evaluate, and track performance levels

The development of a performance management element of ND Moves related to active and public transportation was based on the following key components:

- Comparison measure and indicator development within other state plans
- Comparison with other system measures from neighboring states
- Relationship with baseline funding levels and existing infrastructure levels

The project goals and associated performance measures and long-term performance goals are based on the 20-year horizon of this plan. Shorter-term goals (or performance targets) are typically developed through separate programming or investment strategies and address a specific programming horizon (typically one to five years). As such, shorter-term performance targets are not included in this plan.

Future Performance Measures

Finally, this plan includes a list of additional performance measures as a recommendation for NDDOT exploration as baseline data is calculated or becomes available. The future performance measures recommended include:

- Percent of proposed State/US Bicycle Route network meeting design and wayfinding signage recommendations
- Revenue miles of regional, interregional, and intercity public transit service
- Percentage of fixed-route buses with automatic passenger counters (urban)
- Percentage of fixed-route buses with automatic vehicle location (urban)
- Percentage of demand response buses with automated data collection device (all systems)
- Percentage of local public transit agencies that have safety and security plans that meet FTA guidance

The complete ND Moves Active and Public Transportation Plan can be found at <http://www.dot.nd.gov/plans/statewide/>



CHAPTER 1:

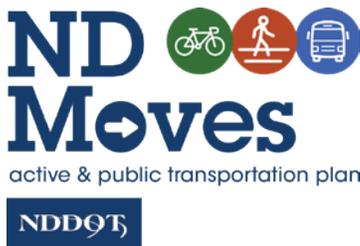
Introduction and Plan Development



CHAPTER 1: Introduction and Plan Development

What is ND Moves?

The North Dakota Department of Transportation (NDDOT), together with project partners, has developed a Statewide Active and Public Transportation Plan branded as ND Moves. This plan is intended to serve as a guide and a resource for accommodating active and public transportation in the development of state and local transportation systems and programs. It establishes recommendations and an implementation framework to address the identified needs and opportunities of active and public transportation in North Dakota. The plan addresses multiple modes of mobility including public transit, walking, and bicycling—identifying needs and opportunities across the transportation spectrum for all users. This combined assessment of active transportation and public transportation is also intended to leverage existing state assets (namely right-of-way and facilities) and better integrate these two system types to provide greater public benefits.



The plan is intended to be used as a guide by state, regional, and local transportation providers. It provides infrastructure and policy recommendations and a framework for implementation, including investment strategies to help guide NDDOT in the allocation of resources. It is also a resource for local jurisdictions interested in developing or revising active and public transportation plans and

facilities. The plan considers needs and improvements over the next 20 years.



Vision, Goals, and Objectives

To meet the guidance established by Fixing America's Surface Transportation (FAST) Act, ND Moves was developed with a performance management element. The FAST Act established a set of national goals to guide the development of transportation investments and focuses on a performance-based approach to transportation planning.

Vision

ND DOT will support the safe integration of active and public transportation facilities and services into and connecting to state facilities, offering transportation choices that connect to a variety of geographies and other transportation modes that are accessible to all North Dakotans.

Goals and Objectives

Active Transportation

The goals for the active transportation element of ND Moves as related to the FAST Act National Planning goals are shown in Table 1.

Table 1: FAST Act and ND Moves Active Transportation Goals

	GOAL THEMES – ND MOVES								
FAST Act National Planning Goals	Mobility/ Accessibility	Modal/ Funding Priority	Asset Management	Sustainability	Marketing & Communications	Modal Integration	Safety	Technology	Community Health
Safety					X		X		
Infrastructure Condition			X						
Congestion Reduction									
System Reliability	X		X		X				
Freight Movement and Economic Vitality					X				X
Environmental Sustainability	X	X		X		X			X
Reduced Project Delivery Delays						X			

The goals and objectives for the active transportation element of ND Moves are shown in Table 2.

Table 2: Active Transportation Goals & Objectives

GOALS	OBJECTIVES
Mobility & Accessibility	
<i>Increase active transportation use in North Dakota</i>	1: Plan, design, construct, manage, and support a comfortable and connected transportation network that accommodates people of all ages and ability levels
	2: Create active transportation connections to the public transportation network and to major destinations throughout all NDDOT districts
	3: Remove the physical barriers to active transportation throughout the state
	4: Implement education and information campaigns to encourage North Dakotans to use active transportation, including information about the health benefits of using active transportation
Modal/Funding Priority	
<i>Dedicate appropriate funds to promote active transportation infrastructure, education, and encouragement programming</i>	1: Facilitate safe and connected active transportation on the state highway system
	2: Pursue equitable investment in active transportation infrastructure and safety education and encouragement programming
	3: Expand data collection and analysis infrastructure throughout the state
	4: Continue investment in education and encouragement programming to encourage safe active transportation
Asset Management & Sustainability	
<i>Maintain the state's existing active transportation network and grow these resources to encourage environmental and economic sustainability</i>	1: Reduce vehicle miles traveled (VMT) through increased active transportation
	2: Regularly monitor plan outcomes through short- and long-term active transportation performance measures
	3: Regularly provide NDDOT staff with training and other resources to stay apprised of best practices for facilitating and promoting active transportation along the state highway system
Marketing & Communications	
<i>Proactively communicate with North Dakota citizens, other public agencies, transportation advocates, and stakeholders to implement the plan</i>	1: Provide meaningful ways for the public to engage with the plan's recommendations and implementation
	2: Increase engagement opportunities for underserved populations across the state
	3: Grow the number of communities recognized as Walk Friendly Communities (WFC) and Bicycle Friendly Communities (BFC)
	4: Use NDDOT online and in-person communication channels to promote advances in active and public transportation infrastructure networks and educational resources

Table 2: Active Transportation Goals & Objectives (Continued)

Modal Integration	
<p><i>Coordinate the growth of active and public transportation networks to enable seamless multimodal travel throughout the state</i></p>	1: Invest in facilities that improve first- and last-mile walk and bike connections to public transit stops and stations across North Dakota
	2: Provide mobility options to underserved populations across the state
	3: Ensure that existing and future public transit vehicles are well-equipped to handle bicycles
Safety	
<p><i>Facilitate a system in which all users feel safe</i></p>	1: Reduce the number of active transportation user-involved crashes across the state
	2: Reduce the number of serious and fatal active transportation-involved crashes across the state
	3: Coordinate the implementation of plan recommendations in conjunction with NDDOT Vision Zero initiatives
	4: Create and utilize design guidelines that ensure high-quality, safe, and comfortable routes for active transportation
Technology	
<p><i>Leverage transportation technologies to advance active and public transportation</i></p>	1: Share information about new transportation technologies with state and local partners
	2: Consider new technologies for data collection
	3: Increase number of active transportation facilities equipped with automatic data collection and real time information
	4: Use technology to promote active and public transportation through websites, mobile apps, and partnerships—providing data to app developers and mapping applications
Community Health	
<p><i>Increase the use of active transportation to improve community health outcomes</i></p>	1: Coordinate with the North Dakota Department of Health to support efforts to reduce the instances of heart disease and diabetes
	2: Partner with the North Dakota Department of Health to collect data and advance active and public transportation to seek better health outcomes for North Dakotans
	3: Support initiatives that encourage active transportation

Public Transportation (Public Transit)

The goals for the public transit element of ND Moves in relation to the FAST Act National Planning goals are shown in Table 3.

Table 3: FAST Act and ND Moves Public Transit Goals

FAST Act National Planning Goals	GOAL THEMES – ND MOVES						
	Mobility & Accessibility	Modal/ Funding Priority	Asset Management	Sustainability	Marketing & Communications	Data Management/ Agency Coordination	Safety
Safety							X
Infrastructure Condition			X			X	X
Congestion Reduction	X	X		X		X	
System Reliability		X				X	
Freight Movement and Economic Vitality		X			X		X
Environmental Sustainability		X		X	X		
Reduced Project Delivery Delays							

The goals and objectives for the public transportation element of ND Moves are shown in Table 4.

Table 4: Public Transit Goals & Objectives

GOALS	OBJECTIVES
Mobility & Accessibility	
<i>Improve public transit opportunities within and between communities</i>	1: Provide convenient public transit opportunities for all populations
	2: Make public transit more time-competitive with automobile travel
	3: Create a passenger-friendly environment
	4: Increase the amount of public transit service provided
	5: Enhance connectivity among local, intercity, and regional public transit services and other modes
	6: Support multimodal connectivity and services, including intercity and regional service
Modal/Funding Priority	
<i>Maintain or increase the amount of transportation funding dedicated to public transit</i>	1: Demonstrate fiscal responsibility in funding decisions
	2: Study the public transit return on investment in North Dakota
	3: Explore additional public transit funding sources

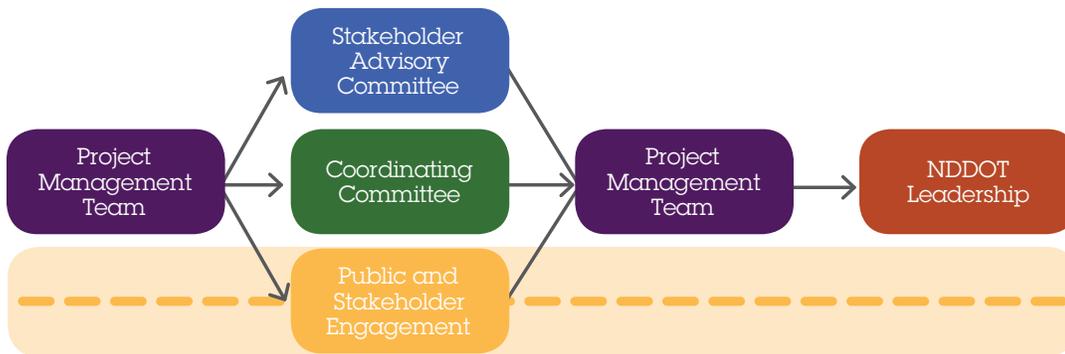
Table 4: Public Transit Goals & Objectives (Continued)

Asset Management & Sustainability	
<i>Maintain public transit assets in a state of good repair</i>	1: Preserve existing infrastructure and protect future infrastructure and right-of-way
	2: Expand public transit services based on a prioritization process
	3: Allocate resources to support preservation and expansion
	4: Identify grant and other funding opportunities to maintain and renew/expand public transit equipment and services
	5: Support energy-efficient vehicles and facilities
Marketing & Communications	
<i>Increase communications and promote public transit as a viable and important mode of travel</i>	1: Support the creation of how-to-ride-videos, photos, and handouts
	2: Support public transit travel training staff and organizations
	3: Allocate resources to fund promotion of public transit and public transit communications staff
	4: Develop materials that illustrate the benefits of public transit for riders and the community
Data Management/Agency Coordination	
<i>Increase communication, collaboration, and coordination within the statewide public transit network</i>	1: Facilitate and leverage key partnerships
	2: Coordinate services to enhance system efficiency
	3: Streamline and standardize the collection of public transit data
Safety	
<i>Improve public transit safety across the state</i>	1: Improve safety on North Dakota's public transit systems
	2: Ensure service providers' safety and security plans meet FTA guidance

Decision-Making Structure

Development of the statewide plan was accomplished by coordination and input from internal NDDOT stakeholders, external stakeholders, and through a meaningful public and stakeholder input process. Decisions made at the committee levels (Coordinating Committee and Stakeholder Advisory Committee) were reviewed and vetted by the Project Management Team.

Figure 1: ND Moves Decision-Making Structure



Coordinating Committee

The Coordinating Committee consisted of NDDOT staff and internal partners, and external partners including Federal Highway Administration (FHWA) and North Dakota Department of Health. This committee acted chiefly to ensure that various internal elements at NDDOT could contribute to the statewide planning process by:

- Developing an overall vision for active and public transportation in North Dakota and the role it plays in the context of the greater state transportation system
- Identifying key stakeholders, project goals, and objectives
- Reviewing existing and forecasted transportation conditions
- Identifying emerging issues and discussing concept strategies
- Reviewing draft strategies and implementation element

Stakeholder Advisory Committee

Key stakeholders throughout North Dakota that have a close working relationship with NDDOT on issues related to public and active transportation were tasked with forming a Stakeholder Advisory Committee (SAC). The SAC met four times during the development of the plan and supported the overall transportation planning process by:

- Reviewing existing conditions
- Identifying emerging issues and discussing concept strategies
- Reviewing draft strategies and implementation element

Project Management Team

A smaller group of NDDOT staff worked closely with the consultant to review on-going public and stakeholder feedback, assessment and analysis results, and development of the individual and final plan components.

Public Engagement

The overall public outreach and input element of ND Moves was developed around two significant public input opportunities. Each round of public input included a series of open houses in locations throughout the state (a meeting in each NDDOT district, see Figure 2), with a corresponding online survey to collect input from a broader geographical area.

STAKEHOLDER ADVISORY COMMITTEE MEMBERS

- AARP
- Dakota Public Transit Association
- ND League of Cities
- ND Association of Counties
- MPOs
- North Dakota State Parks
- American Heart Association
- Community Action Partnership
- ND Active Transportation Alliance
- ND Association of Counties

Open houses and surveys were advertised through multiple channels, including newspaper advertisements,

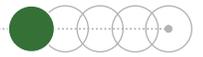
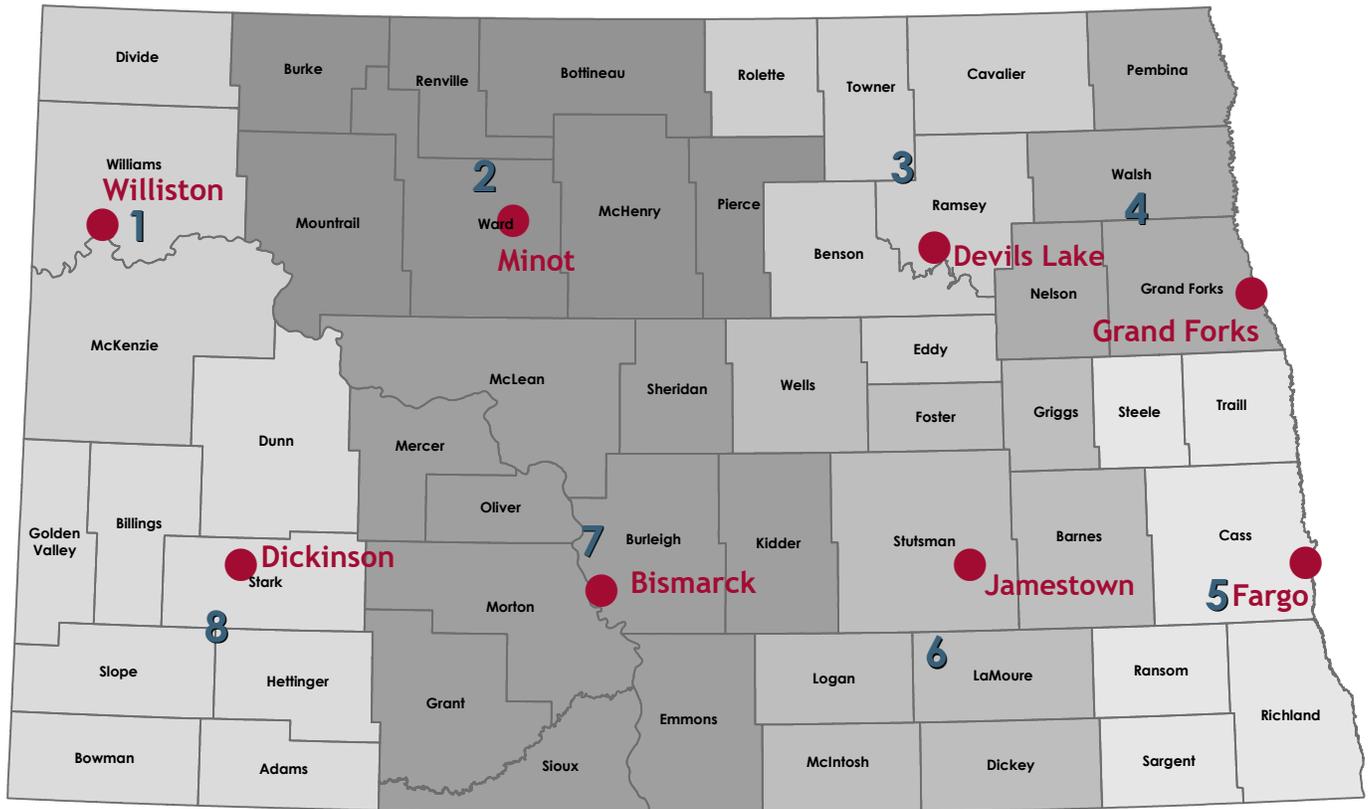


Figure 2: Regional Input Sessions



press releases, project email list, and social media (including purchased Facebook ads). Additionally, key stakeholders such as the League of Cities, Association of Counties, Community Action Agencies, North Dakota Planning Association, and Metropolitan Planning Organizations (MPOs) distributed materials widely through their respective communication channels.

Engagement Round 1 (November/December 2017)

The first series of public open houses focused on system needs and barriers, key destinations, and the planning vision (what people thought biking, walking, and public transit should be in the next 20 years). Meetings were held in the months of November and December 2017, and the online survey was open between November 8, 2017 and January 8, 2018. A total of 417 people engaged in the open houses or the online survey, with 66 percent participating online.

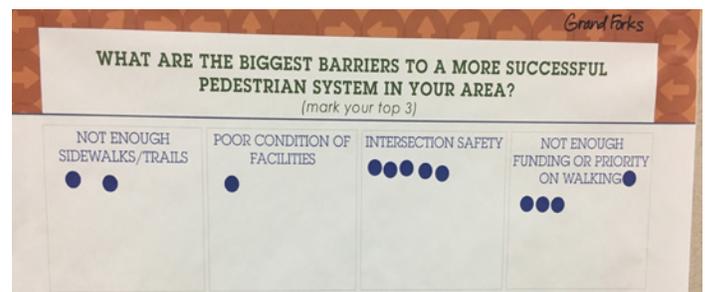
A summary of input from Round 1 is included in Appendix A.

Biggest Barriers

Open house and survey participants were asked to identify the biggest barriers to more successful pedestrian, bicycle, and public transit systems in their area. The top three barriers for each system include:

- Public Transit System: not enough funding or priority on public transit; bus frequency; and no bus service where I live/go
- Pedestrian System: intersection safety; not enough sidewalks/trails; and nowhere to walk/poor connectivity
- Bicycle System: lack of facilities; not enough funding or priority on the bike system; and gaps in the bike network

Online, participants also shared key destinations, and specific areas where they saw a barrier or need for improvement.



Prioritization of Goals

Of the goals developed for the plan, respondents were asked to select the top 3 priorities for NDDOT to act upon over the next 20 years.

PRIORITY (TOP 3)	ACTIVE TRANSPORTATION THEME AND DRAFT GOAL	PRIORITY (TOP 3)	PUBLIC TRANSIT THEME AND DRAFT GOAL
1 50%	Modal/Funding Priority Goal: Maintain or increase the amount of transportation funding dedicated to active transportation infrastructure and programming.	1 60%	Mobility & Accessibility Goal: Improve transit opportunities within and between communities.
2 44%	Modal Integration Goal: Coordinate the growth of active and public transportation networks to enable seamless multi-modal travel throughout the state.	2 53%	Asset Management & Sustainability Goal: Maintain transit assets in a state of good repair.
3 37%	Asset Management & Sustainability Goal: Maintain the state's existing active transportation network and grow these resources to encourage environmental and economic sustainability.	3 46%	Technology Goal: Leverage transportation technologies to advance public transportation.

Measuring Performance

Defining performance measures and targets help NDDOT to see how it is doing over time with various aspects of the active and public transportation systems. Measuring against certain targets identifies where additional improvements or resources are needed. Respondents were asked to select up to five of the best measures of success in the short term (next 5 years) and longer term (5-20 years) for both active transportation and public transit (Tables 5 and 6).

Table 5: Public Opinion – Best Indicators to Measure Performance of Active Transportation System

%	Best Short-Term Indicators	%	Best Long-Term Indicators
60	Percent of urban state roadway miles with sidewalks, trails, or bikeways	67	Percent of public that feels safe walking and bicycling in their community on state highways
55	Number of cities, towns, MPOs that are Bicycle Friendly Communities (BFC) and/or Walk Friendly Communities (WFC)	53	Active transportation improvements along state or US Bicycle Route systems
54	Percent of rural state roadway miles with sidewalks, trails, or bikeways	51	Continued tracking of active transportation-involved crashes resulting in fatalities or serious injuries
44	Mode share of biking in overall annual commuting patterns	50	Estimated active transportation miles traveled
40	Number and severity of bicycle and pedestrian crashes	50	Percent of active transportation facilities in fair to excellent condition
37	Dollars per capita spent on active transportation at the state level	33	Change in health and safety metrics measured on counties and tribal lands with at least one extreme health outcome or behavior
29	Mode share of walking in overall annual commuting patterns	26	Level of collaboration with ND Department of Health
19	Percentage of high hardship Census block groups within one mile of a walking, bicycling, or shared-use facility on a state highway	10	Other (please specify)
7	Other (please specify)		

Table 6: Public Opinion – Best Indicators to Measure Performance of Public Transit System

%	Best Short-Term Indicators	%	Best Long-Term Indicators
61	Level of public transit access for public transit-dependent populations	69	Percentage of major employment and activity centers that are served by public transit
59	Percent of total population with access to public transit service	60	Percentage of human services and schools with public transit access
46	Passengers per revenue hour	57	Percentage of public transit stops with walking routes and crossings within a quarter mile
34	Cost per hour of revenue service	52	Percentage of public transit routes with a 90% or greater on-time performance
32	Annual revenue miles of regional, interregional, and intercity passenger service	30	Percentage of fixed route public transit providers providing online trip planning
32	Public investment cost per passenger	29	Percent of public transit agencies coordinated with human services transportation
29	Availability of public transit information (print, online, and translated)	16	Percentage of crossings within a quarter mile of public transit stops with active safety warning devices installed
20	Percent of buses/vans that have met or exceeded their useful life	7	Other (please specify)
18	Percentage of statewide fleet using low emission vehicles		
14	Number of crashes per 100,000 public transit vehicle miles		
6	Other (please specify)		

Demonstration Projects

Demonstration projects, conducted spring and summer of 2018, were a partnership between NDDOT, North Dakota Department of Public Health, and participating communities for bicycle and pedestrian improvements. Goal outcomes of the projects were to:

- Test aspects of a project using a much shorter timeline than projects intended for permanent installation
- Inspire action and build support for how the project or similar projects could be installed over time
- Widen public engagement by allowing residents to experience new infrastructure first-hand
- Deepen understanding of active transportation needs and resources through a planning and design workshop held in Spring 2018

- Encourage people to work together in new ways, strengthening relationships between residents, local businesses, and government agencies.



The demonstration projects were installed on a short-term, trial period in nine North Dakota cities. City staff and partners collected baseline and during-project data, solicited public and stakeholder feedback, and developed summary reports to be used as guides for similar projects in the future (included as Appendix B).

The demonstration project experience was an effective way to collect input from members of the public. The following lessons learned relate to the installations in terms of public input and other topics.

- **Public input:** More than 1,500 people took the online survey to provide feedback about the demonstration projects. Survey responses were sortable based on certain answer choices (e.g., mode of transportation, community). The project helped communities and NDDOT understand differing desires for comfort and safety, based on survey respondents' indicated forms of transportation
 - Survey respondents who reported using active or public transportation felt safer as a result of the projects
 - Respondents who drive noticed that the installations narrowed the roadway and required people to drive more slowly past the site. This was consistent with the project's traffic calming goals
 - A total of 83 volunteers and city staff helped install the nine demonstration projects. This was a sufficient number of volunteers per project and contributed to efficient project installation. Other residents and city staff helped conduct project evaluations before and during the projects
 - ND Moves demonstration projects have resulted in residents talking about active transportation and telling community decision makers about a desire for more opportunities to walk and bike safely
- **Evaluation results:** Each installation's evaluation process was customized based on community goals
 - Temporary curb extensions and other crossing enhancements narrowed the installation sites' pedestrian crossing distance



- Mandan used automated equipment to collect before and during-project speed data. The data showed a reduction in speed as motorists approached an intersection
- Several projects saw an increase in motorists yielding to pedestrians in crosswalks during the time the projects were installed
- Some residents were confused about what the projects might look like should they become more permanently installed. Clarifying these ideas would be important for any future projects conducted by communities, NDDOT, or others.

Tribal Nations

NDDOT invited all North Dakota tribal nations to convene in Bismarck on January 17, 2018 to learn about ND Moves and discuss tribal interests and concerns. The agenda covered the overall purpose and scope of the plan, a presentation of health and demographic findings, a discussion of barriers and opportunities for active transportation and public transit in tribal communities, and a discussion of best ways to engage with tribal nations throughout the planning process. In general, attendees suggested engaging specifically with health and transit-specific staff for data and wished to engage more fully in any project-specific recommendations or outcomes of the plan.

Tribal representatives did not think another in-person meeting during the planning process was necessary but wished to stay notified of upcoming overall engagement opportunities. Notification was provided to tribal nations for both rounds of public engagement (November/December 2017 and July/August 2018), and representatives did attend in some cases.

In December 2018, NDDOT sent additional information to each tribal nation in North Dakota including the draft action plan, the draft State Bike Network, and a full copy of the health and demographic analysis. No other specific feedback from tribal nations was received as a result of that distribution, and no additional meetings were requested.



CHAPTER 2:

Existing and Projected Conditions



CHAPTER 2: Existing and Projected Conditions

Existing and projected conditions for North Dakota were analyzed to gain insight on factors influencing and impacting active and public transportation across the state. Considerations included proximity of active transportation destinations to state routes, health and demographics, condition of existing systems, safety, and asset management. Emerging trends were also studied, in addition to projected conditions for the active transportation and public transit systems.



Active Transportation Destinations and Opportunities

To develop an understanding of key destinations for active transportation in North Dakota, an analysis was completed that reviewed the following data:

- State roadways
- Boundaries of incorporated communities
- Parks (national, state, and local) and recreational trails
- Employment density
- Population density
- K-12 schools
- Institutes of higher education
- Public buildings
- Hospitals
- Regional bus stations
- 72 hospitals
- 63 local, state, and national parks
- 18 colleges and universities (all colleges and universities in North Dakota)
- 15 points of interest along the North Country Trail
- 5 regional bus stations
- 4 of 5 state forests

Employment density and destinations within 1.5 miles of a state or federal roadway were mapped (see Figure 3). Destinations within 1.5 miles included:

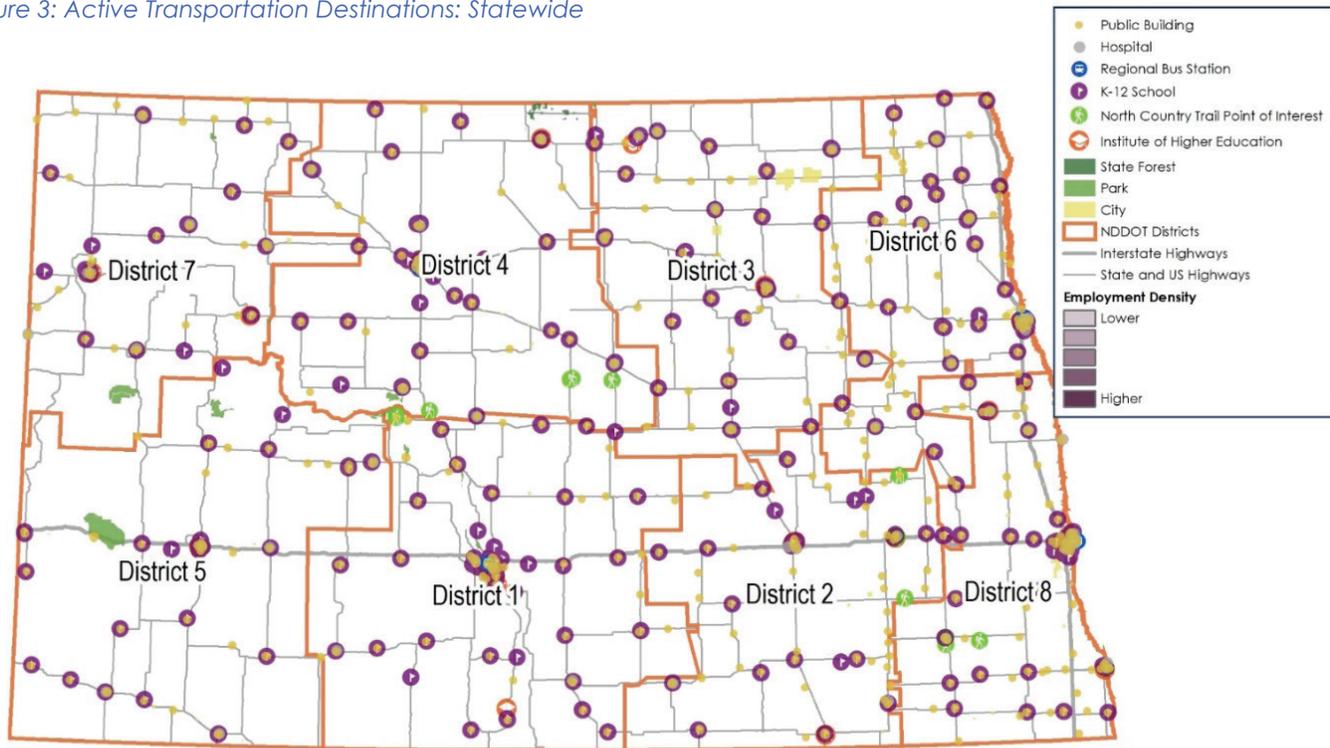
- 1,473 public buildings, such as courthouses and police stations
- 497 K-12 schools (about 90 percent of schools in North Dakota)
- 293 incorporated communities (about 80 percent of incorporated communities in North Dakota)

The active transportation destinations analysis confirmed the importance of state and federal roadways for accessing education, employment, recreation, and basic services throughout North Dakota. Approximately 95 percent of all jobs in North Dakota are in census blocks within one mile of a state or federal roadway, and 85 percent are within half a mile.

As would be expected, destinations are more concentrated in more populated areas. In rural areas, destinations are sparser but spread evenly throughout the state.

Figure 3 shows statewide active transportation destinations. Maps for each of NDDOT's eight regions, and the areas included in North Dakota's three MPOs are available in Appendix C.

Figure 3: Active Transportation Destinations: Statewide



Health and Demographic Analysis

To best realize the benefits that physical activity can have for all North Dakotans, local, regional and statewide active transportation infrastructure must be designed in consideration of the unique opportunities and constraints of the geography, seasons, weather, and culture of the state. This type of design will help to meet a level of safety and comfort to encourage walking and biking. The health and demographic analysis used available data from the Centers for Disease Control and Prevention (Behavioral Risk Factor Surveillance System - BRFSS), the U.S. Census Bureau, and other sources to evaluate chronic health disparities in North Dakota and identify geographic locations of populations who typically rely on active transportation options, including children, older adults, people without access to a motor vehicle, people without high school degrees, people with limited English proficiency (LEP), and people with low incomes. The findings from the assessment can be used as a starting point for developing region-specific and statewide recommendations and establishing priorities for where

to make active and public transportation infrastructure and programmatic investments.

Health

The following community health indicators were analyzed at the county level, the smallest geographic level for which health data exists in North Dakota:

- Obesity
- Diabetes
- Heart disease mortality
- High blood pressure
- Mental illness
- Unintentional injury mortality (including falls)
- Pedestrian-motor vehicle crash mortality
- Physical inactivity
- Commute via biking and walking
- Food access^{1, 2}

¹ North Dakota Department of Health – Division of Vital Records. (2015). North Dakota Resident Vital Event Summary Data 2001-2015. Retrieved from <http://ndhealth.gov/vital/pubs/2015VES.pdf>.

² North Dakota Department of Health. (2010). North Dakota American Indian Health Profile. Retrieved from: [https://www.ndhealth.gov/HealthData/CommunityHealthProfiles/American percent20Indian percent20Community percent20Profile.pdf](https://www.ndhealth.gov/HealthData/CommunityHealthProfiles/American%20Indian%20Community%20Profile.pdf).

Data was analyzed with attention to North Dakota's eight human service regions. Data was also analyzed through an urban/rural lens to reveal patterns that can inform more targeted recommendations. Counties overlapping with cities of more than 5,000 people were considered to be urban, and all other counties were considered to be rural.

Findings

Obesity

Rates of adult obesity are higher in North Dakota (31 percent) than in the United States as a whole (27.5 percent). Of the 10 leading causes of death in North Dakota, obesity is linked to at least six of these conditions.^{3, 4} Every county in North Dakota, with the exception of Slope, Griggs, and Divide Counties, has obesity rates higher than the national average of 27.5 percent of the adult population. Rolette, Mountrail, and Williams Counties have the highest rates of obesity at 41, 35.5, and 35 percent, respectively.

Diabetes

Diabetes is the seventh leading cause of death in North Dakota, and prevalence of the condition has been increasing steadily over the past 10 years.⁵ Sioux County's diabetes rate of 13 percent is significantly higher than the statewide average of 10 percent. Cass County's diabetes rate of 7 percent is significantly lower than the statewide average. Urban counties overall tend to have lower rates of adult diagnosed diabetes than rural counties.

Heart Disease Mortality

Coronary heart disease (CHD) is a leading cause of death nationwide. Three counties have heart disease mortality rates significantly above the state average rate of 284 per 100,000 people: McIntosh (641 per 100,000), Griggs (544 per 100,000) and Nelson (526 per 100,000). These rates are almost double that of the state average of all of the counties with reported data.

High Blood Pressure

In North Dakota, the prevalence of high blood pressure is slightly less than the United States, but still represents one in four North Dakotans. Divide County has the highest blood pressure prevalence rate in the state at 46 percent, nearly double the state average of 24.85 percent. Dunn, Grant, and Nelson also have significantly higher rates of high blood pressure than the state as a whole.

Frequent Mental Distress

Examining the percentage of adults who report 14 or more days of poor mental health per month (frequent mental distress) provides a window into identifying where individuals are experiencing chronic and likely severe mental health issues. In the United States, approximately 10.2 percent of adults report experiencing frequent mental distress in comparison to nine percent on average in North Dakota^{6, 7}.

Three counties report a percentage of adults with frequent mental distress that is significantly higher than the state average of nine percent. These three counties are Sioux (16 percent), Rolette (16 percent), and Benson (14 percent). All three overlap with tribal lands.

Unintentional Injury Mortality

In 2014, the nationwide unintentional injury mortality rate was 43 per 100,000. In North Dakota, the rate was slightly higher at 45 per 100,000. Unintentional injury is the fourth leading cause of death in the state of North Dakota, with the American Indian population experiencing a disproportionate rate of unintentional injury mortality^{8, 9}. Motor vehicles and falls are the leading causes of unintentional injury for both North Dakota residents and American Indians. Grant and Sioux Counties have the highest rates of unintentional injury death in the state.

³ Centers for Disease Control and Prevention. (2017). Leading Causes of Death. Retrieved from <http://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm>.

⁴ North Dakota Department of Health – Division of Vital Records. (2015). North Dakota Resident Vital Event Summary Data 2001-2015. Retrieved from <http://ndhealth.gov/vital/pubs/2015VES.pdf>.

⁵ North Dakota Department of Health – Division of Vital Records. (2015). North Dakota Resident Vital Event Summary Data 2001-2015. Retrieved from <http://ndhealth.gov/vital/pubs/2015VES.pdf>.

⁶ Centers for Disease Control and Prevention (2013). Mental Health. Retrieved from https://www.cdc.gov/mentalhealth/data_stats/nsdpd.htm.

⁷ County Health Rankings. (2017). North Dakota. Retrieved from <http://www.countyhealthrankings.org/app/north-dakota/2017/measure/outcomes/145/datasource>.

⁸ North Dakota Department of Health – Division of Vital Records. (2015). North Dakota Resident Vital Event Summary Data 2001-2015. Retrieved from <http://ndhealth.gov/vital/pubs/2015VES.pdf>.

⁹ North Dakota Department of Health. (2010). North Dakota American Indian Health Profile. Retrieved from <https://www.ndhealth.gov/HealthData/CommunityHealthProfiles/Americanpercent20Indianpercent20Communitypercent20Profile.pdf>.

Pedestrians Killed by Motor Vehicles

North Dakota's pedestrian motor vehicle crash mortality rate of 2.1 per 100,000 is lower than the country as a whole (3.1 per 100,000). Benson, Steele, Sioux, and Adams Counties have the highest rates of pedestrian mortality due to motor vehicles in North Dakota. Of the 53 counties in North Dakota, 31 reported zero pedestrian deaths per 100,000 due to motor vehicle crashes. In total, 43 people walking in North Dakota were killed by motor vehicles from 2011 to 2015.

Physical Inactivity

Regular physical activity is important for maintaining overall health and fitness. However, as of 2013, 21.8 percent, or a little over one in five U.S. adults, reported engaging in no physical activity outside of their regular job in the past thirty days. In North Dakota, the number of adults who engaged in no physical activity outside of work in the past 30 days was slightly higher than the national average (22.5 percent compared to 21.9 percent)^{10, 11}. Divide County has the highest level of physical inactivity in North Dakota, whereas Cass County has the highest levels of physical activity.

Commute via Walking or Biking

The rate of walking or biking to work in North Dakota, 4.3 percent, is higher than the national average, 3.38 percent. Moreover, over 80 percent of North Dakota counties have residents that walk or bike to work at rates greater than the state average¹². North Dakota counties are ahead of the nation on this indicator. Only five counties—Ward, Morton, Stark, Burleigh, and Rolette—have rates of walking and biking to work less than the national average. Billings, McIntosh, and Towner Counties have the highest rates of walking and biking to work in North Dakota.

Food Access

In North Dakota, 29.37 percent of the state is considered to have low food access in comparison to 22.43 percent of the U.S.¹³. Over 99 percent of the population of Billings, Golden Valley, Hettinger, Burke, Kidder, and Nelson Counties has low food access, more than double the state average of 44 percent.

Health Analysis Summary

There were four counties that have rates above the average on three or more health factors (Figure 4). Three of those counties overlap with tribal lands, and all four include areas with high concentrations of populations likely to rely on active transportation options, as determined in the demographic analysis below.

- Sioux County, including the Standing Rock reservation, was significantly above the statewide average on the following factors:
 - Poor mental health
 - Pedestrians killed by motor vehicles
 - Medicare population with diabetes
 - Adults with diagnosed diabetes
 - Accidental deaths
- Rolette County, including the Turtle Mountain reservation, was significantly above the statewide average on the following factors:
 - Poor mental health
 - Medicare population with diabetes
 - Adult obesity
- Benson County, including the Spirit Lake reservation, was significantly above the statewide average on the following factors:
 - Poor mental health
 - Pedestrians killed by motor vehicles
 - Medicare population with high blood pressure
- Ransom County was significantly above the statewide average on health outcomes for the Medicare population only, including:
 - High blood pressure
 - Depression
 - Heart disease

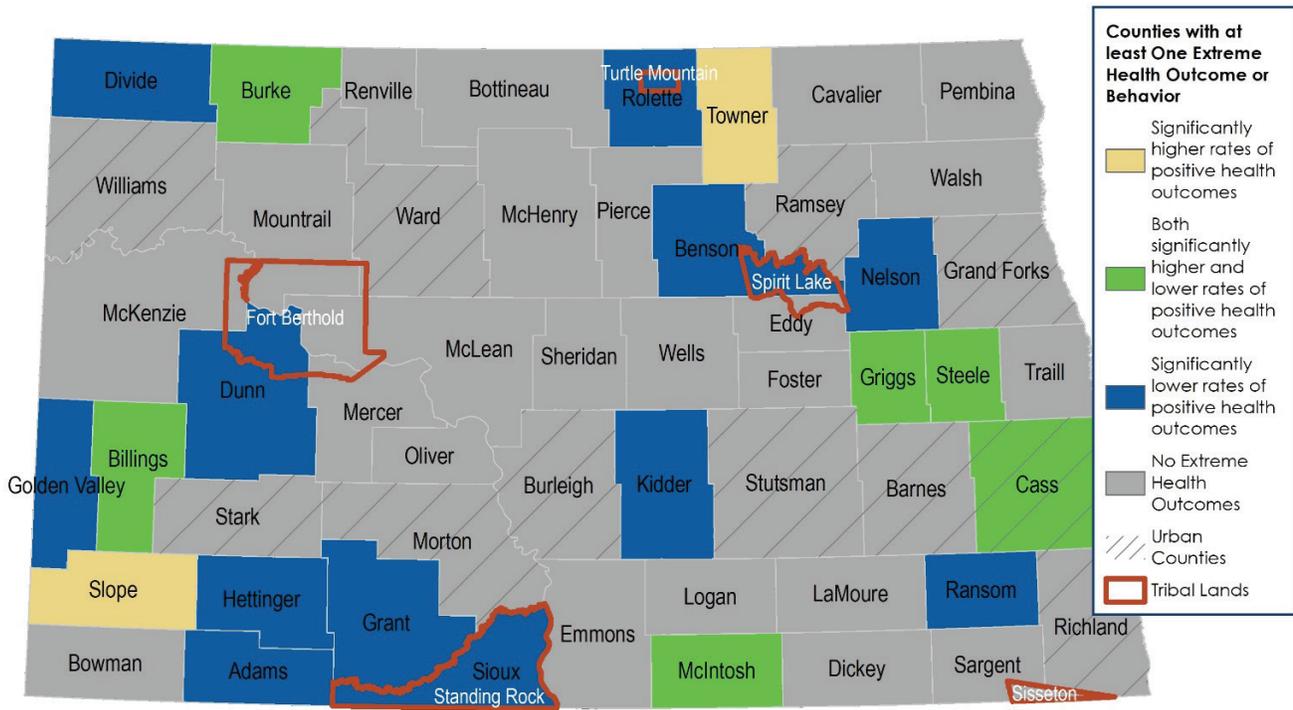
¹⁰ Centers for Disease Control and Prevention. (2015). Physical Activity. Retrieved from: <http://www.cdc.gov/physicalactivity/basics/>.

¹¹ United Health Foundation. (2017). America's Health Rankings 2015 Annual Report. Retrieved from: <https://www.americashealthrankings.org/explore/2015-annual-report/measure/sedentary/state/ALL>.

¹² IP3, CARES – University of Missouri. (n.d.). Community Health Needs Assessment (CHNA). Retrieved from: <https://communitycommons.org/>.

¹³ US Department of Agriculture, Economic Research Service, USDA - Food Access Research Atlas. 2015.

Figure 4: Counties With At Least One Extreme Health Outcome or Behavior



Demographics

Considering populations that have heightened sensitivity to the presence and quality of active transportation facilities is important for developing an ND Moves plan that effectively serves all residents of North Dakota. Building off the health analysis, this analysis considered demographic data to determine where there are concentrations of populations likely to use active transportation to meet every day needs.

The demographic analysis included the following populations that typically rely on active transportation options:

- Children
- Older adults
- People without access to a motor vehicle
- People with limited English proficiency
- People with disabilities
- People without high school degrees
- Low-income individuals

Attention to these populations is important because of their common reliance on active and public

transportation, which renders them more vulnerable from a mobility perspective. Reliable, safe, and affordable transportation is essential to creating opportunities for these groups.

The demographic analysis identified where the majority of individuals within each indicator reside within North Dakota. Understanding where these individuals are most densely located helps to prioritize transportation improvements to address historic inequities and to ensure that NDDOT invests in improvements with a high return on investment. Increasing transportation opportunities for the communities that most depend on such services improves access to life-enhancing services and supports strong local economies.

Findings

Older Adults

The population over 65 years of age may have more mobility needs than the general adult population, specifically in that they may require more alternatives to driving. People over age 65 comprise between 0 percent and 33 percent of the population across all census tracts in North Dakota, with a statewide mean of

16 percent. The highest percentage of seniors are found in rural areas of the state as well as pockets of Bismarck, Devils Lake, and Valley City. The lowest concentrations are in major cities and tribal lands, with the exception of a portion of the Fort Berthold reservation in McLean County, and the Sisseton tribal lands in Sargent and Richland Counties.

Children

The population under 18 years of age is thought to have higher active transportation infrastructure need because they have less access to motor vehicles and may rely more on walking and bicycling. Youth comprise between 2 percent and 43 percent of the population across all census tracts, with a statewide mean of 22 percent. Youth comprise larger portions of the population in census tracts near North Dakota's major cities, as well as in tribal lands and rural areas in the southwest corner of the state. Census tracts with more than 36 percent youth are all located in tribal lands.

Access to a Motor Vehicle

Households with limited or no access to motor vehicles by necessity have to take advantage of other transportation options such as walking, bicycling, and public transit. Households without access to a motor vehicle comprise between 0 percent and 36 percent of the population across all census tracts, with a statewide mean of five percent. Households without access to a motor vehicle comprise larger portions of the population in census tracts within North Dakota's major cities, as well as in tribal lands and rural census tracts scattered throughout the state.

Education

Nationwide, those without high school diplomas have the highest rates of walking and the second highest rates of biking to and from work¹⁴. Educational attainment, as a socioeconomic indicator, correlates with income levels. Therefore, although this population is most likely to walk to work, individuals without high school diplomas tend to live in areas without adequate biking and walking facilities¹⁵. Boosting active transportation resources in areas where these individuals reside could promote increased access to educational resources and job opportunities.

People without high school diplomas comprise between less than 1 percent and 25 percent of the population

across all census tracts, with a statewide mean of 10 percent. The highest concentrations of people without high school diplomas are found in rural areas of the state, including tribal lands. Small pockets are also located in Dickinson, Bismarck, Valley City, Fargo, Grand Forks, Jamestown and Williston. The lowest concentrations of people without high school diplomas are all in and around major cities, with the exception of census tracts in Adams County in the southwestern part of the state and Pembina and Mountrail Counties in the eastern part of the state.

Poverty

Populations with higher levels of poverty may have limited access to vehicles and rely more on active transportation networks for daily trips. Even with increased dependence on non-automotive transportation, low-income residential areas are often less walkable, a condition that creates barriers to living safe, social, and active lives^{16, 17}.

People living under 200 percent of the poverty line range from 1.5 percent of a census tract's population to 83 percent in North Dakota, with the mean falling around 62 percent. The highest percentage of people living under 200 percent of the poverty line are located in census tracts that overlap with tribal lands and within Fargo, Grand Forks, Bismarck, Devils Lake, Minot, Jamestown and Valley City. Fargo, Grand Forks and Bismarck are also home to the census tracts with the lowest concentrations of people with low incomes in the state.

Disability

According to the North Dakota State Council on Developmental Disabilities, 77,000 people in North Dakota are living with a disability, or about 10 percent of the population. Mobility is a top issue for most people with disabilities and often determines the extent to which they can participate in the community and retain employment. No clear pattern emerged in the analysis of people with disabilities; as people with disabilities are scattered throughout the state. People with disabilities comprise between 2 percent and 26 percent of the population across all census tracts, with a statewide mean of 11 percent. Of this 11 percent, 9.7 percent have an ambulatory disability and 2.4 percent have a vision-related disability.

¹⁴ McKenzie B. Modes Less Traveled—Bicycling and Walking to Work in the United States: 2008–2012. Am Community Surv Reports. 2014.

¹⁵ Dannenberg A, Frumkin H, Jackson R. Making Healthy Places. 1st ed. Washington D.C.: Island Press; 2011.

¹⁶ Dannenberg A, Frumkin H, Jackson R. Making Healthy Places. 1st ed. Washington D.C.: Island Press; 2011.

¹⁷ Active Living By Design. Low Income Populations and Physical Activity. 2012.

Language

Individuals with LEP, or who identify as not speaking English well or at all, tend to rely more on active transportation as their primary means of transportation than the average English speaker^{18, 19}. General low economic status of LEP individuals may correlate with low car ownership rates and high reliance on active transportation facilities²⁰. Therefore, access to active transportation services is critical for LEP individuals to access basic employment and other necessities²¹.

Compared to other measures, there is much less variation between census tracts on percentage of population with LEP. Population with limited English proficiency ranges from zero percent of a census tract's population to five percent in North Dakota, with a mean of less than one percent.

Demographic Analysis Summary

The composite demographic analysis displays the sum of the results from each of the indicators explored. Census tracts in dark purple represent areas of higher relative sensitivity to active transportation options. Investing in active transportation facilities and intersection improvements in these areas of highest need will likely improve access to health and economic advancement opportunities.

The demographic and health analyses both point to greater needs in rural areas. While providing active and public transportation facilities in very rural areas where destinations are far apart and population density is low may not be beneficial, there are opportunities to improve access within rural centers, where most people are concentrated within rural counties. As Figure 5 shows, most rural centers in North Dakota are located on or near state roadways. There are at least 16 rural centers of over 1,000 people located in census tracts with higher concentrations of populations that typically rely on active transportation options. For many rural centers, roads under NDDOT jurisdiction serve as main streets. NDDOT could review existing active transportation facilities along state highways through rural centers and engage residents to understand needs for additional or improved facilities on state highways. Further study would reveal strategic locations for NDDOT investment within these rural centers.

As shown in Figure 6, all major cities contain census tracts with higher concentrations of populations that typically rely on active transportation options, with the exception of Mandan and Wahpeton.

¹⁸ M. Litman T. Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning. Victoria Transp Policy Inst. 2016;8(2):50-65. http://ecoplan.org/wtpp/wt_index.htm. Accessed October 15, 2016.

¹⁹ U.S. Government Accountability Office. Transportation Services: Better Dissemination and Oversight of DOT's Guidance Could Lead to Improved Access for Limited English-Proficient Populations. Washington D.C.; 2005.

²⁰ Liu R, Schachter H. Emergency Response Plans and Needs of Communities with Limited English Proficiency. Transp Res Rec J Transp Res Board. 2007;2013:1-7. doi:10.3141/2013-01.

²¹ Liu R, Schachter H. Emergency Response Plans and Needs of Communities with Limited English Proficiency. Transp Res Rec J Transp Res Board. 2007;2013:1-7. doi:10.3141/2013-01.

Figure 5: Concentration of Populations that Typically Rely on Active Transportation Options

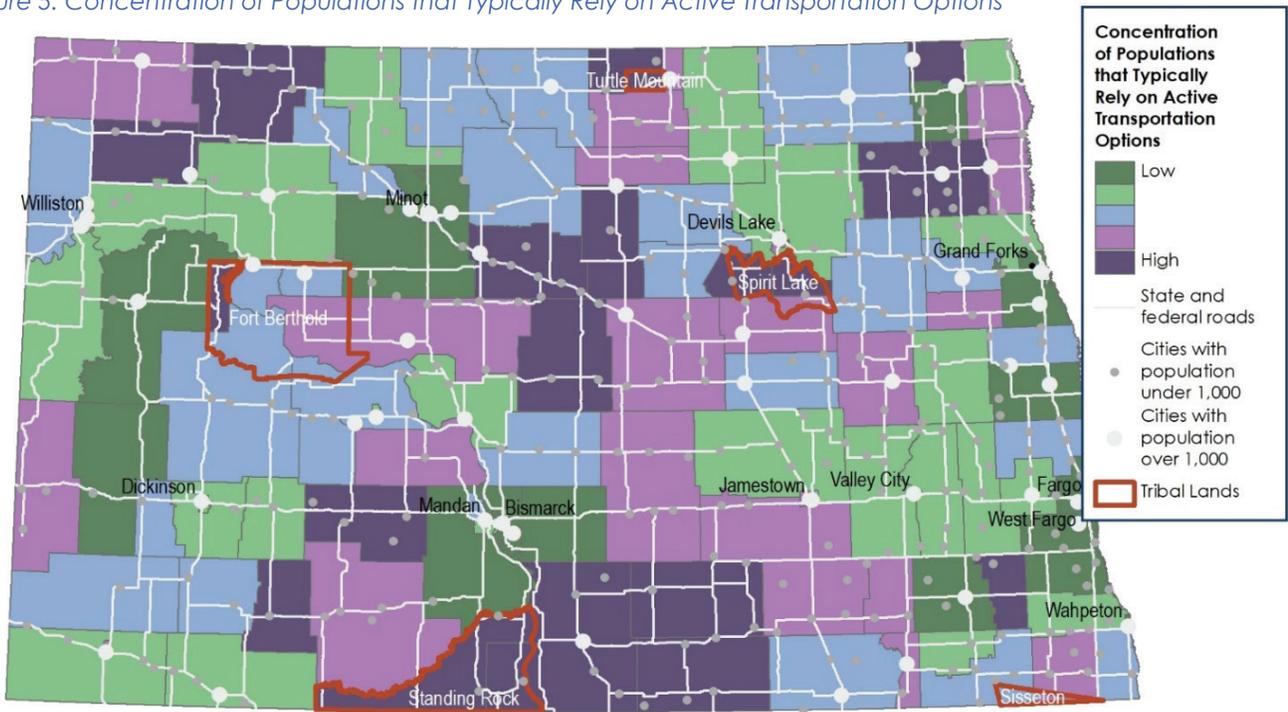
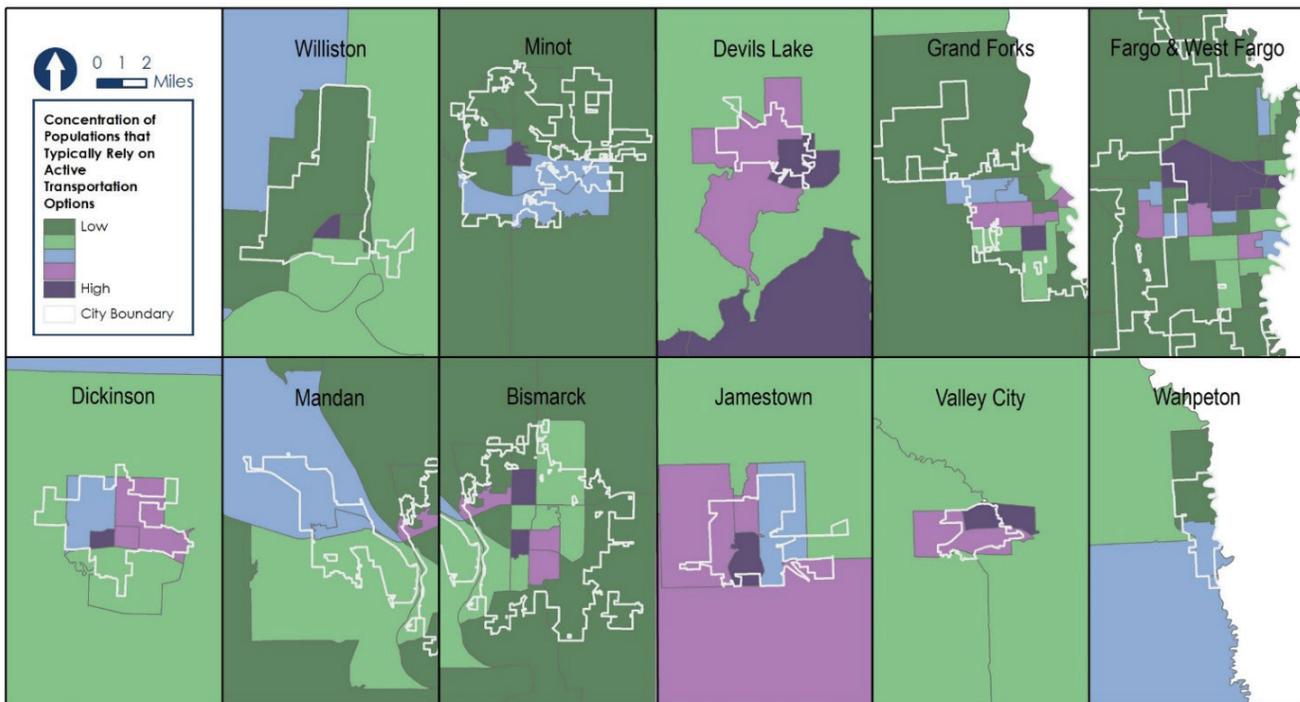


Figure 6: Concentration of Populations that Typically Rely on Active Transportation Options: Urban Areas



Existing Active Transportation Infrastructure and Systems

The existing active transportation infrastructure in North Dakota was analyzed at a state and urban system level. The state perspective provides insight on how key destinations across North Dakota, including existing urban centers, are currently connected. More detailed analysis of urban areas (cities over 5,000 in population) was necessary to identify how to connect state systems into urban communities.

Urban Systems Analysis

Connecting the State Bike Network System to Urban Networks

A key component of the Urban System Analysis was to ensure a transition between the urban and rural portions of North Dakota for active transportation mobility. As the project team analyzed opportunities for connections between the statewide system and the urban areas, every effort was made to take advantage of local shared use paths, bike lanes and markings, and other infrastructure to facilitate moving the network through urban areas. For example, while the city of Minot was relatively lacking in shared use paths along state system routes (US Highways 83, 52, and 2), the city has sufficient shared use paths to create an intuitive route through the city.

Urban System Facility Consideration

As part of the development of the Active and Public Transportation Facility Planning Best Practices Recommendations (a sub element of ND Moves) a Facility Consideration Matrix was developed for the purposes of identifying the need for active transportation facilities along the state highway system. The Urban component of the Facility Consideration Matrix can be seen in Figure 7. The matrix uses the following inputs:

- Posted speed limits
- Average Annual Daily Traffic (AADT)
- Functional class

ND Moves stops short of recommending a specific facility type to fill identified gaps. It is important to remember that cyclists can ride on the road. However, the Facility Consideration matrix may provide guidance to NDDOT and Local Public Agencies (LPAs) in considering facility type opportunities to fill identified gaps, as defined herein. Considering the roadway's purpose, context/surrounding land use, and overall goals is important. These discussions add necessary nuance to planning and design projects. They help decision makers weigh tradeoffs that may occur due to selecting one type of facility or mode of transportation over another.

The facilities included in the matrix are defined as follows:

- **Yield street/bicycle boulevard:** a roadway is designed to serve pedestrians, bicyclists, and motor vehicle traffic in the same slow-speed travel area
- **Advisory shoulder:** create usable shoulders for bicyclists on a roadway that is otherwise too narrow to accommodate one. The shoulder is delineated by pavement marking and optional pavement color
- **Bike lane:** designate an exclusive space for bicyclists through the use of pavement markings and signage
- **Buffer separated bike lane:** conventional bicycle lanes paired with a designated buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane
- **Barrier separated bike lane:** an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane
- **Sidewalk:** a paved path for pedestrians on the side of a roadway
- **Shared use trail/sidepath:** physically separated from motorized vehicular traffic by either a physical barrier or clear space

Figure 7: Urban Facility Consideration Matrix

URBAN

Posted Travel Speed (mph)	Average Annual Daily Traffic	Yield Street / Bicycle Boulevard	Advisory Shoulder	Bike Lane	Buffer Separated Bike Lane	Barrier Separated Bike Lane	Sidewalk	Shared Use Trail / Sidepath
Local / Collector								
25 and below	< 500	Preferred	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Preferred	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
30	< 500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
35 and above	< 500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
Arterial								
30 and below	< 3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-10,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	10,000-15,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	15,000-20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	>20,000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential
35 and above	< 3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-10,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	10,000-15,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	15,000-20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	>20,000	Not recommended	Not recommended	Potential	Potential	Potential	Potential	Potential

Legend

	Preferred
	Potential
	Not recommended

Identification of Assets and Needs

In each of the 12 urban areas across the state, data was gathered regarding existing shared use paths, sidewalks, and other bike facilities. In most cases, a complete urban-wide network was available for analysis. In a few cases, only the facilities adjacent to the state highway system were available. Through a review of this data, ND Moves established an understanding of existing and missing active transportation infrastructure adjacent to the state highway system in urban areas. Urban portions of the state highway system were evaluated according to the Urban Facility Consideration Matrix (Figure 7).

To ensure completeness, and to account for variation in analysis, two independent evaluations of bike and pedestrian needs along the urban state highway system were developed and conducted by the project team. Maps of these gaps can be found in Appendix D.

Outputs of both analyses were combined (and averaged) to determine an approximate 101.9 mile “gap” along the urban state highway system in North Dakota. The output averages balance a series of similar assumptions made by each evaluation team. Table 7 documents the gaps identified for each urban area in North Dakota.

Table 7: Gap Analysis by Urban Area

URBAN AREA	GAP (MILES)
Bismarck-Mandan	23.3
Devils Lake	4.7
Dickinson	9.6
Fargo-West Fargo	12.1
Grand Forks	6.5
Jamestown	6.5
Minot	19.8
Valley City	4.1
Wahpeton	5.5
Williston	9.8
Total	101.9

Summary of Need

Based on the composite output of the needs analysis, an estimate of future resources required to fill those gaps was developed. Part of the evaluation determined gaps by type. The total gap was split between two (2) gap types:

- 1) **Bike gap:** locations lacking adequate bicycling facility (note: it is legal to bike on roads in North Dakota)
- 2) **Bike + walk gap:** locations lacking both a bicycle and pedestrian facility

Table 8: Summary of Urban System Gaps by Type

GAP TYPE	GAP (MILES)	PERCENT GAP
Bike	46.4	45.5%
Bike + Walk	55.5	54.5%
Total	101.9	100%

A third gap type, **walk gap** was developed and evaluated, however dismissed due to the frequent duplication for which it created in the needs analysis.

Based on the evaluation of needs and gaps on the urban state highway system, it was determined that 45.5 percent of system gaps were related specifically to a **bike gap** and 54.5 percent was related to a **bike + walk gap**. The application of this assumption to the existing 101.9 miles of system gaps is shown below.

Non-Urban Incorporated and Rural Areas Analysis

Limited data is available to identify gaps in non-urban incorporated areas (communities with a population less than 5,000) and rural areas. It is a recommendation of this plan to develop a system for obtaining data regarding existing facilities in these areas, and a determination of gaps and needs. The guidance contained in the Active Transportation Facility Consideration section (Chapter 3) could help evaluate need and consider street design changes.

Existing Public Transit Systems: Public Transit Provider Profiles

There are currently 35 public transit providers that serve North Dakota. Profiles for each of the 35 North Dakota public transit providers were created with data collected from NDDOT's website, from the Federal Transit Administration (FTA) National Transit Database, and from information provided in the individual providers' websites, as available.

The profiles include service and financial data from 2011-2016, depicting both snapshots of current (2016) characteristics, as well as 6-year trends, where data was available.

Service

The service performance of public transit providers in North Dakota was analyzed based on two measures: revenue hours per capita and revenue miles per capita. These measures provide insight on how much service is provided (in time or distance) relative to the amount of people living in the service area²².

Revenue Hours per Capita

The revenue hours per capita for urban/emerging urban providers in North Dakota ranged from 0.21 (Bis-Man Transit) to 0.54 (MATBUS), while revenue hours per capita for rural providers in North Dakota ranged from 0.02 (Wildrose Public Transportation) to 2.73 (Can-Do Transportation).

Revenue Miles per Capita

The revenue miles per capita for urban/emerging urban providers in North Dakota ranged from 3.28 (Bis-Man Transit) to 9.32 (Cities Area Transit), while revenue miles per capita for rural providers in North Dakota ranged from 0.62 (Nelson County Council on Aging) to 38.10 (Golden Valley/Billings County Council on Aging).

Ridership

The ridership for each of the public transit providers in North Dakota was also analyzed. Two measures used (passengers per revenue hour and passengers

²² For the urban/FTA full-reporter providers, 2010 Census populations within providers' service areas are used, as reported to FTA. For rural/FTA small-systems providers, 2010 Census populations within the service areas as described herein are used. The Trenton Indian Service Area population is from nd.gov (<https://www.ndstudies.gov/tm-trenton-indian-service-area>). The West River Transit service area population excludes the Bismarck's population. The Wildrose Public Transportation service area population excludes Minot's population."

per revenue mile) provide insight regarding the effectiveness of the service. A third measure (revenue miles per passenger) was calculated to demonstrate the distance that some providers are required to travel for each passenger based on the distance required for medical appointments and other essential trips.

Passengers per Revenue Hour

The passengers per revenue hour for urban/emerging urban providers in North Dakota ranged from 6.74 (Bis-Man Transit) to 23.15 (MATBUS), while passengers per revenue hour for rural providers in North Dakota ranged from 0.7 (Golden Valley/Billings County Council on Aging) to 6.8 (Hazen Busing).

Passengers per Revenue Mile

The passengers per revenue mile for urban/emerging urban providers in North Dakota ranged from 0.43 (Bis-Man Transit) to 2.05 (MATBUS), while passengers per revenue mile for rural providers in North Dakota ranged from 0.01 (Wildrose Public Transportation) to 1.1 (Kenmare Wheels & Meals).

Revenue Miles per Passenger

The revenue miles per passenger for urban/emerging urban providers in North Dakota ranged from 0.5 (MATBUS) to 2.34 (Bis-Man Transit), while revenue miles per passenger for rural providers in North Dakota ranged from 1.0 (Kenmare Wheels & Meals) to 109.3 (Wildrose Public Transportation).

Cost-Effectiveness

Several measures were utilized to analyze the cost-effectiveness of public transit providers in North Dakota. These included: cost per revenue hour, cost per ride, farebox recovery ratio, and subsidy per passenger.

Cost per Revenue Hour

The cost per revenue hour for urban/emerging urban providers in North Dakota ranged from \$37.77 (Minot City Transit) to \$78.30 (MATBUS), while cost per revenue hour for rural providers in North Dakota ranged from \$21.58 (South Central Adult Services) to \$114.21 (Standing Rock Public Transportation).

Cost per Ride

The cost per ride for urban/emerging urban providers in North Dakota ranged from \$3.26 (MATBUS) to \$9.81 (Bis-Man Transit), while cost per revenue hour for rural providers in North Dakota ranged from \$5.98 (Hazen Busing) to \$50.83 (Spirit Lake Tribe).

Farebox Recovery Ratio

The farebox recovery ratio for urban/emerging urban providers in North Dakota ranged from 5.6% (Cities Area Transit) to 12.3% (Minot City Transit), while the farebox recovery ratio for rural providers in North Dakota ranged from 1.1% (Trenton Indian Service Area Aging Program) to 34.9% (City of Jamestown).

Subsidy per Passenger

The subsidy per passenger for urban/emerging urban providers in North Dakota ranged from \$2.86 (MATBUS) to \$9.26 (Bis-Man Transit), while the subsidy per passenger for rural providers ranged from \$4.96 (Hazen Busing) to \$43.68 (Standing Rock Public Transportation).

Additional information and graphics about the public transit providers in North Dakota can be found in the ND Moves Transit Provider Profiles, June 2017.

Safety Analysis

Since 2013, crashes involving people walking and bicycling have increased by 19 percent in North Dakota. It is unclear if this is due to an increase in pedestrian and bicycle traffic and, thus, a greater exposure to crashes. The analysis of high-risk roadways suggests that crashes are much more likely to occur in urban areas. Within urban areas, crashes are most likely to occur at intersections and on arterial roadways. While there are fewer crashes in rural areas, they tend to result in greater injury and are most likely to occur at non-intersection locations across the network.

To improve conditions for people walking and bicycling in North Dakota, it is critical to understand where crashes have occurred in the state. Additionally, it is important to understand trends on roadway corridors where there may be a pattern and tendency for greater safety risks for people walking and bicycling.

The safety analysis completed by the project team used available roadway characteristics and pedestrian- and bicyclist-involved crash data to evaluate locations where safety conditions are a problem on North Dakota roadways. The results from this analysis will be used to recommend appropriate safety countermeasures that target crashes involving people walking and bicycling.

The following findings resulted from two analyses: a hot spot analysis of reported crashes and a systemic safety analysis. The hot spot analysis discusses results from an evaluation of reported crashes. The systemic analysis identifies state-owned roadways in North Dakota where there may be higher risk for future crashes based on roadway characteristics.

Hot Spot Analysis of Statewide Reported Crashes

This section is an analysis of reported crashes involving people walking and bicycling from 2012 to 2016. The analysis includes all reported crashes within the state, including those on local roadways and state highways. Data for this analysis was provided by the Safety Division of the North Dakota Department of Transportation. The crashes analyzed in this report are limited to traffic conflicts that NDDOT collects data on: those that result in an injury, or that result in property damage exceeding \$1,000. If a crash did not result in either of these conditions, data was not collected and thus was not considered in this analysis.

While data is reported directly from local jurisdictions to NDDOT and is assumed to be accurate, there are limitations to pedestrian- and bicyclist-involved crash data. Often these crashes go unreported if an injury is minor. Because of this, the numbers of reported crashes may be lower than the actual number of crashes. As expected, near misses are not tracked by any state. While an injury may not result from a near miss, the stress a person walking or bicycling experiences from a near

miss might directly influence their willingness to walk or bike again along a street or in a corridor.

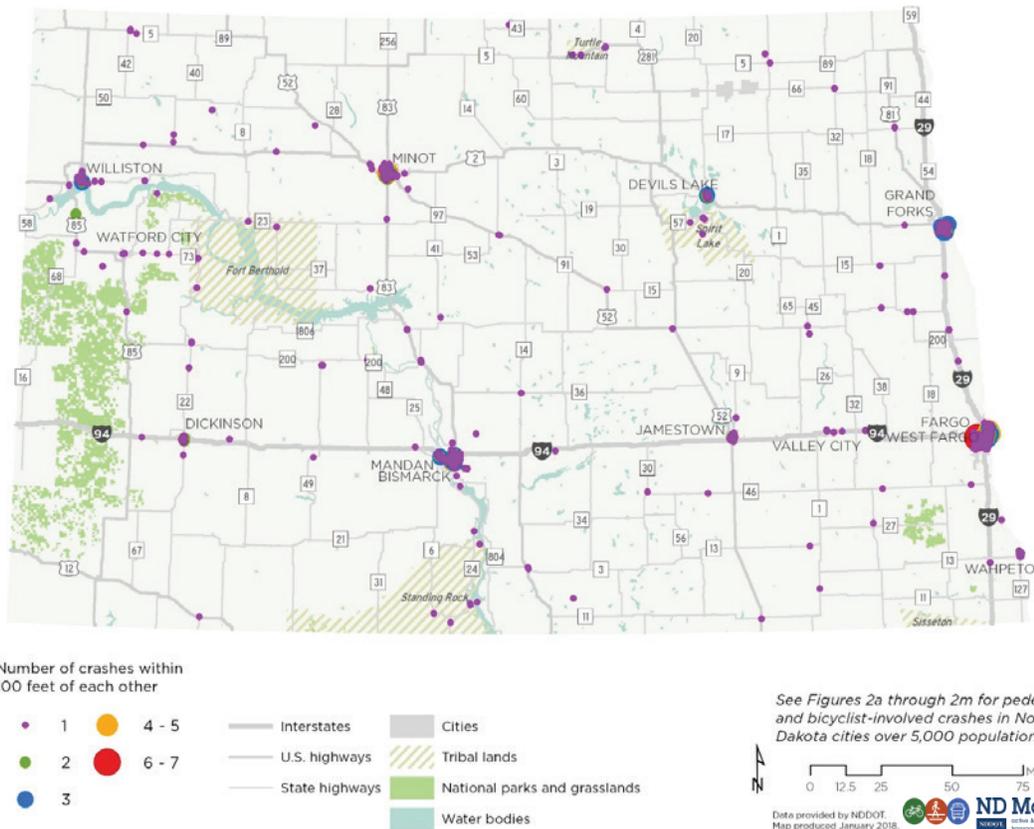
Location of crashes

There were 1,000 crashes involving people walking and bicycling on North Dakota roadways between 2012 and 2016. Of these 1,000 crashes:

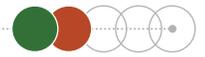
- 34 percent occurred on NDDOT-managed roadways, 66 percent occurred on locally managed roadways
- 53 percent involved a person walking²³, 47 percent involved a person bicycling
- 88 percent of crashes occurred in urban areas, 12 percent occurred in rural areas
- Crashes occurred nearly equally at intersections and along roadway segments
- People walking more often were struck along the roadway
- People bicycling were more often struck at an intersection

Figure 8 shows the location of crashes involving people walking and bicycling across the state.

Figure 8: Bicyclist and Pedestrian-Involved Crashes, Statewide, All Roads, 2012-2016



²³ This analysis combines crashes involving a pedestrian and those involving someone using a mobility device. Three people of the 2,106 people involved were using a mobility device. For the purpose of this analysis, the terms 'pedestrian-involved crash' and 'people walking' includes persons using mobility devices.



Severity of Crashes

When involved in a crash, people walking and bicycling are more likely to experience a severe injury than someone traveling in a vehicle.

Three categories of injuries are tracked and reported²⁵:

- **Incapacitating:** Any injury, other than a fatality, which prevents the injured person from walking, driving or normally continuing the activities the person was capable of performing before the injury occurred. Often defined as “needing help from the scene.” Includes but is not limited to: severe lacerations, broken or distorted limbs, skull or chest injuries, abdominal injuries, and unconsciousness at or when taken from the crash scene.
- **Non-incapacitating:** Any injury, other than a fatality or an incapacitation injury, which is evident to observers at the scene of the crash in which the injury occurred. Examples: contusions (bruises), minor laceration, bloody nose.
- **Possible injury:** Any injury reported or claimed which is not a fatality, incapacitating injury, or non-

incapacitating evident injury. Examples: Claim of injuries not evident, limping, or complaint of pain

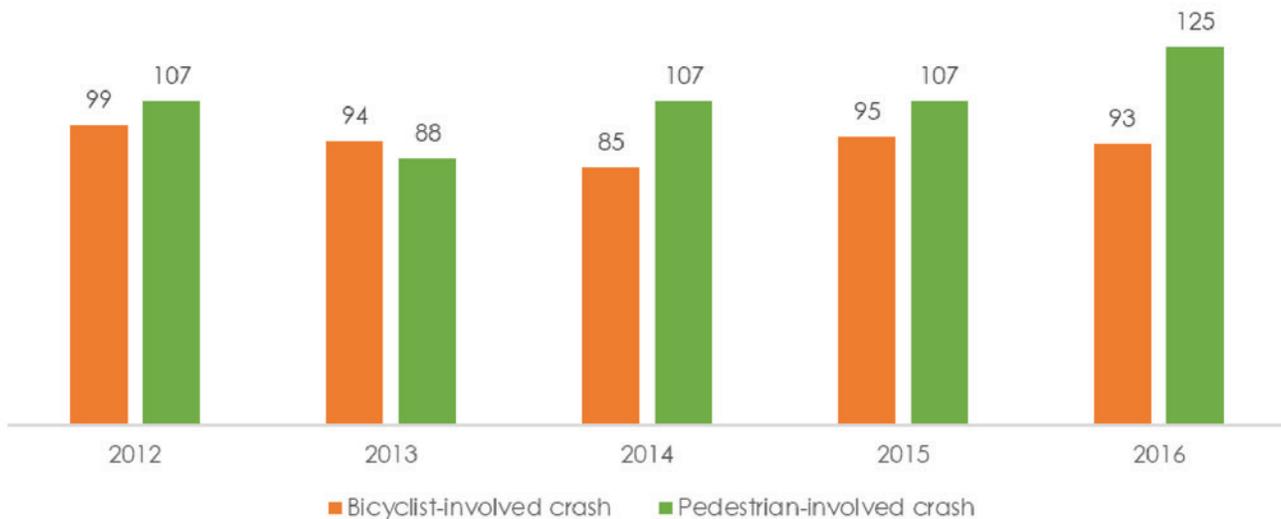
The 1,000 crashes involving people walking and bicycling on North Dakota roadways resulted in 43 fatalities (4.3 percent) and 914 injuries (91 percent). Of these 914 injuries, 135 were incapacitating, 403 were non-incapacitating, and 376 were possible injuries. By comparison, from 2012 to 2016, there were 83,561 vehicle-only-involved crashes reported on North Dakota roads. Of these, 697 (0.8 percent) resulted in a fatality, and 25,485 (30 percent) resulted in some level of injury²⁴. This suggests that there is a greater likelihood of an injury and fatality for crashes involving people walking or bicycling over those driving.

Changes in Crashes over Time

Annual Crashes between 2012 and 2016

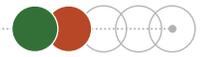
Total crashes decreased in 2013 to a five-year low (see Figure 9), then increased steadily to reach a five year high in 2016. In every year besides 2013, pedestrian-involved crashes outnumbered bicyclist-involved crashes.

Figure 9: Crash Frequency Over Time



²⁴ Data on reported crashes involving vehicles only taken from 2016 North Dakota Crash Summary, <https://www.dot.nd.gov/divisions/safety/docs/crash-summary.pdf>

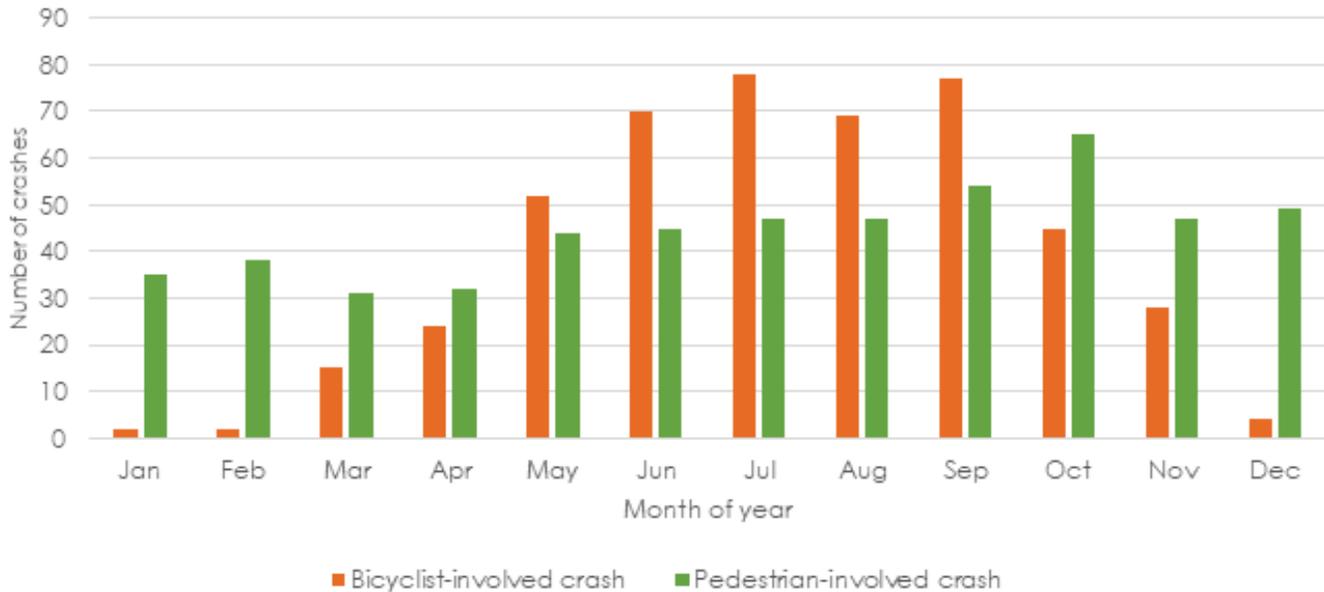
²⁵ https://safety.fhwa.dot.gov/hsip/spm/conversion_tbl/pdfs/kabco_ctable_by_state.pdf



Crashes by Month of Year

Figure 10 shows the number of crashes by month of year. The frequency of pedestrian-involved crashes is fairly constant over the year. The frequency of bicyclist-involved crashes varies by season, likely due to increased bicycling during warmer months.

Figure 10: Crash Frequency by Month of Year



Demographic Findings

Demographic trends or patterns in pedestrian- and bicyclist-involved crashes can help target efforts that might improve safety and comfort for people traveling on North Dakota roads. The analyses below use crash report data to summarize the demographic characteristics of people involved in these crashes. 151 crashes included a road user who fled the scene (labeled as hit-and-run in the crash reports). The analyses below did not include these individuals. In addition, demographic information is missing from some crash records.

Age of People Involved in Crashes

Figure 11 shows the age of people walking and bicycling who were involved in crashes. This figure highlights that:

- 32 percent of people bicycling involved in crashes were age 17 or younger
- 23 percent of people walking involved in crashes were age 17 or younger
- 17 percent of people walking and involved in crashes were over 56 years old

Figure 11: Age of Person Involved in Crash

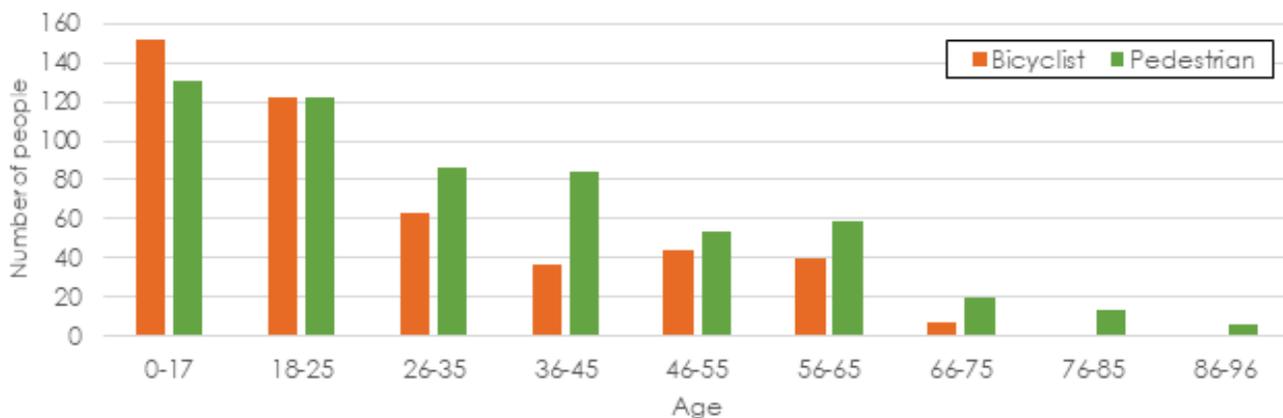
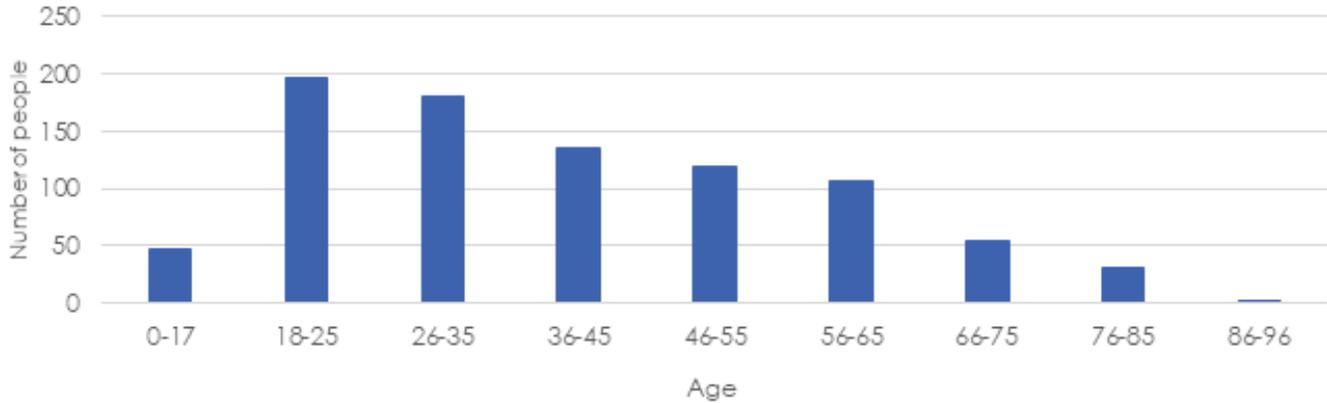


Figure 12 shows the age of people driving and involved in crashes with people walking and bicycling. The data suggests drivers age 35 and younger are more often involved in these crashes.

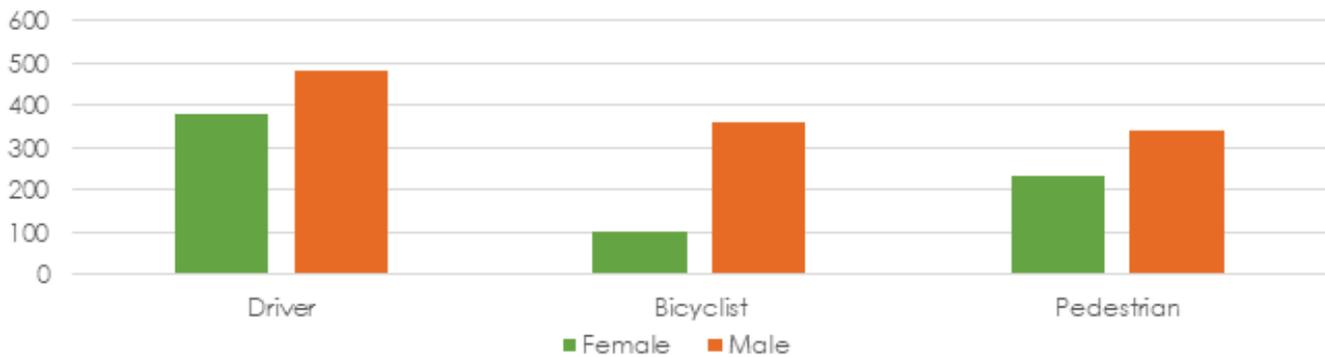
Figure 12: Age of Person Driving Involved in Crash



Gender of People Involved in Crashes

Figure 13 shows the gender of drivers, bicyclists, and pedestrians involved in crashes. In all cases, males were more frequently involved.

Figure 13: Gender of Person Involved in Crash



Factors contributing to crashes

The officer reporting to the scene of a crash indicates factors contributing to the crash and vehicle movements immediately prior to the crash. There are several limitations to this data. The responding officer relies on eyewitness accounts, which means the data reported may be inaccurate or omitted all together. In addition, inaccurate reporting can result because of the large number of contributing factor options from which an officer might choose.

Reported Contributing Factor

Table 9 shows reported contributing factors for people in bicyclist- and pedestrian-involved crashes. Contributing factors with the top five totals across all three modes are shown. The majority of crashes have “no clear factor” reported. However, controlling for this, some contributing factors stand out. The data was formatted by color to indicate frequency of reported contributing factor. Reds and warmer colors indicate a higher number of crashes, greens and cooler colors indicate fewer crashes.

Failure to yield was the most commonly reported contributing factor. Failing to yield by a driver was listed as the contributing factor 21 percent of the time, by a bicyclist 12 percent of the time, and by a pedestrian 5 percent of the time.

Table 9: Top Five Reported Factors Contributing to Crash

REPORTED CONTRIBUTING FACTOR	DRIVER	BICYCLIST	PEDESTRIAN	TOTAL
Failed to yield	194	56	27	277
Vision obstructed	72	13	15	100
Weather	27	2	24	53
Operated vehicle in erratic manner	25	3	0	28
Disregard traffic signs	6	13	3	22
No clear factor	449	308	426	1,183
Other	42	33	69	144

Light Conditions at Time of Crash

Table 10 shows the light conditions at the time of crash. Most frequently, crashes occurred during daylight hours. This is likely due to the fact that most bicycle and foot traffic occurs during the day. 16 percent of all crashes occurred during dark hours on roadways that were lighted.

Table 10: Light Conditions at the Time of Crash

LIGHT CONDITIONS	BICYCLIST-INVOLVED CRASH	PEDESTRIAN-INVOLVED CRASH	TOTAL
Unknown	2	3	5
Daylight	389	327	716
Dawn	14	15	29
Dusk	10	21	31
Dark (Lighted)	42	115	157
Dark (Unlighted)	9	53	62
Total	466	534	1,000

Alcohol or Drug Involvement

Table 11 shows the presence of alcohol and drugs in people involved in crashes. While drugs or alcohol were not a factor in most crashes, 13 percent of people walking were under the influence of alcohol at the time the reporting officer arrived on scene. In 13 out of 43 crashes resulting in a fatality, drugs and/or alcohol was present in at least one of the crash victims.

Table 11: Alcohol or Drugs Present at the Time of Crash

ALCOHOL OR DRUGS PRESENT	DRIVER	BICYCLIST	PEDESTRIAN	TOTAL
No	764	427	429	1,620
Alcohol present	26	14	76	116
Other drugs present	2	0	1	3
Alcohol plus other drugs present	1	0	1	2
Unknown	118	27	69	214
Total	911	468	576	1,955

Systemic Safety Analysis

A Systemic Safety Analysis involves analyzing the characteristics of reported crashes to inform improvements across the entire roadway network. This technique takes a more proactive approach to crash prevention. To identify locations where crashes are more likely to occur in the future, this analysis considers road characteristics of crash locations and looks for those same road characteristics across the entire roadway network.

Road characteristics can be defined as the spatial, physical, and regulatory conditions existing along a road segment. The characteristics of a road will have an effect on the environment in which a person bicycling or walking travels. This analysis considers the following conditions at the location of a crash:

- Setting (urban or rural)
- Functional class
- Posted speed limits
- Location of the crash along the network (intersection or segment)

Additional information on the methodology of the Systemic Safety Analysis can be found in the ND Moves Active Transportation Safety Analysis Memo.

Results

The results of this analysis reveal what type of roadways, if any, had a disproportionately high number of crashes reported on them. By understanding where crashes occur more frequently, recommendations to mitigate potential crashes can be developed that respond to roadway characteristics common among high-crash locations.

Identification of Risk Factors

Roadway characteristics that are overrepresented in reported crashes are referred to as risk factors.

Crashes on urban roadways accounted for 82 percent of all reported crashes, while urban roadways only make up three percent of total state roadway miles. It should be noted that the majority of vehicle miles traveled (VMT) occur on the urban network. In particular, crashes on urban principal arterial roadways with speeds equal to or less than 40 miles per hour (mph) account for over 76 percent of all statewide reported crashes and 45 percent of fatal or severe injury crashes, while only representing two percent of all state roadway miles. Crashes on urban principal arterial roads with posted speeds of 25 or 30 mph were more common than those on roads with speeds of 35 or 40 (52 versus 23 percent of all crashes, respectively). Because a high number of crashes occurred on a low percentage of roadways, the state could see significant safety benefits from focusing investments on these urban roadways.

Crashes on rural roadways accounted for 18 percent of total number of crashes, but 52 percent of all resulting in a fatality or severe injury. Twenty-three percent of all severe and fatal crashes occurred on rural principal arterials with posted speed limits at or greater than 40 mph.

Of all 336 crashes, 58 percent of crashes occurred at intersections and 42 percent occurred along segments or were not intersection-related. In urban areas, 67 percent of crashes occurred at intersections, while in rural areas, 82 percent of crashes occurred on segments or were not intersection-related.

Discussion of Risk Factors

Crashes on urban roadways make up the majority of all crashes. This is expected, as most of the walking and bicycling activity in North Dakota is concentrated in cities, where destinations are closer and more connected, and populations are higher. Crashes occurred more often on urban roads with lower speeds. This may be because people walking and bicycling feel uncomfortable on higher speed roadways and, therefore, avoid traveling on them. Higher speeds have been positively correlated to injury severity in crashes involving people walking and bicycling²⁶. Research shows that there is a 25 percent chance of severe injury to a pedestrian or a bicyclist if struck by a vehicle moving 25 mph. The risk of severe injury increases to nearly 70 percent at 45 mph.

In rural areas, where crashes were less common, the chance of a crash resulting in a severe injury or fatality was much higher compared to urban areas (55 percent vs 11 percent, respectively). This is likely because motor vehicle speeds are generally higher on rural roadways and there are fewer dedicated facilities for people walking and bicycling. Rural roadways also have a higher proportion of crashes that occurred along a segment, instead of at an intersection. This is likely due to the lack of facilities and a less dense network of intersecting roadways.

Public Transit Demand

Population growth and demographic trends are impacting the need for public transportation service across North Dakota. The state is expected to reach a population of approximately 992,000 by 2040, an increase of 20.4 percent from the projected 2020. However, the factors driving demand for public transportation extend beyond population. Underlying demographic trends reinforce a context of increasing demand for services, with transportation-disadvantaged populations, such as the people with disabilities, seniors, and people with low-incomes, likely to increase in the coming decades.

The objective of this analysis was to identify the existing and projected need for public transit services in North Dakota and evaluate if existing public transit service levels will address identified need now and in the year 2040.

Methodology

The analysis was completed through a multi-step process that considered various factors contributing to the need for public transit services in the state, including population²⁷, population age 65 and older, population at or below 185 percent of the poverty line, population with a disability age 18 and older, and person-to-vehicle ratio (for people age 16 and older)²⁸.

To evaluate service levels, the state was divided into service areas, including four urban areas and 20 rural areas. Urban and rural areas were analyzed separately due to differences in public transit needs and services. The analysis in the urban areas focused on fixed route service only in order to compare a uniform service across service areas.

A five-factor Transit Needs Index was developed to measure the 2016 and 2040 need for public transit service within North Dakota. Benchmark public transit service levels for revenue miles per capita and revenue hours per capita were established using national rural and small urban public transit service level averages and adjusted for each public transit service area within the state according to local need, as identified by the Transit Needs Index. 2016 and 2040 public transit service levels for each service area were measured against adjusted benchmark levels, and 2016 and 2040 public transit service gaps were identified. This process is summarized in Figure 14. Additional information on this methodology can be found in the ND Moves Existing and Projected Demand Memo.

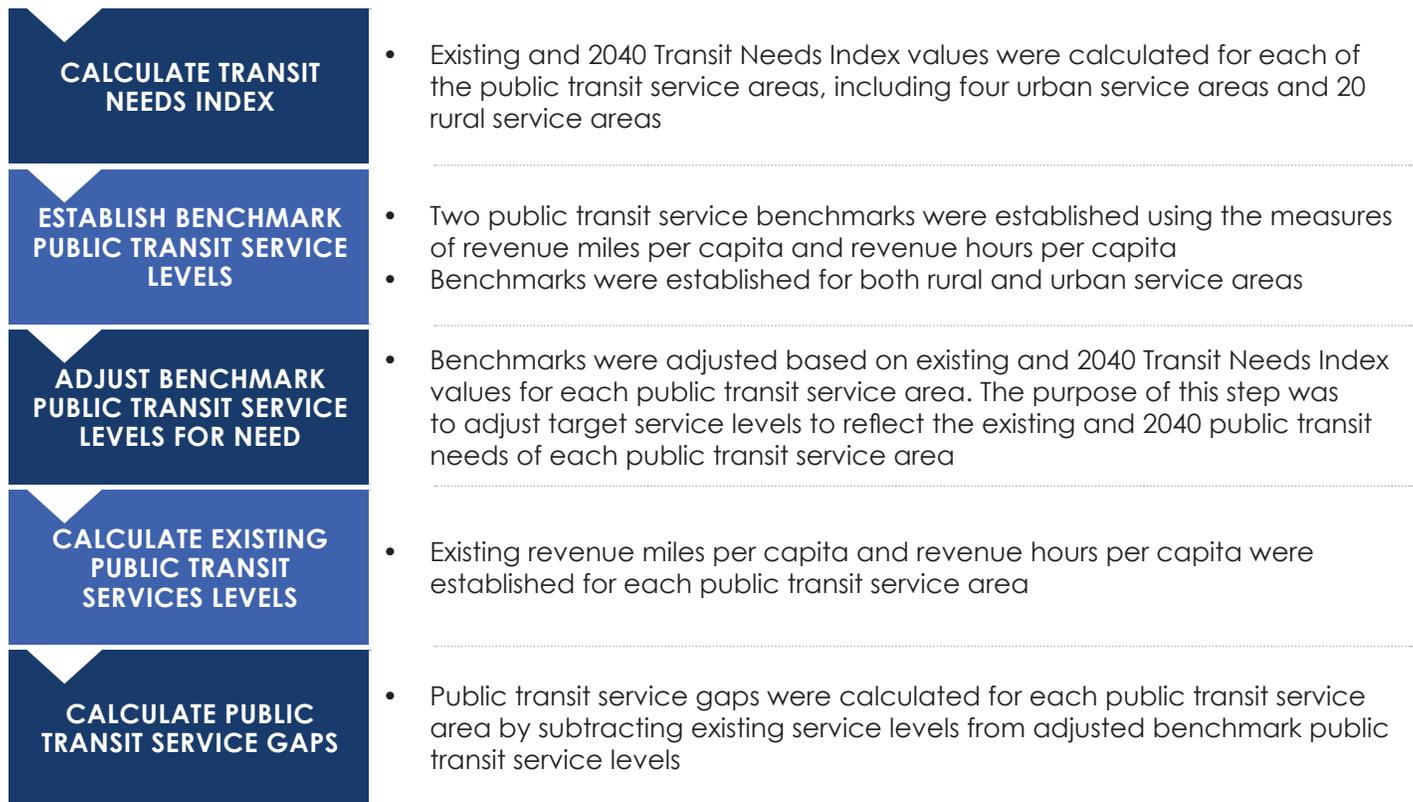
²⁶ Tefft, B. C. Impact speed and a pedestrian's risk of severe injury or death. *Accident Analysis & Prevention* 50 (2013) 871-878.

²⁷ Total population data was obtained from North Dakota Census Office Population Projections of the State, Regions and Counties 2016.

²⁸ Population age 65 and older, population at or below 185% of the poverty line, population with a disability age 18 and older, and person-to-vehicle ratio data was obtained from the 2012-2016 American Community Survey 5-Year Estimates.

²⁹ This analysis assumes that older adults (65+), people with disabilities, people with low-incomes, and those with less access to a vehicle are more likely to need public transit services; these groups are referred to here as "transportation-disadvantaged".

Figure 14: Public Transit Service Gap Calculation



Results

The Transit Needs Index indicates existing and 2040 public transit need to be highest in counties with large populations, as well as some in less-populated counties with high concentrations of transportation-disadvantaged populations²⁹. The largest variations in need from the present to 2040 are visible in counties expected to experience large population changes.

Ten (56%) of the eighteen rural public transit service areas have no public transit gaps in 2016 when measured against either service benchmark. Three (17%) of these service areas forecast a service gap emerging by 2040 based on one of the service benchmarks. Two (11%) rural public transit service areas show no service gaps now or in 2040 when measured against the benchmark of vehicle revenue hours per capita but gaps when measured against the benchmark of vehicle revenue miles per capita. Six (33%) rural public transit

service areas show public transit service gaps both in the present and in 2040 when measured against both service level benchmarks. The Stark County service area (the area in which Stark County Council on Aging / Elder Care operates) has the greatest gaps, which supports the proposed addition of fixed route service in Dickinson. The 2040 rural service gaps are shown in Figure 15 and Figure 16.

Three urban public transit service areas (Cities Area Transit, Bis-Man Transit, and Minot City Bus) have service gaps both in the present and 2040 when measured against either benchmark. MATBUS, shows service gaps now and in 2040 when measured against the benchmark of vehicle revenue miles per capita but presents no existing or 2040 gaps when measured against the benchmark of vehicle revenue hours per capita. The 2040 urban service gaps are shown in Figure 17 and Figure 18.

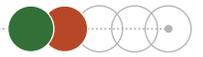


Figure 15: 2040 Public Transit Service Gaps by Rural Transit Service Area (Vehicle Revenue Miles per Capita)

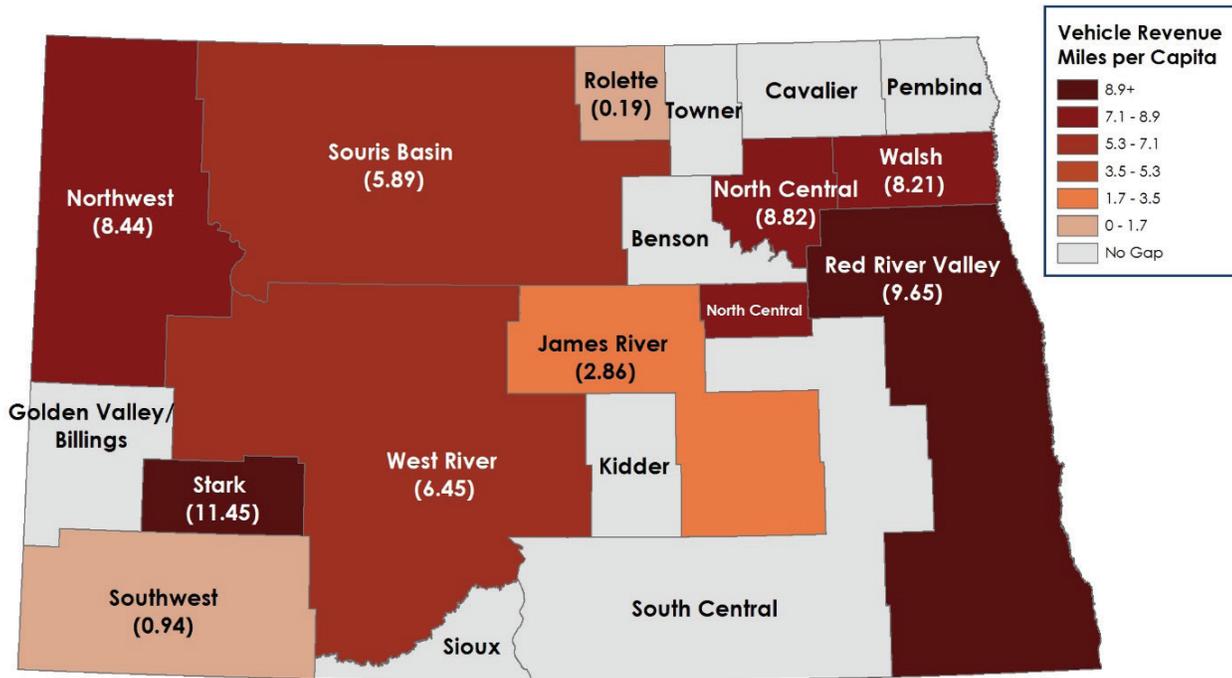


Figure 16: 2040 Public Transit Service Gaps by Rural Public Transit Service Area (Revenue Hours per Capita)

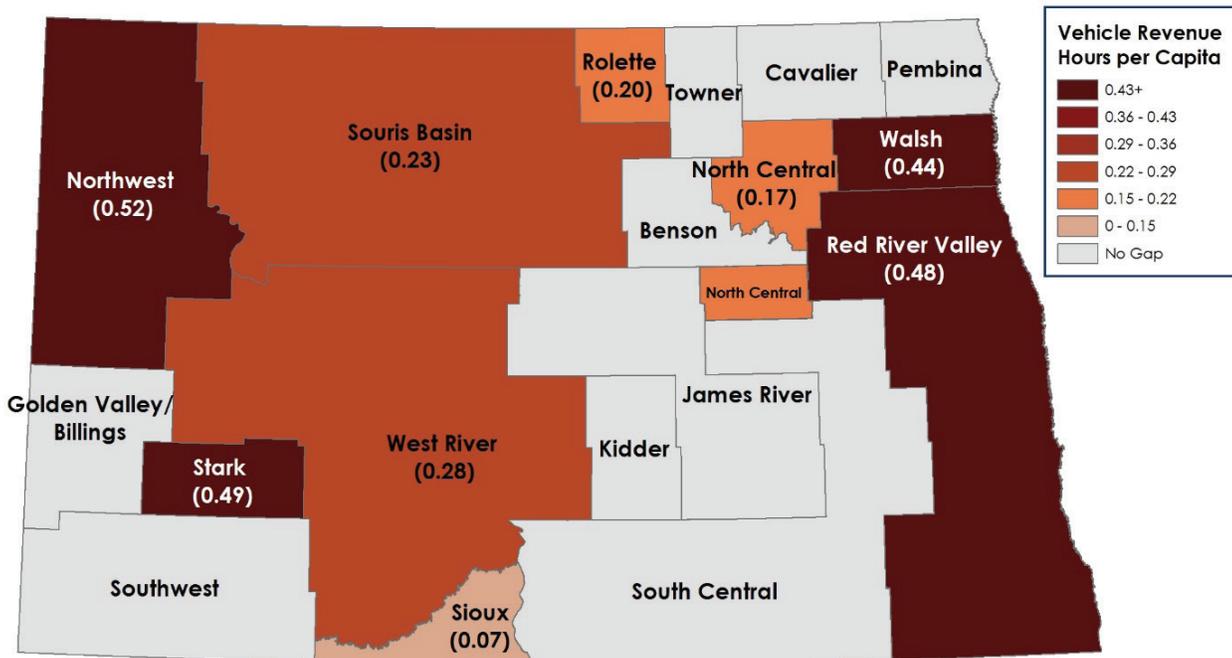
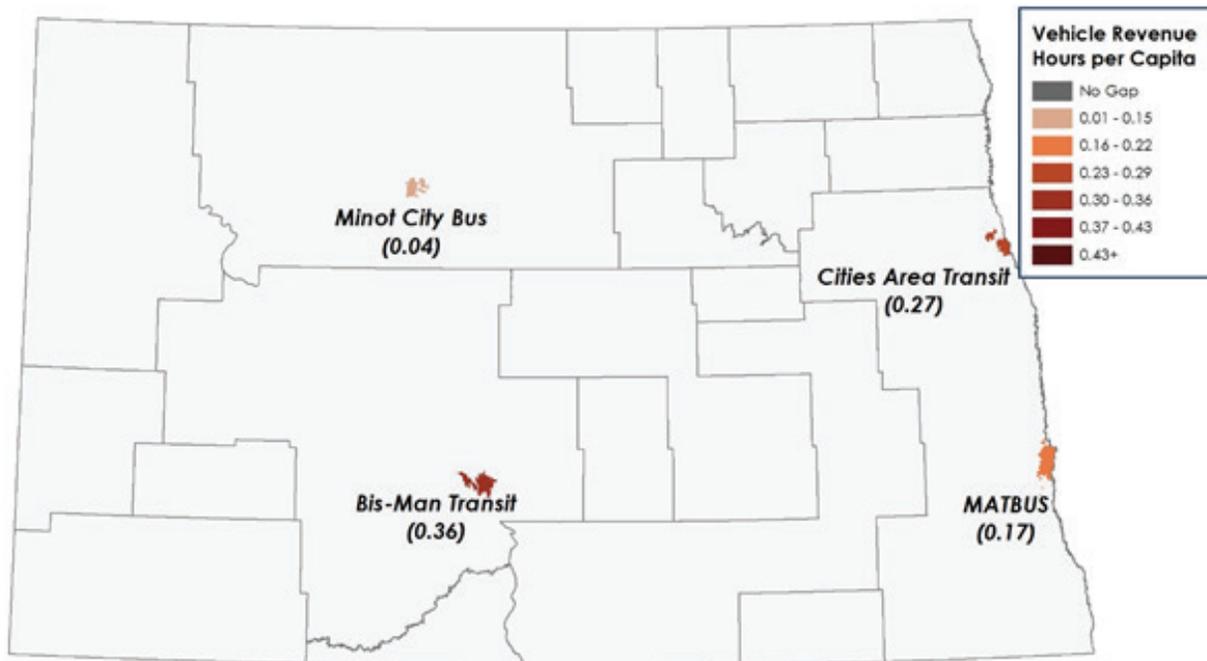


Figure 17: 2040 Public Transit Service Gaps by Urban Public Transit Service Area (Vehicle Revenue Miles per Capita)



Figure 18: 2040 Public Transit Service Gaps by Urban Public Transit Service Area (Vehicle Revenue Hours per Capita)



Public Transit Asset Management

Current Conditions

Maintaining and replacing public transit assets is essential to the successful operations and financial sustainability of public transit in North Dakota. The purpose of this section is to document the existing public transit assets and the age of the assets throughout the state and compare these ages with industry useful life standards of the assets. Additionally, this document identifies replacement needs for these assets based on NDDOT's established targets for State of Good Repair (SGR).

Methodology

The FTA's Transit Economic Requirements Model (TERM) Lite tool estimates public transit capital investment needs over an extended time horizon. It estimates asset condition based on age, useful life, and asset decay curves. This tool was used to identify the current condition of the North Dakota public transit system features and create recommendations for resource allocation to reach and maintain a SGR for years to come.

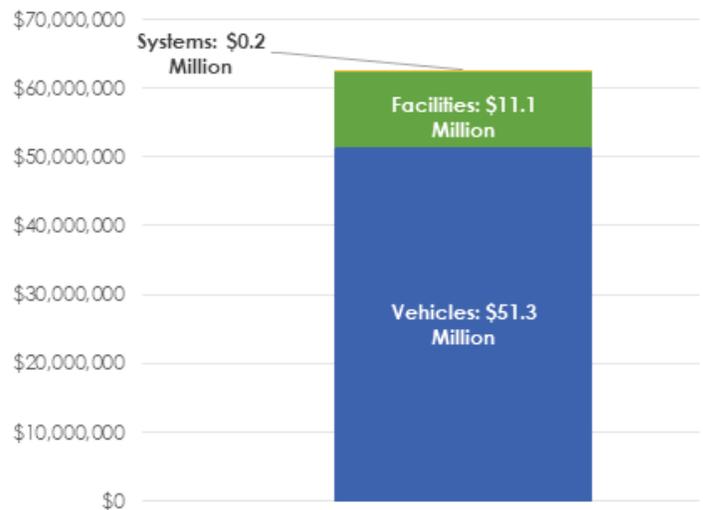
Inputs

Inputs for the TERM Lite model included vehicles, systems, and facility inventories received from NDDOT (systems and facility inventories were only provided for rural providers). These inventories included a range of revenue and non-revenue vehicle types, from heavy duty, large buses to minivans and automobiles. Facilities included buildings and storage yards. Equipment included revenue collection systems.

Asset Inventory Replacement Value

The existing replacement value of North Dakota's public transit system capital assets is \$62.6 million. Vehicles, make up the largest single asset type at \$51.3 million

Figure 19: 2018 Asset Replacement Values



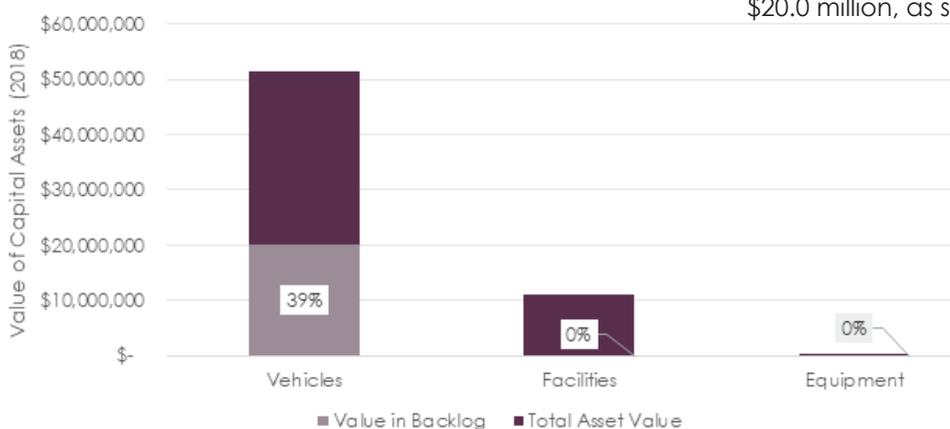
in value. Facilities make up about 18 percent of asset value and systems is less than one percent of total assets. Figure 19 above compares the asset values for each category.

Asset Conditions

An asset is in a SGR if it has not reached the end of its useful life. The useful life of vehicle, system, and facility assets used for this analysis was defined using NDDOT standards.

The SGR backlog represents the value of all assets in the statewide public transit system that are beyond their useful life and should be replaced. Based on the provided inventory, 33 percent of the total value of North Dakota's public transit system is in backlog. This is largely reflective of all public transit facility assets (buildings and storage yards) being in a state of good repair, but 39 percent of vehicle assets being beyond their useful life. The current total asset value in backlog is \$20.0 million, as shown in Figure 20.

Figure 20: NDDOT Public Transit Capital Backlog





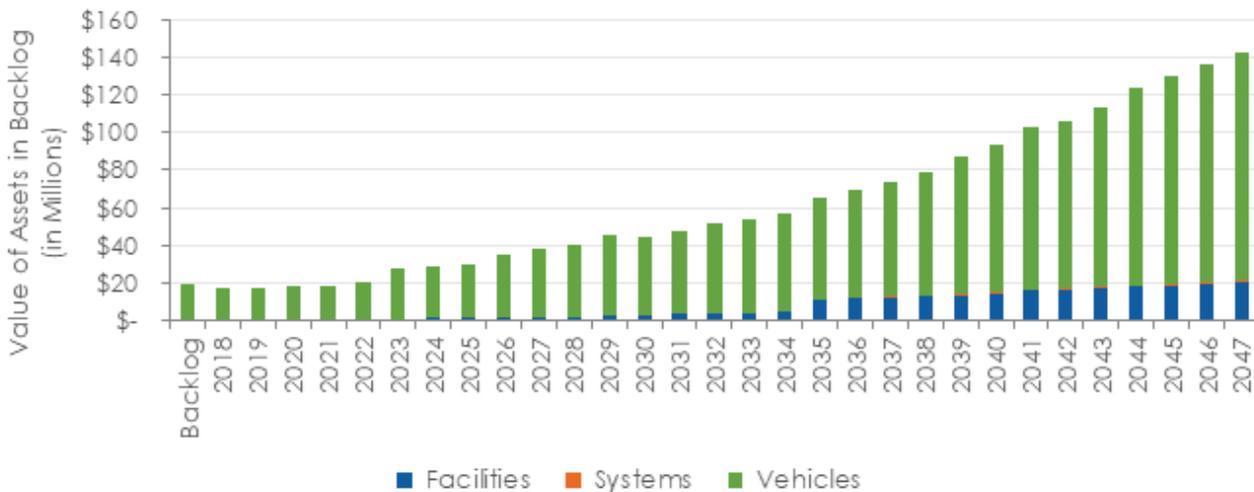
Recommendations for Guiding Resources

Current Funding Scenario

Maintain 2019 Funding

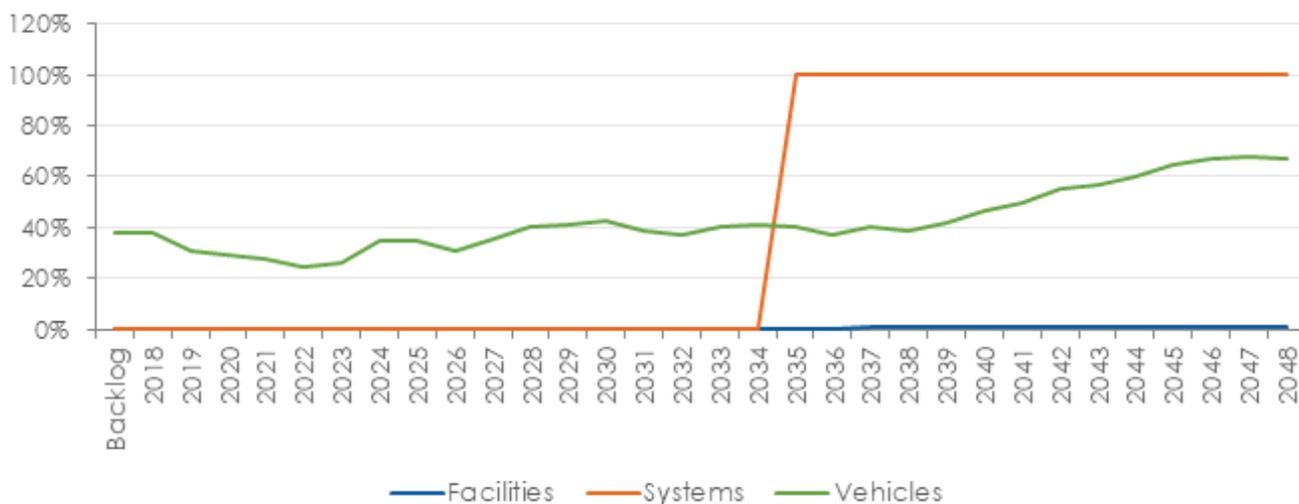
Two different “current funding” scenarios were considered, given that funding for 2019 is significantly higher than the average annual funding over the past three years (2016-2018). The first scenario considered constant, annual funding at the current, 2019 funding level of \$4.7 million per year. In this scenario, \$146.3 million dollars is invested in capital assets over 30 years without resolving the SGR backlog. In fact, the SGR backlog increases significantly over the 30-year period, increasing to over \$140 million (Figure 21).

Figure 21: State of Good Repair Backlog Maintaining 2019 Annual Funding



Not all assets have consistent backlog in this scenario. Vehicle backlog steadily increases over the 30-year time frame, while systems will reach a backlog of 100 percent in 2035, and the facilities backlog will remain at nearly 0 percent (Figure 22). The sudden increase in backlog of the systems category is because the only system asset is a farebox payment system.

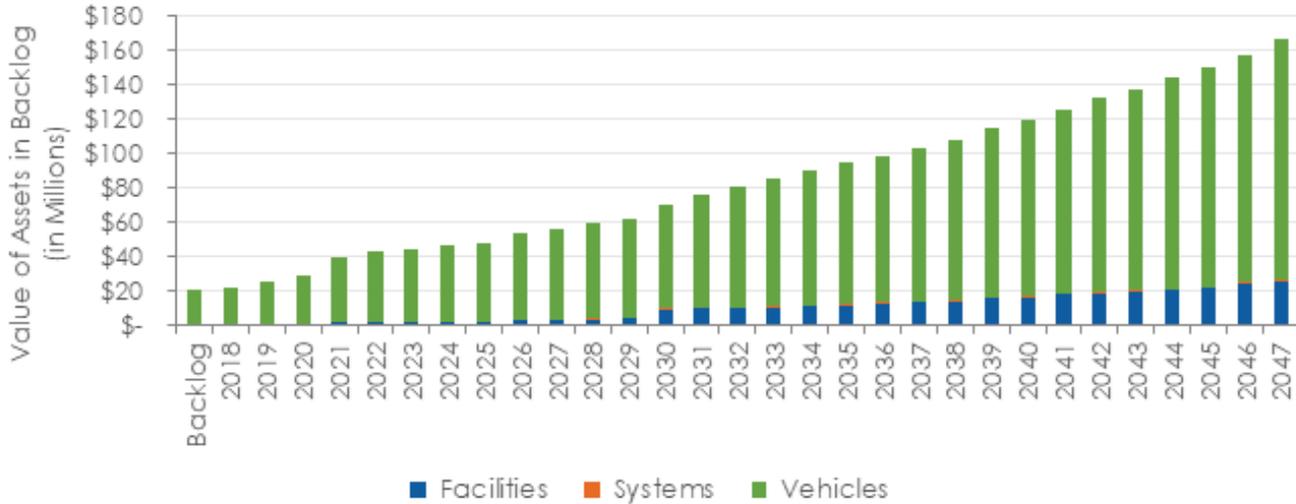
Figure 22: Percent of Replaceable Assets that Exceed Their Useful Life by Maintaining 2019 Annual Funding



Maintain Average of 2016-2018 Funding

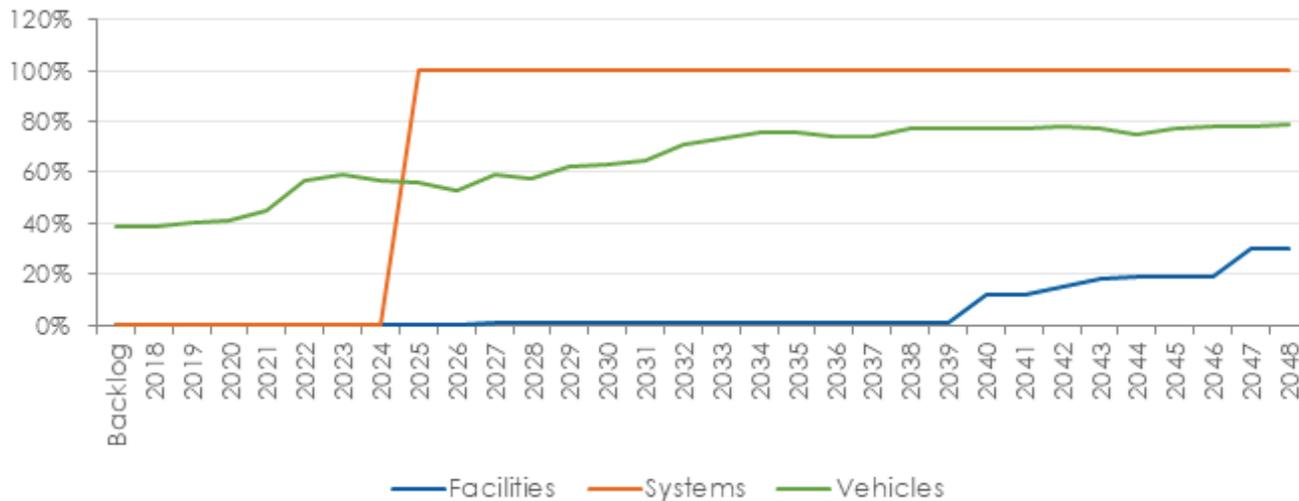
The second “current funding” scenario considers a constant funding level at the average annual funding level from 2016 to 2018 nearly \$2.7 million per year. In this scenario, \$82.8 million dollars is invested in capital assets over 30 years with similar results to the first scenario of maintaining funding at the 2019 funding level. SGR backlog steadily increases over the 30-year time period to over \$160 million (Figure 23).

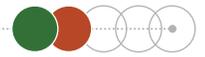
Figure 23: State of Good Repair Backlog Maintaining an Average of 2016-2018 Annual Funding



Much like the previous scenario, vehicles backlog will steadily increase, systems backlog will reach 100 percent in 2024 when the farebox system is not replaced and reaches the end of its useful life, and the facilities will begin to grow a backlog in 2039 (Figure 24).

Figure 24: Percent of Replaceable Assets that Exceed Their Useful Life by Maintaining an Average of 2016-2018 Annual Funding





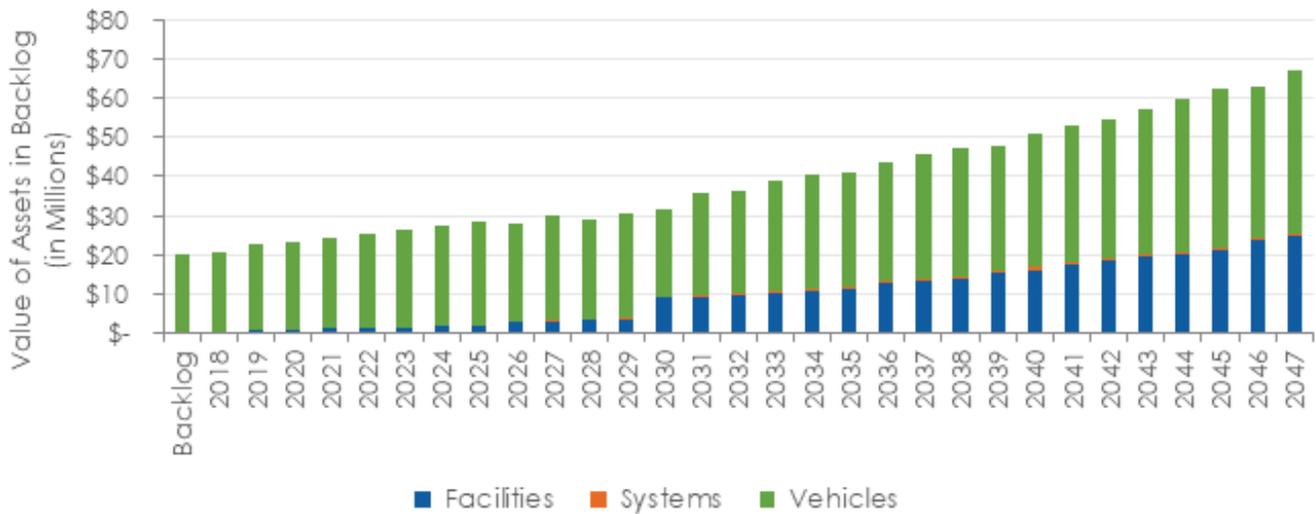
Backlog Management Scenarios

Two scenarios have been considered that would allow public transit providers in North Dakota to manage SGR backlog over a time period of 30 years. These scenarios consider applying different funding levels and schedules to potentially improve SGR across the state.

Scenario 1: Maintain a Backlog of 33 Percent for 30 Years

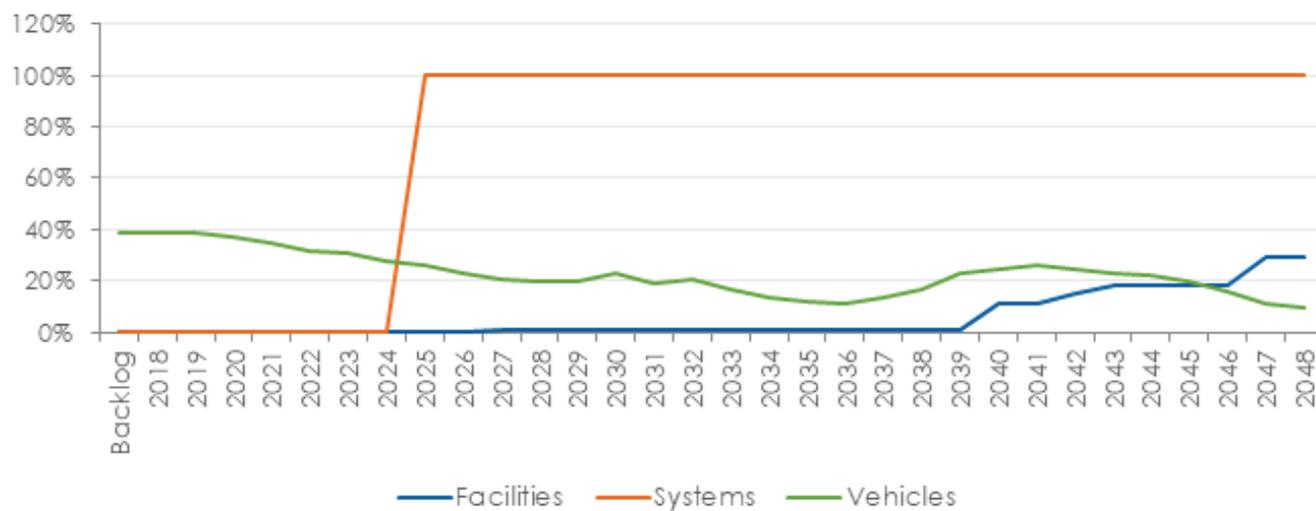
The first scenario identifies what funding level is necessary to maintain the current 33 percent backlog for 30 years. Although the dollar value of the backlog rises over time, this value, given inflation, remains at nearly 33 percent of the total capital asset value in that year. After 30 years, this scenario results in a backlog of roughly half the backlog in the two “current level” scenarios (Figure 25).

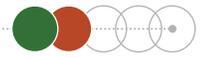
Figure 25: State of Good Repair Backlog Maintaining Backlog for 15 Years



After 15 years, the SGR backlog begins to steadily increase, but vehicle SGR significantly improves over this time period and vehicle backlog continues to remain low after the 15-year mark. However, facilities SGR begins to deteriorate around 2039 (Figure 26).

Figure 26: Percent of Replaceable Assets that Exceed Their Useful Life by Maintaining Backlog for 15 Years





Scenario 2: Reduce Backlog by 25 Percent Incrementally

The goal of the second scenario is to reduce the backlog by 25 percent over 15 years. The backlog would then be maintained at that constant reduced percentage of all assets during years 15-30. This scenario results in the best overall statewide SGR after 30 years, with backlog remaining below current conditions, despite some increase in backlog after the 15-year mark. However, by 2047 the facilities backlog has increased to nearly the level of the current vehicle backlog (Figure 27 and Figure 28).

Figure 27: State of Good Repair Backlog Reducing Backlog Incrementally

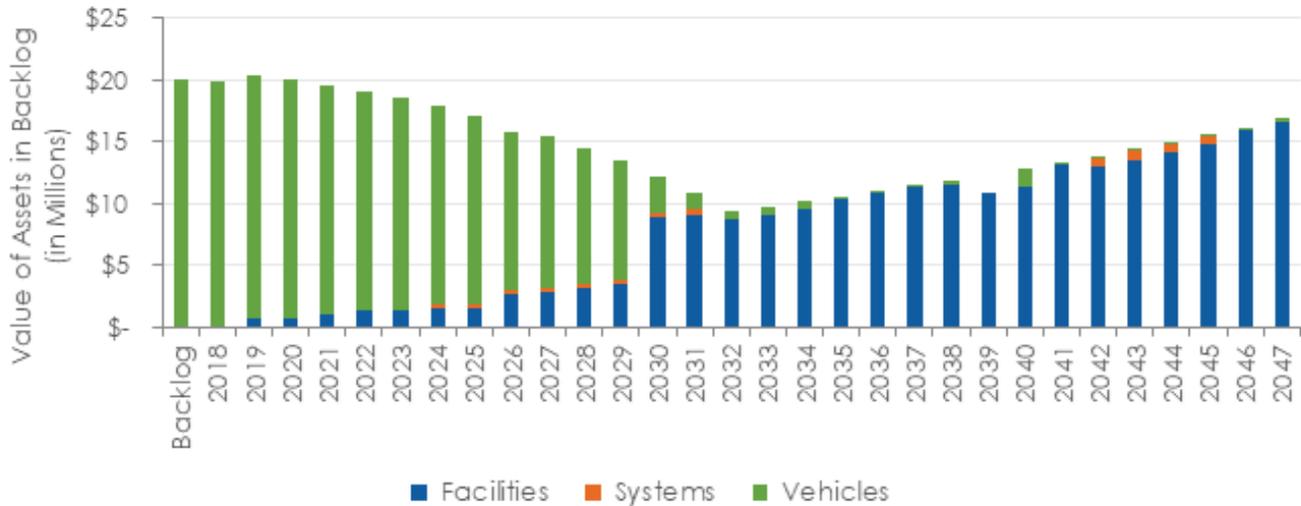
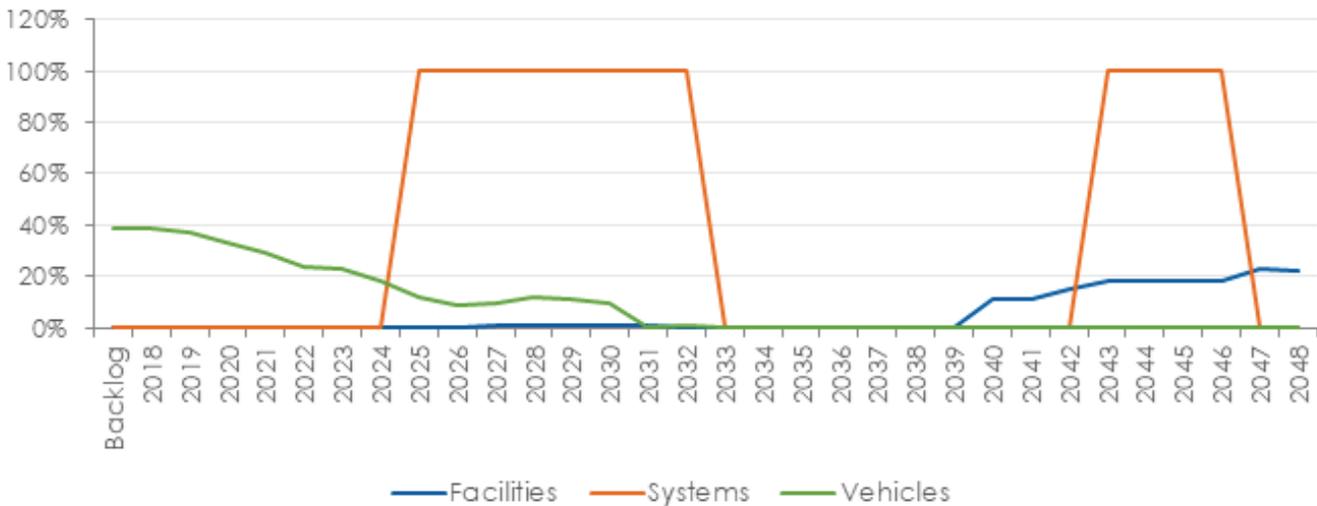


Figure 28: Percent of Replaceable Assets that Exceed Their Useful Life by Reducing Backlog Incrementally



To achieve this reduction in backlog, investments per year would need to increase. Every year has at least \$5 million in capital investments, and four years have annual investments of over \$20 million. The average annual investment over the 30 years that the 25 percent backlog is being maintained is \$13.2 million.

Goals and Investment Thresholds

Even given the recent increase in public transit capital funding, maintaining the current (or historical) funding levels for public transit capital assets will result in a substantial increase in the number of assets that are not within a state of good repair.

To provide guidance on the resources necessary to effectively manage the asset backlog, two scenarios were evaluated. Both scenarios will require additional funding be allocated to capital assets, averaging \$10 and \$13 million per year.

The scenarios primarily target the vehicle assets because they make up the largest percent value of North

Dakota's public transit assets and because they have a shorter lifespan than the system and facility assets. Targeting vehicle asset investments will help to reduce and maintain backlog in the short- to mid-range but it will be important to be aware of the facility needs that will need to be addressed during the second 15 years of the 30-year investment period.

The next steps for NDDOT could include:

- What funding levels are appropriate and feasible to address the existing backlog
- Vehicles can be replaced annually. Consideration of the larger facilities items will affect the SGR drastically in the year it is purchased.

Emerging Issues and Trends

Technology, demographics, and consumer demands are shifting rapidly. This section is intended to support NDDOT in responding to these changes, focusing specifically on four focus areas: renewed demand for walkable, revitalized communities with strong downtowns and main streets; changing demographics and geographies; shared mobility and technology; and the nascent movement toward automating vehicles.

Revitalizing Communities: Main Streets and Downtowns

The Main Street Initiative is a new program proposed by the State of North Dakota. It is based on three pillars: a skilled workforce; smart, efficient infrastructure; and healthy, vibrant communities. The program was developed with the belief that the three pillars are linked and necessary to create stronger and more economically sustainable communities.

Most relevant to ND Moves are the pillars of smart, efficient infrastructure and healthy, vibrant communities. Under smart, efficient infrastructure is a focus on reinvesting in existing infrastructure and restoring and rebuilding neighborhoods to mitigate large investments in new greenfield developments that result in higher property taxes and government spending. The healthy, vibrant communities pillar pursues mixed use developments to create strong main streets and walkable neighborhoods, resulting in improved health outcomes. Both of these pillars seek more compact communities that either directly or indirectly would support more biking, walking, and public transit.

The action of community building and placemaking is a collaborative effort undertaken by several different units of government and the public and private sectors. Transportation serves as an important function

in community building and placemaking but it is not the only function a community services. NDDOT should seek to understand broader community goals for the adjacent built environment and balance overall transportation goals with local community goals.

In combination with the Main Street Initiative, NDDOT has implemented the Urban Grant Program (UGP), which reallocates some federal funds from existing programs into a competitive fund. The UGP will allow urban communities (population over 5,000) to compete for funds based on how well the proposed project(s) meet the objectives of the program.

In addition to the UGP, NDDOT has also been working on several additional efforts related to potential changes to changing customer demand.

Implications

Active Transportation

The combination of changing consumer demand, the Main Street Initiative, and competitive UGP will likely result in a measured change in investments in active transportation in North Dakota's urban communities. Communities have started to leverage these UGP new funds to develop active transportation projects once considered out of reach due to fiscal constraint or limitations on other funding programs. As was seen with the first round of awards, many of these projects are core streetscape and active transportation focused.

Communities will need to be prepared to demonstrate active transportation projects were the result of a sound planning process with public support and estimate their economic impact to be well-positioned for the UGP.

Public Transportation

For most of North Dakota's public transit providers, service models are regional in nature, and focus more on large geographic coverage areas. Nonetheless, the continued focus on downtowns and main streets will have potential impact on service models in North Dakota's medium and large-sized cities. There is the need to understand new and emerging service models to better create multimodal public transit services in North Dakota's largest urban areas. The Bismarck, Fargo, and Grand Forks metro areas complete regular updates to their long-range public transit planning. As of early 2018, Minot and Dickinson had also completed public transit planning studies. Additional planning efforts will be necessary for cities like Minot, Dickinson, and Williston as they evaluate new and/or improved service.

Changing Demographics and Geographies

Dynamics within North Dakota's largest communities are shifting quickly and differ greatly from conditions in smaller less urban areas of the state. Understanding the specifics of these trends will assist in ensuring ND Moves provides guidance relevant and useful to North Dakota's larger urban areas in the provision of active and public transportation assets. Policy, infrastructure and programming guidance needs to be geographically and context sensitive to unique conditions in North Dakota's largest urban and metropolitan areas.

Large Communities

Population and Households

The largest communities in North Dakota (Bismarck, Fargo, West Fargo, Grand Forks, Dickinson, Minot, and Williston) comprise a major component of North Dakota's population and households.

The population growth rate of most of the largest cities in North Dakota outpaced the overall North Dakota population growth rate. The growth in these communities nearly equaled the entire population growth (99.9 percent) of the state. In 2000, these seven communities made up 42.9 percent of the total state population, but by 2015, these communities made up 49.1 percent of the total state population. Like population growth, the growth in households in the largest cities outpaced the state. More than half of North Dakota's households are now in the largest seven cities.

Age

Many of these communities are younger than the state average but have a higher proportion of households over 65. These communities also have a higher proportion of renters, who are typically more mobile than homeowners and may be adversely affected by rising property values.

Commuting Patterns

The percent of workers who bike, walk, or take public transit in large communities varies from 1.8 percent in West Fargo to 5.7 percent in Fargo. The statewide rate of 4.8 percent is much higher than the rate in many of the large communities, suggesting that workers in small towns walk or bike to work more than residents of large communities.

Fargo and Grand Forks have many more households with no vehicles, and individuals below the poverty line, than the state average. This is likely associated with the large university student populations.

Rural Change & Aging Population

North Dakota's rural communities continue to evolve, including an increase in the percentage of older adults. The trends on rural change and aging largely depend on the geography. In the Bakken Region, young families moved into small communities for work during the oil boom, and many stayed, resulting in small population growth and pushing the median age down. However, outside of the Bakken region, many small communities are seeing decreased population growth overall and an increasing median age.

Since 2013, North Dakota's 60 years and older population has hovered around 20 percent of the total population. Of North Dakota's 53 counties, 42 of them are older than the statewide average. Many of these older than average counties are classified as "frontier" with just six people per square mile or less. From 2010 to 2015, 18 counties saw their percent of the population 60 and older decline, including 15 extremely rural counties. All four urban counties saw their 60 and older population increase. This follows nationwide trends of older individuals moving to urban areas for services.

Planning for Change

The recent energy boom in western North Dakota points out the need to develop proactive planning processes to prepare rural and smaller urban communities in North Dakota to respond to rapidly changing conditions. ND Moves will explore changes in statewide, regional, and local planning practices which leave rural/small urban areas and NDDOT better prepared to respond to changing conditions. This points towards the

development of a more formal regional/rural planning approaches to support greater resiliency in community planning efforts for active and public transportation.

Implications

Active Transportation

Investing in active transportation will be important to maintain a high quality of life and support economic development in North Dakota's growing urban communities and evolving rural communities. Studies show that the integration of active transportation features can improve property values.

Maintaining High Quality of Life

In both urban and rural communities, active transportation can play a role in supporting pedestrians with visual and mobility impairments and in supporting residents as they age. Providing safe places to walk and bike is an important component of supporting people with visual and mobility impairments in moving independently, accessing employment, improving their health, and maintaining connections to their communities. Supporting walking and biking-oriented small-town growth centers and clusters will meet resident demands for economic resiliency and self-sufficiency, especially as residents age.

As urban areas attract more young adults and families, the landscape for walking and biking is shifting. Families expect connected sidewalk networks and safe, protected places to ride bikes. Cities will need to respond with higher quality infrastructure as well as education and encouragement programming.

Supporting Economic Development

Active transportation options can support the growing workforce in North Dakota's urban areas, both by attracting workers and reducing the demand for costly new parking facilities and wider roadways that could accompany economic development.

Planning forecasts and policy will need to take into account changing trip patterns as preferences shift toward more active lifestyles. Policy should support employer efforts to promote multimodal travel. Employers can use Transportation Demand Management (TDM) programs to attract new workers, retain current workers, and reduce costs related to healthcare, lost time, and parking space.

Public Transportation

The shifting demographic trends discussed herein create a range of implications for mobility. With these changes in mind, public transportation is and will continue to be an important component of a connected multimodal transportation network in both urban and rural communities across North Dakota.

Investing in public transportation can help support mobility in all communities to maintain quality of life and economic development by creating an independent workforce and attracting and retaining young talent. This section summarizes prominent implications related to public transportation amidst the changing demographic characteristics of North Dakota.

Connecting Individuals with Mobility Impairments

As the population in North Dakota continues to age, it will become increasingly important to provide adequate mobility opportunities to older adults and all people with mobility impairments. According to *Identifying and Satisfying Mobility Needs in North Dakota's Transit System*³⁰, in 2015, almost 8 percent of working age people (21 to 64) in North Dakota had some disability. In the same year, about 26 percent of adults ages 65-74 had a disability and almost 50 percent of people ages 75 and older had a disability of some kind. By making public transit accessible for these populations, North Dakota will also increase accessibility for people of all ages and physical abilities.

Demographic and Geographic Changes

Demographic changes and urbanization trends are likely to increase demand for public transit due to a variety of factors:

- Population growth leading to continued urbanization, as seen in Minot, Dickinson, and Williston, among other communities, is likely to drive the transition to more urban public transit system needs
- The growth in specific populations of aging Baby Boomers, older children, and young professionals is likely to increase demand in fixed route and demand response public transit
- Focusing on Main Street and established neighborhoods through infill development and redevelopment, will likely create more public transit supportive densities, likely to increase demand in fixed route public transit

³⁰ <http://www.ugpti.org/pubs/pdf/DP280.pdf>

Shared Mobility and Technology

Shared mobility is part of a broader emerging trend of consumers demanding access to goods and services rather than ownership (Figure 29). This idea is generally referred to as the “shared economy”. Based on revenue, the shared mobility sector is one of the fastest-growing segments of this industry. By the year 2025, experts predict that shared mobility will be worth \$35 billion.

Shared mobility is the umbrella term used to describe transportation services that are shared among users. Shared mobility encompasses a variety of mobility options and platforms which are becoming more ubiquitous in communities across the United States.

Examples of shared mobility include:

- Bikeshare
- Carshare and ridesharing (i.e., carpool, vanpool)
- Ridesourcing (i.e., Uber, Lyft)
- Shuttles and micro-transit
- Commercial delivery options
- Public transit (i.e., buses, trains)

GLOSSARY

Ride-hailing involves a customer hailing a taxi from the street, calling up a car service on the phone, or electronically hailing a car from a smartphone app.

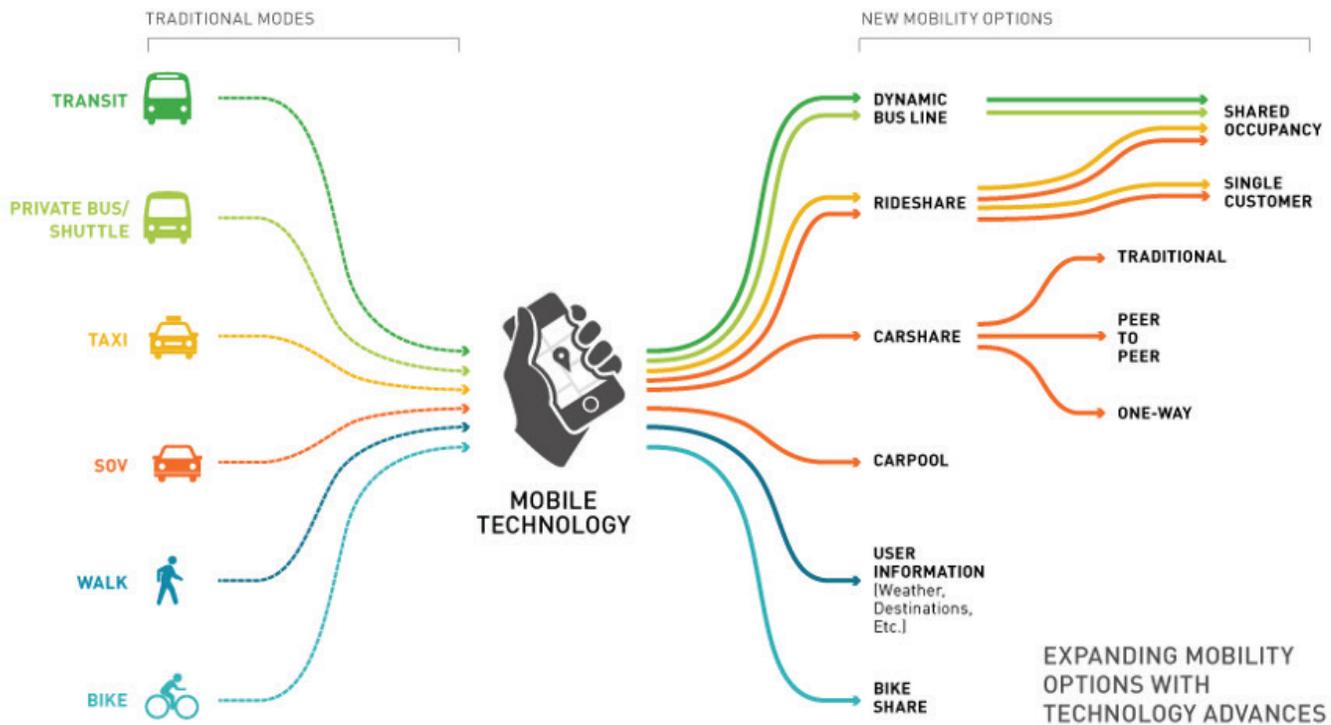
Transportation Network Companies (TNCs) connect passengers with drivers via websites and mobile apps to provide a taxi-like service.

Carsharing gives members access to an automobile for a length of time, typically less than a day.

Ridesharing is where two or more people share all or part of a trip in the same vehicle.

Microtransit refers to IT-enabled multi-passenger transportation services that use dynamically generated routes based on where passengers are located.

Figure 29. Shared and New Mobility Options (Image: Alta Planning + Design for Atlanta Regional Walk.Bike.Thrive!)



The extent to which shared mobility options reach their potential depends on policy changes, program investments, private sector participation, and consumer response. Some forms of shared mobility have greater potential to reduce VMT, gallons of gasoline consumed, and metric tons of CO₂ reduced than other forms of shared mobility.

Due to the emerging nature of shared mobility, additional data and research are needed to understand potential costs and benefits of consumers adopting these modes of transportation.

Uncertain Impact on Public Transit

The relationship between shared mobility services and public transit is constantly evolving, and several different scenarios could play out over the coming decades depending on changes in technology, policy, and traveler behavior. Shared mobility may positively impact public transit services, especially if public transit agencies thoughtfully integrate bikesharing, ride-hailing, car sharing and mobile technology into existing public transit service networks and platforms. However, some research suggests that ride-hailing services do and will continue to negatively affect established fixed route public transit services now and into the future.

Personal Devices and Apps

Access to shared mobility services often depends on technology such as mobile apps and websites. As smart phones become increasingly important to mobility, apps with real-time information are becoming essential to supporting active and public transportation. Use of trip planning technology like Google Maps is a commonplace way to plan for multi-modal trips. People record data on walking and biking trips and discover comfortable routes using apps like Strava and MapMyRun. Many public transit systems offer apps with real-time information on bus operations and mobile payment options. Governments can support this digital infrastructure by providing up-to-date information on construction and roadway conditions and can publicize apps that support mobility.

Bikeshare

A bikeshare system typically consists of a fleet of user-friendly and durable bikes placed at conveniently-located stations. Bike share is a relatively inexpensive and quick infrastructure extension to a city's public transportation system. Bike share systems are typically structured to operate like automated bike rental

for short periods. The structure encourages shorter, spontaneous trips whereby bikes are checked out, ridden for a short period of time (typically 30 minutes or less), and returned to any station in the system for someone else to use. Most systems employ some form of pricing schedule that encourages short, frequent trips and discourages bikes being in use for long periods of time. The focus is getting to nearby destinations quickly and conveniently. Generally, it is not intended to compete with bike rental, which is designed for those interested in using a bicycle continuously for longer periods of time.

Contemporary bikeshare systems generally take one of two forms:

Station-based: Bikeshare trips begin and end at modular stations throughout an urban area (Figure 30). Users access the stations through a physical key or through a code in a mobile application. Bikeshare users can purchase memberships in yearly or other increments. Users can also purchase daily passes for 24-hours' worth of trips. Users typically must dock the bike every 30 minutes to one hour.

Dockless: This type of bikeshare system is rapidly gaining momentum in North America. Dockless bikeshare systems do not require docking stations (Figure 31). Instead, users park bicycles within a defined district or in an ordinary bike rack. The bikes are unlocked and located using a smartphone application. However, operators have developed methods for users to unlock bikes without relying on smart phones or access to a bank account. Private companies are leading the push towards dockless bikeshare. New start-ups are well-funded and aim to launch many



Figure 30: Station-based Bike share (Image: Alta Planning + Design)



Figure 31: Dockless Bike share (Image: Cropped from original by David Hawgood.geograph.org.uk/photo/5546099)

more bikes at a time than were thought possible using station-based systems.

Dockless bikeshare is considered the industry's future. As discussed above, private companies and venture capitalists tout this style of bikeshare as a low-cost way for cities to deploy more bikes within a shorter timeframe, than was previously possible. Today, twenty US cities and 12 college campuses have at least one dockless bikeshare system operator present³¹.

Implications

Shared mobility options have the potential to substantially shift transportation patterns. The more people who use shared modes, the more likely they are to use public transit, own fewer cars, and spend less on transportation overall³².

Shared mobility options are supported by population size, household density, a mixture of land uses, and appropriate levels of public transit and walking commute mode shares³³. As such, NDDOT should partner with State and local agencies to foster land use planning and transportation planning decisions that support these characteristics. Shared mobility trends will impact NDDOT districts differently. Urbanized areas are generally more likely to be early adopters of these forms of transportation, compared to rural areas.

Active Transportation

The APTA/SUMC survey found that almost half of all respondents reported increased physical activity after beginning to use shared mobility options. Another study of North American roundtrip carsharing operators found that carsharing members more frequently walk, bike, and use carpool³⁴.

Reduction in Driving

Bikeshare members in North America report a reduction in driving thanks to their bikeshare membership³⁵. Bikesharing also offers the potential to influence members' motor vehicle ownership behavior. A 2013 Capital Bikeshare Member Survey for the District of Columbia region noted that four to five percent of members sold a private car as a factor of bikesharing. The study also found that members' average annual reduction in driving was 198 miles³⁶. Capital Bikeshare's membership increased by 10.5 percent in 2017. Four dockless bikeshare companies are currently operating in D.C., increasing consumer options without increasing the District's cost to expand stations or the number of bicycles in circulation.

Decreased Prices

New dockless bikeshare companies offer communities and consumers increased access to bikeshare, through a reduction in cost. For example, some dockless bikeshare companies offer rentals for substantially less money than station-based memberships or day passes. Historically, bikeshare passes have cost 10-20 percent of the cost of a public transit pass³⁷. Emerging dockless systems typically cost \$0.50 to \$1.00 per half hour.

Public Transit Integration

Bikeshare operators have long sought the ability to integrate bikeshare systems with public transit. When siting new bikeshare stations, the City of Chicago plans to locate them near public transit stations. Bikeshare members can also access bicycles using a third-party mobile application, called Transit, which also offers multimodal trip planning support. The City of Pittsburgh's bikeshare system is accessible through the local public transit agency card. Users can use the card to obtain 15 minutes of free bikeshare. This program increases the system's accessibility to low-income earners and people without access to smartphones.

³¹ https://www.washingtonpost.com/local/trafficandcommuting/will-dockless-bike-services-boost-bike-commuting-cities-are-betting-on-it/2017/12/02/4fd6216c-c895-11e7-b0cf-7689a9f2d84e_story.html?utm_term=.a1672b5aa3b9

³² <https://www.apta.com/resources/reportsandpublications/Documents/APTA-Shared-Mobility.pdf>

³³ http://sharedusemobilitycenter.org/wp-content/uploads/2015/09/SharedUseMobility_ReferenceGuide_09.25.2015.pdf

³⁴ <https://www.move-forward.com/impacts-of-shared-mobility-and-transportation-demand-management/>

³⁵ Public Bikesharing in North America During a Period of Rapid Expansion: Understanding Business Models, Industry Trends and User Impacts, Mineta Transportation Institute, MTI Report 12-29, October 2014.

³⁶ LDA Consulting. 2013 Capital Bikeshare Member Survey. May 22, 2013.

³⁷ <https://marketurbanismreport.com/a-triumph-of-riders-and-business/>

Mobility Hubs

Mobility hubs combine multiple forms of transportation in one physical location³⁸ (Figure 32). Instead of creating new buildings, mobility hubs frequently take advantage of existing well-known public transit stations or parking structures and add access to bikeshare, carshare, rideshare, car- or vanpool, and other forms of transportation. Mobility hubs are also poised to transition into logical hubs of activity for autonomous shuttles and other vehicles. As demographics and land use patterns in North Dakota change, mobility hubs may become increasingly viable.

North Dakota is also poised to help shape discussions regarding small town and rural mobility hubs. Mobility hub siting should take equity considerations in mind; their potential to offer access to a variety of services should not be isolated to wealthier areas of the state.

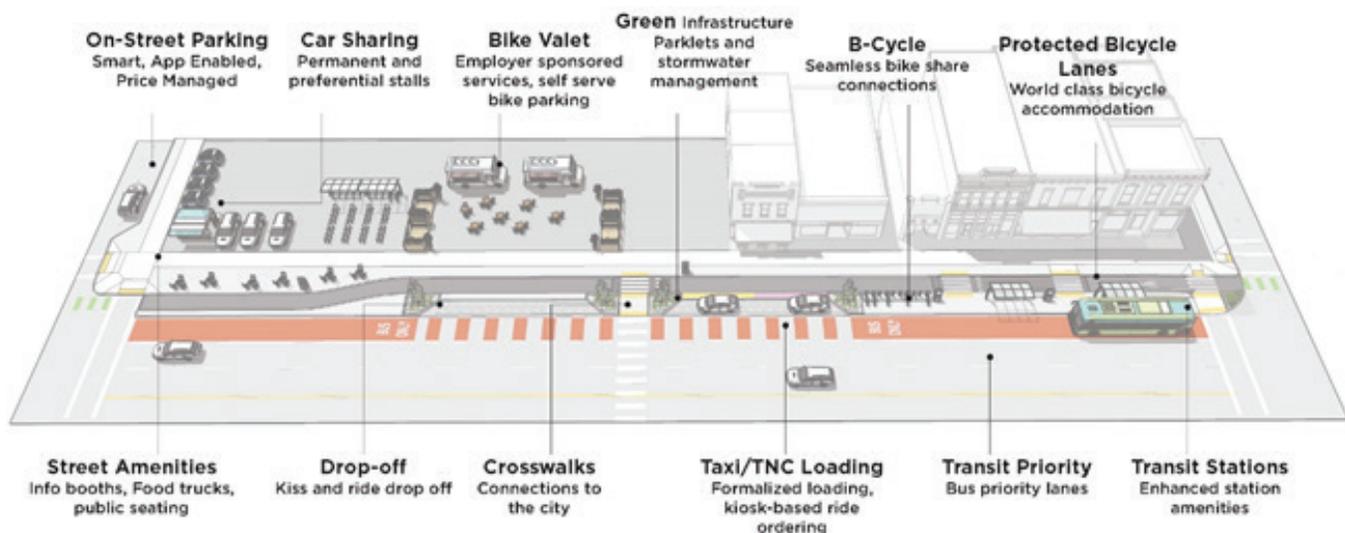
Public Transportation

Ride-Hailing/Transportation Network Companies (TNCs)

These services, which include widely known companies such as Uber and Lyft, have already made a significant impact on the way people get around.

The expansion of TNCs has numerous implications for public transit and mobility. These are articulated below.

Figure 32: Example Mobility Hub (Image: Alta Planning + Design)



These implications are important to evaluate as communities and public transit providers think about co-existing and partnering with TNCs to provide a range of mobility solutions for the public.

TNCs serve a variety of trip purposes and may be competing with public transit

In North Dakota, Uber and Lyft are operating statewide across North Dakota. For residents, this can be a convenient and flexible mobility option for rides of all kinds, whether for professional or personal purposes. For many riders, especially younger ones and ones with greater means, TNCs are becoming the preferred transportation option at the expense of public transit services.

TNCs may be increasing congestion in urban areas

The research on the topic is limited, but indications are

that TNCs are increasing congestion in denser urban environments. This congestion is being observed in commercial corridors, on university campuses, and in other places as ride-hailing vehicles angle for curb space to drop-off and pick-up riders.

Research suggests that in certain environments VMT is increasing due to ride-hailing services as many people are making trips that they otherwise would not make, or otherwise would complete by walking, biking, or taking public transit. Furthermore, empty ride-hailing vehicles circulating to pick-up riders are also impacting congestion in certain local areas, much in the same way as vehicles searching for available parking.

³⁸ <http://sharedusemobilitycenter.org/news/build-your-own-mobility-hub-7-lessons-for-cities-from-bremen-germany/>

Shared TNCs could provide important benefits in denser, congested areas with more commute trips

Ridesharing services are essentially a cheaper version of ride-hailing services. Customers with similar routes and destinations share rides and the cost of the fare decreases for both passengers. Examples include integrated shared ride-hailing options like UberPool and LyftLine, as well as carpool aggregators like Scoop, where drivers are matched with riders traveling in the same direction.

These services are particularly beneficial in higher density congested areas and provide a possible mobility option for communities, agencies, and businesses that facilitate and promote them.

Coverage and frequency is purely demand-based and, thus, unpredictable

TNC services are demand-based systems, and rides only become available when drivers determine demand will be high-enough for them to turn on the app and get on the road to pick-up riders. This means that access to ride-hailing service is unpredictable in both time of day and location. Greater access occurs in locations with greater population density and at times of day where people are traveling. Additionally, the cost of these services can be prohibitive to lower-income individuals.

TNCs can be an important ally for traditional public transit agencies and public transit service

With proper proactive measures, TNCs can be an important ally to fixed route public transit service. Lyft has a campaign called Friends with Transit that actively identifies, establishes, and communicates ways to partner with fixed route public transit services and provide important supplementary mobility services.

Carsharing

Carsharing companies and programs have been around since the middle of the 1990s. Carsharing involves sharing access to vehicles that are parked in fixed locations, such as with ZipCar.

Carsharing provides the benefits of car ownership without the financial commitment

Carsharing programs are relatively inexpensive when compared to the cost of owning a car. Like ride-hailing services, cities and regions will be able to capitalize on the benefits of these services for people who desire the freedom and flexibility of being able use a car only some of the time without the cost of gas, insurance, and maintenance.

Carsharing can be leveraged to support public transit service and promote public transit ridership

For those who use public transit, particularly those

commuting to and from work on public transit, having a shared car available during the day offers an important amenity. Shared vehicles stationed near employment centers offer employees the ability to use a car during the day for meetings and errands. This amenity makes it more likely that people will ride public transit as part of the daily routine, in which multimodal mobility platforms are integrated together.

Microtransit

The emergence of app-based and on-demand shared mobility services is changing the public transit landscape as well (Figure 33). New public transit platforms, which are public transit demand-based software like Uber and Lyft, have emerged. These services use algorithms to pick up riders requesting service along an optimized route. Planners in states, cities, and regions across the United States are evaluating the potential effect these microtransit services may have traditional fixed-route public transit service.



Figure 33: Example Microtransit Vehicle (Image: Chariot/Facebook)

Private and public microtransit platforms are emerging

Cities and start-ups are starting to experiment with microtransit due to potential public benefits or private gains from this service. Private microtransit platforms like Chariot in San Francisco have emerged.

Microtransit is not limited to the private marketplace, however. TransLoc is a company that helps public agencies to better utilize data as they implement microtransit solutions. The City of San Joaquin, California, is working with TransLoc to pilot an on-demand, flexible service that responds to the immediate needs of paratransit riders in more rural areas. The goal of microtransit in this context is to connect riders with main public transit corridors more effectively, by meeting them closer to where they are, and bringing them directly to public transit hubs where fixed service exists.

Autonomous Vehicles

Ideas about autonomous vehicles are quickly entering public discourse. Spurred by private sector technology advancements, governments are beginning to grapple with what these new technological and transportation tools might mean from safety, legal, ethical, environmental, social, and other angles.

The arrival of autonomous vehicles on a large scale is not something that will occur overnight. The technology needed to make vehicles autonomous is complex and will be phased in over the coming years and decades and may only be allowed in certain geographies when first introduced. Regulatory barriers and widespread cultural and societal acceptance also stand in the way of full-scale adoption. Despite these factors, now is the time to start thinking about and planning for this likely future.

States are working on legislative frameworks to enable autonomous vehicles, and planners are thinking about what effects autonomous vehicles may have on traffic, parking, congestion, street space, and other factors. Companies like Google, Uber, Tesla, Ford, and General Motors are developing and refining their own autonomous vehicles and investigating what a driverless future does to the business and culture of car ownership and operation.

Potential State Roles

Aspects of a possible transition to autonomous vehicles may deal with issues that States already regulate. The Autonomous Vehicle Policy Framework Summit, a national conference of professionals focused on formulating autonomous vehicle policy at different levels of government, proposed the following State-level roles with regards to AVs:

- Driver licensing
- Vehicle registration
- Traffic control
- Statewide planning
- Enacting and enforcing traffic laws
- Regulating insurance/liability
- Requirements for testing

Current Practice in North Dakota

North Dakota is one of 13 states with an executive order, limited pilot, or advisory committee related to autonomous vehicles³⁹. North Dakota's House Bill #1202 was passed by the Sixty-Fifth Legislative Assembly of North Dakota to prepare an AV transportation study.

According to the bill, "The department of transportation, in collaboration and consultation with the autonomous vehicle technology industry, shall study the use of vehicles equipped with automated driving systems on the highways in this state and the data or information stored or gathered by the use of those vehicles."⁴⁰ North Dakota's legislative review echoes NHTSA's interest in assisting states to regulate "the testing and deployment of autonomous vehicles."⁴¹

The review will evaluate current laws including:

- Licensing
- Registration
- Insurance
- Data ownership and use
- Inspection

North Dakota received \$7.5 million from the Volkswagen Clean Air Act settlement, of which 15 percent must be used for charging stations. Plans for Electric Vehicle (EV) charging stations on the I-29, I-94 and Highway 2 corridors were announced in spring 2017. I-94 from the ND/MN border to the east coast has already been identified as a zero emissions corridor by the FHWA, and new EV charging stations would extend that corridor into North Dakota. Jamestown, Fargo, Grand Forks, Pingree, Bismarck, Bowman and Prairie Knights Casino are currently the only places in North Dakota with EV charging stations.

Future Scenarios and Attention to Active and Public Transportation

Media attention, research, and public speculation primarily focuses on automotive technology related to autonomous futures. Nonetheless, states must support and encourage investments in active and public transportation even as they begin to study possible near-future scenarios involving autonomous vehicles. According to Pedestrian Bicycle Information Center (PBIC), "As vehicle technologies become more automated, navigation around and interactions with pedestrians and bicyclists in complex travel environments will determine their success."⁴²

Private sector technology companies, automotive manufacturers, and others have presented many competing visions of automated futures. However, "while numerous studies have sought to understand what the driving public wants out of future vehicles, there is currently a lack of research on the needs, desires, and comfort level of pedestrians and bicyclists in relation to traveling around and communicating with AVs."⁴³

³⁹ <https://www.enotrans.org/article/adopting-adapting-state-policies-automated-vehicles/>

⁴⁰ <http://www.legis.nd.gov/assembly/65-2017/documents/17-0711-03000.pdf>

⁴¹ <http://knowledgecenter.csg.org/kc/content/nhtsas-model-state-policy-autonomous-vehicles>

⁴² Ibid.

⁴³ Ibid.

Goal Setting

Future scenarios involving autonomous vehicles should be evaluated based upon criteria including their:

- Ability to reduce VMT
- Use of electricity and other power sources
- Ability to detect people walking and bicycling, including individuals with visual and physical impairments

These and other criteria would influence the development of a shared, connected, electrified, and autonomous future. Such a future would offer more societal benefits compared to a private-ownership model of AV technology that threatens to increase congestion and VMT.

Implications

Despite the many unknowns, cities and regions must start planning for a range of possible impacts on transportation systems. Autonomous vehicles have numerous implications for public transit and mobility that must be considered. These are as follows:

Ownership models

When evaluating the potential impacts of autonomous vehicles, one of the key questions that arises is whether the vehicles will be shared or owned. Based on the current market trajectory, it is likely that first phase of autonomous vehicles will be shared (operated by a ride-hailing platform like Uber or Lyft) in a specific, defined environment. These shared AVs will be operating alongside traditional driver vehicles and, because they are shared, will be able to circulate without needing to park for long periods of time. Some of the purported benefits of AVs, such as congestion reduction and enhanced safety, may not be realized until all vehicles on the road are autonomous and can communicate with each other in an integrated fashion.

As the price of AVs comes down, personal, privately-owned AVs are likely to become more ubiquitous. These vehicles will still need parking and could potentially add more trips to the road network as the experience of driving becomes more pleasant and people can sleep, work, or socialize while the vehicle is moving. Additionally, privately-owned AVs will need to travel to remote parking areas or back to their place of origin until the owner needs them again.

Mobility Benefits in Less Populated Areas

Understanding the potential benefits of autonomous vehicles in less urban areas will help these places maximize the use of this technology. Some of the benefits of autonomous vehicles in these areas may include enhanced mobility, particularly for those with physical limitations who are unable to drive. These

benefits are similar to those that may be realized through active partnership with driver ride-hailing services.

Mixed Impact of Low-Capacity Autonomous Vehicles on Public Transit

The impending arrival of autonomous vehicles raises the question of how conventional public transit will fit into the transportation system of the future. Ultimately, it is difficult to determine how the introduction of autonomous vehicles will change public transportation systems. There are some who argue that autonomous vehicles could supplement conventional public transit, while others argue that autonomous vehicles could decimate conventional public transit as it operates today.

A summary of the potential impacts is as follows:

- Autonomous vehicles could support public transit systems by supplementing existing fixed-route service, much like what is done with ride-hailing services. Conversely, shared AVs may replace trips for which individuals would typically rely on public transit
- Should the intended benefits of AVs like dramatic congestion reductions begin to occur, public transit may become less desirable. As the cost of shared and owned-AVs comes down, riders may shift their riding from public transit to AVs. A reduction in public transit use may result in a reduction in public transit service, which could negatively impact low-income or vulnerable populations if shared AV service is more costly than existing public transit service
- Autonomous vehicles could benefit people with physical mobility issues or low vision by providing access to a vehicle without the need to drive themselves or travel with a human driver

Autonomous Public Transit Vehicles

Universities, cities, agencies, and states are exploring and evaluating the potential of autonomous microtransit, a driverless version of the on-demand microtransit services discussed above.

For example, the Minnesota Department of Transportation is currently testing the use of an autonomous shuttle bus from EasyMile.

Public transit agencies will need to examine the potential applications of such platforms over time. Questions include whether the autonomous public transit vehicles would be flexible and on-demand or operate on a fixed-route, what effects they might have on necessary staff and personnel, the cost of the vehicles, and whether they would be operated by the public transit agencies themselves or in partnership with an outside entity.

Autonomous public transit vehicles that operate in mixed traffic may not experience all potential benefits of congestion reduction and trip time improvements until all vehicles on the street are autonomous.

Opportunities for NDDOT to Respond to Emerging Issues and Trends

The emerging trends outlined, including revitalizing communities, changing demographics and geographies, shared mobility and technology, and autonomous vehicles, will require NDDOT to be nimble and adaptable, constantly testing and evaluating new technologies and responding to shifting demands. A few broad roles for NDDOT emerge from this analysis: mobility manager, advisor and convener, and partner.

As a mobility manager, NDDOT could use policy levers to support multimodal options for North Dakota residents and visitors. It can alter funding criteria to reward projects that support active and public transportation and that anticipate evolving transportation technology. NDDOT could set context-sensitive performance goals around increased use of public and active transportation at the state level and for large urban, small urban, and rural areas.

As an advisor and convener, NDDOT has the opportunity to provide support to local communities as they seek to respond to emerging trends. NDDOT could adopt national guidelines and create statewide guidelines for bikeshare, use of curb space, and active transportation networks. NDDOT could incentivize local communities to use these guidelines and could offer supportive training, educational materials, and technical assistance. NDDOT could host statewide conferences bringing together city, county, and tribal nations as well as state departments to share information and develop cohesive policies. It could encourage the development of online and physical mobility hubs that allow for seamless user connections between modes.

As a partner to private mobility companies, NDDOT could provide policy, infrastructure, and data frameworks and structures within which the companies must work. NDDOT could protect and advance the public interest through these frameworks, particularly by elevating the needs of vulnerable road users (pedestrians and cyclists), older adults, children, people with low-incomes, and people with mobility challenges. It could facilitate collection, reporting, and publication of data to support coordination between modes and continuous evaluation.



Figure 34: An autonomous shuttle that was tested by NDDOT (Image credit: North Dakota Department of Transportation)

CHAPTER 3:

Infrastructure and Network Recommendations



CHAPTER 3: Infrastructure and Network Recommendations

This chapter summarizes infrastructure and network recommendations developed for North Dakota based on the existing and projected conditions of the state and the input received through public and stakeholder engagement. This section references a separate document titled *Active and Public Transportation Facility Planning Best Practices Recommendations*, which is a companion document to ND Moves and can be found on NDDOT's web page.

Active Transportation Recommendations

Active Transportation Facility Planning Best Practices Recommendations

The *Active and Public Transportation Facility Planning Best Practices Recommendations* document was developed as part of ND Moves to provide a reference for best practices in active and public transportation facility planning in North Dakota. It is recommended that NDDOT consider these best practices on forthcoming active transportation projects throughout the state.

The Active and Public Transportation Facility Best Practices and Recommendations document provides an expanded range of facility design guidance and tools related to active and public transportation facilities and highlights key considerations when planning for active and public transportation infrastructure.

This document supports the development of project concepts for consideration at the planning and scoping phase of a project and supports the inherent design flexibility afforded by the adopted NDDOT design manuals. Additionally, this document highlights resources that can be referenced for recommendations or considerations. It is important to note that this document is not a design manual, and NDDOT's design manual and applicable FHWA guide manuals adopted by NDDOT's design manual should be used for design.

Universal Design

Universal Design is the concept of meeting the needs of all potential users to the greatest extent possible while considering the physical, cognitive, emotional and social changes that people experience over the course of a lifetime.

Legal Requirements

Americans with Disabilities Act (ADA)

Passed in 1990 and updated in 2010, states that "If a public entity has responsibility or **authority over streets, roads, or walkways**, its transition plan shall include **a schedule for providing curb ramps** or other sloped areas

where pedestrian walks cross curbs, **giving priority to walkways serving entities covered by the Act**, including State and local government offices and facilities, transportation, places of public accommodation, and employers, followed by walkways serving other areas." ADA requirements apply to shared use paths as well as sidewalks.

PROWAG (Public Right-of-Way Access Guidelines)

Federal standards proposed by the United States Access Board.

Design Considerations

- **Vertical Clearances** – Where the vertical clearance to an obstruction is less than 80 inches, guardrails or other barriers shall be provided. The leading edge of such guardrail or barrier shall be located not more than 27 inches above the sidewalk
- **Curb Ramps** – Perpendicular and Parallel Curb Ramps are recommended over Diagonal Curb Ramps
- **Width of Accessible Route** – PROWAG states minimum width of an accessible route must be 4 feet. If an accessible route has less than 5 feet clear width, then passing spaces at least 5 feet x 5 feet must be located at reasonable intervals not to exceed 200 feet (ADA Accessibility Guidelines). To remove need for passing areas NDDOT recommends 5 feet as the minimum width of sidewalks. A 6-foot sidewalk width is desired to allow two pedestrians to walk side by side and allow pedestrians with mobility aids to more easily pass each other
- **Protruding Objects** – Objects located between 27 inches and 80 inches from the ground should not protrude more than 4 inches into the corridor. Objects longer than 4 inches should be placed no lower than 80 inches
- **Sidewalk Surface** – Avoid decorative pavement within the pedestrian zone to make it easier to discern for pedestrians with vision impairments. Avoid textured paving materials in the pedestrian

through zone as they can cause pain to those in mobility devices with spinal injuries. According to ADA standards, sidewalk surfaces must be slip resistant. Apply a broom finish to concrete surfaces to increase skid resistance

- **Grade** – The grade of the walkway will generally follow the grade of the roadway and should ideally be no greater than 5% (ADAAG). Provide rest areas and periodic landings to lessen impact of steep grades
- **Changes in Level** – When possible, changes in level should be prevented through good design and active maintenance. If it exists, follow the ADAAG requirements for changes in level
- **Cross-Slopes** – Maximum is 2%, lower slopes should be designed to account for construction tolerances
- **Driveways** – Design the pedestrian portion of the driveway using the accessible route criteria: maximum cross-slope of 2%, flush changes in level and a minimum of 4 foot in width
- **Gaps, Grates, and Openings** – Maximum of 0.5 inch gap for grating and joints. For rail crossing flangeway gaps, there shall be a maximum of 2.5 inch gap for non-freight rail and maximum of 3.0 inch gap for freight rail. The long dimension of the opening should be perpendicular or diagonal to the dominant direction of travel (ADAAG)
- **Doorway openings** – If doors open onto pedestrian accessible routes, follow the Appendix D, Section 404 of 36 CFR Part 1191 (ADA) for requirements for clear space to provide accessible route to and around doorway openings

Operating Needs of Bicyclists

Bikeway designers must have a clear understanding of how bicyclists operate and how their bicycle influences that operation. Bicyclists, by nature, are much more affected by poor facility design, construction and maintenance practices than motor vehicle drivers. By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk.

Bicycle as a Design Vehicle

Similar to motor vehicles, bicyclists and their bicycles exist in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle or a tricycle), and behavioral characteristics (such as the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected bicycle types on

FOR MORE INFORMATION:

United States Access Board. Proposed Accessibility Guidelines for Pedestrian Facilities in the Public-Right-of-Way (RPOWAG). 2011.

AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities. 2004.

the facility and utilize the appropriate dimensions.

Figure 35 illustrates the operating space and physical dimensions of a typical adult bicyclist, which are the basis for typical facility design. Bicyclists require clear space to operate within a facility. This is why the minimum operating width is greater than the physical dimensions of the bicyclist. Bicyclists prefer five feet or more operating width.

In addition to the design dimensions of a typical bicycle, there are many other commonly used pedal-driven cycles and accessories to consider when planning and designing bicycle facilities. The most common types include tandem bicycles, recumbent bicycles, and trailer accessories. Figure 36 summarizes the typical dimensions for bicycle types, and Table 12 documents the design speed expectations by type of bicycle.

Figure 35: Bicycle Rider – Typical Dimensions

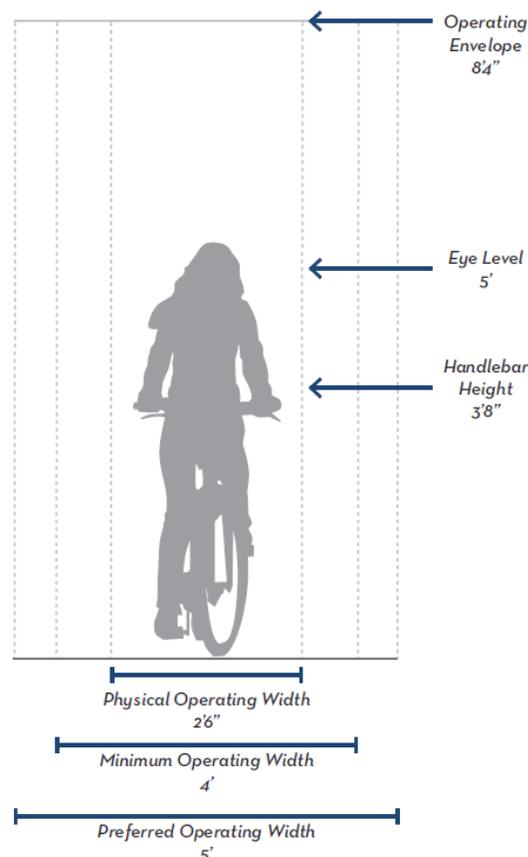


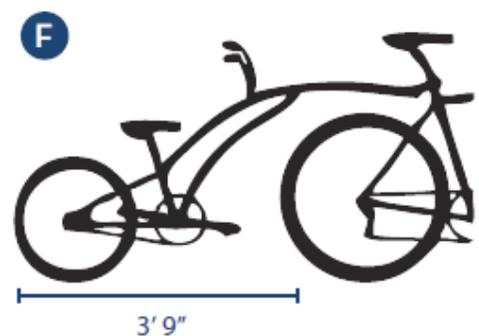
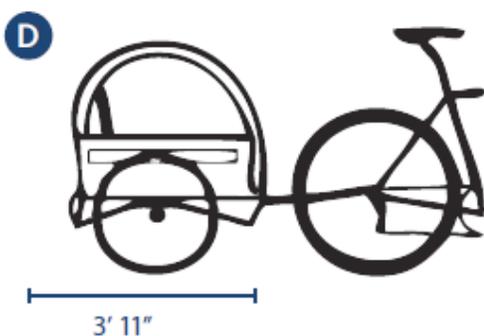
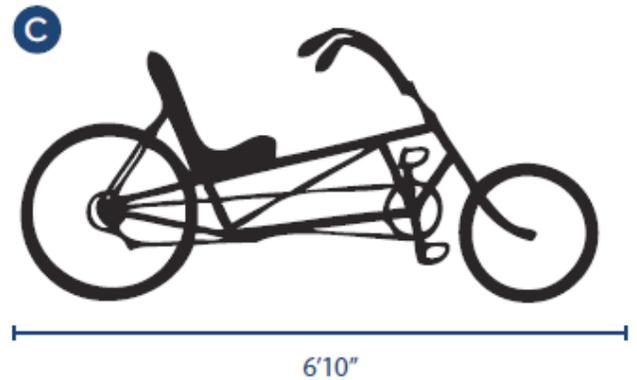
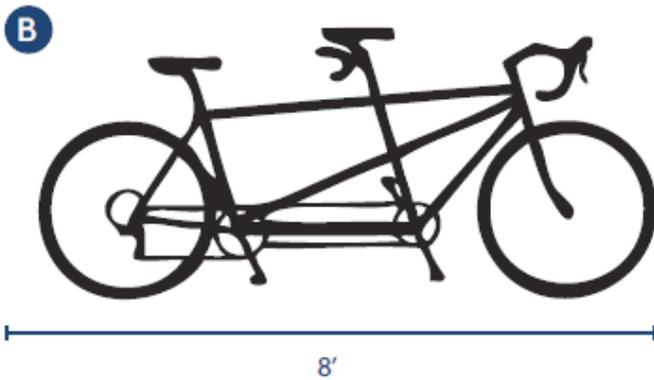
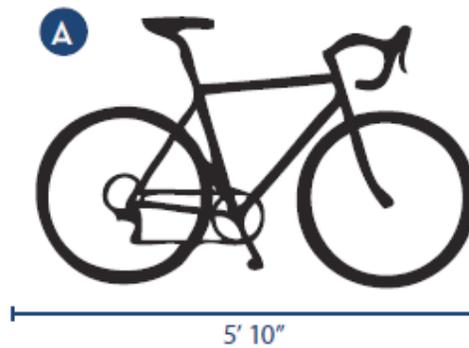
Table 12: Bicycle as Design Vehicle – Design Speed Expectations

BICYCLE TYPE	FEATURE	TYPICAL SPEED
Upright Adult Bicyclist	Paved level surfacing	8-12 mph*
	Crossing Intersections	10 mph
	Downhill	30 mph
	Uphill	5-12 mph
Recumbent Bicyclist	Paved level surfacing	18 mph

*Typical speed for casual riders per AASHTO 2013

Figure 36: Bicycle Design Vehicle – Typical Dimensions

- A: Adult Typical Bicycle
- B: Adult Tandem Bicycle
- C: Adult Recumbent Bicycle
- D: Child Trailer Length
- E: Child Trailer Width
- F: Trailer Bike Length



Source: AASHTO Guide for the Development of Bicycle Facilities, 4th Edition

Operating Needs of Pedestrians

Pedestrians have a variety of characteristics and the network should accommodate a variety of needs, abilities, and possible impairments (Figure 37). Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their

Figure 37: Pedestrian – Typical Dimensions

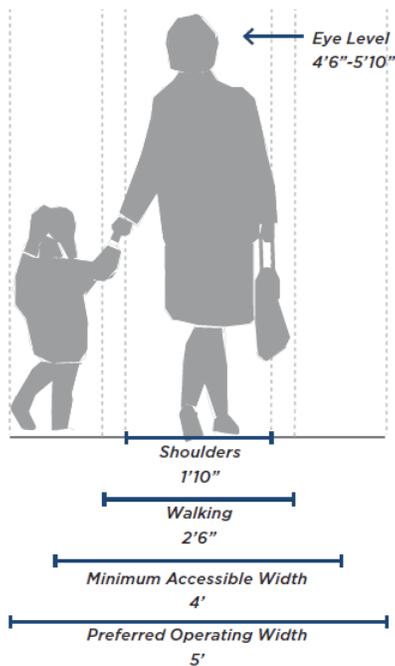


Figure 38: Runner – Typical Dimensions

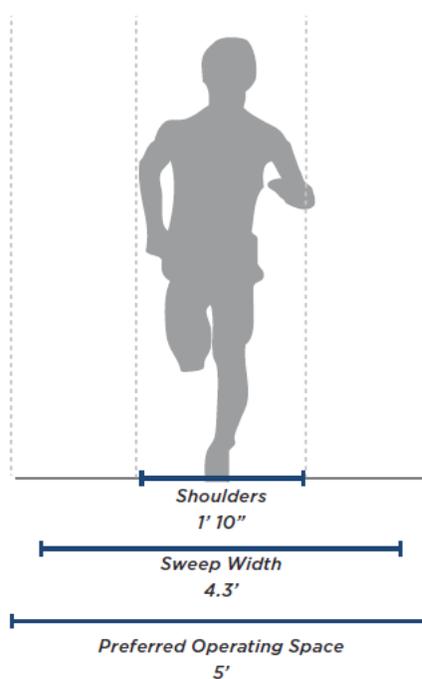


Table 13: Pedestrian Characteristics by Age

AGE	CHARACTERISTIC
0-4	Learning to walk Requires constant adult supervision Developing peripheral vision and depth perception
5-8	Increasing independence, but still requires supervision Poor depth perception
9-11	Susceptible to "darting out" in roadways Insufficient judgement Sense of invulnerability
14-18	Improved awareness of traffic environment Insufficient judgement
19-40	Active, aware of traffic environment
41-65	Slowing of reflexes
65+	Difficulty crossing street Vision Loss Difficulty hearing vehicles approaching from behind

Source: AASHTO. Guide for the Planning, Design, and Operation of Pedestrian Facilities, Exhibit 2-1, 2004

cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing. Table 13 summarizes common pedestrian characteristics for various age groups.

The Manual on Uniform Traffic Control Devices (MUTCD) recommends a normal walking speed of 3.5 feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to under 3 feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.

Operating Needs of Runners

Running is an important recreation and fitness activity commonly performed on shared use paths (Figure 38). Many runners prefer softer surfaces (such as rubber, bare earth or crushed rock) to reduce impact. Runners can change their speed and direction frequently. If high volumes are expected, controlled interaction or separation of different types of users should be considered.

Operating Needs of Strollers

Strollers are wheeled devices pushed by pedestrians to transport babies or small children. Stroller models vary greatly in their design and capacity. Some strollers are designed to accommodate a single child, others can carry 3 or more. Design needs of strollers depend on the wheel size, geometry and ability of the adult who is pushing the stroller (Figure 39).

Strollers commonly have small pivoting front wheels for easy maneuverability, but these wheels may limit their use on unpaved surfaces or rough pavement. Curb ramps are valuable to these users. Lateral overturning is one main safety concern for stroller users.

Operating Needs of Wheelchair Users

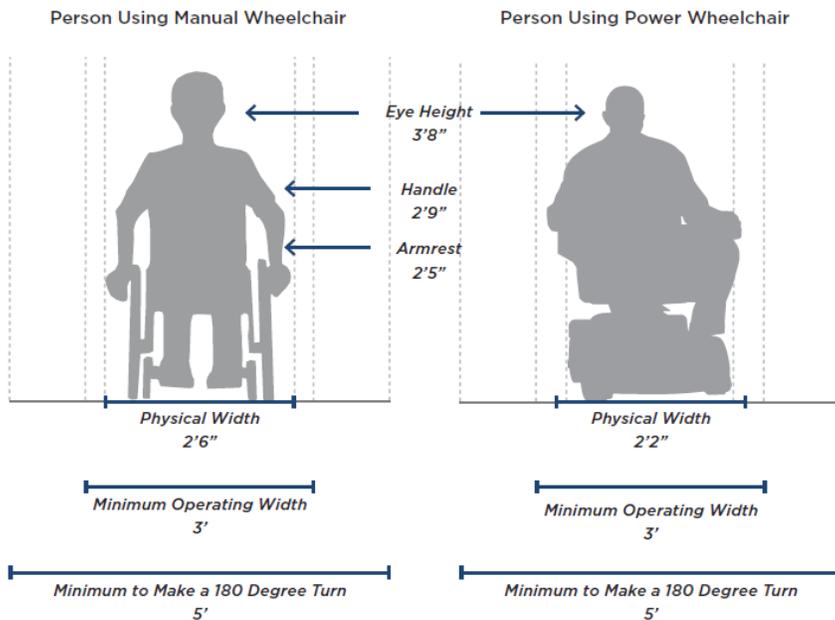
As the American population ages, the number of people using mobility assistive devices (such as manual wheelchairs, powered wheelchairs) increases.

Manual wheelchairs are self-propelled devices. Users propel themselves using push rims attached to the rear wheels. Braking is done through resisting wheel movement with the hands or arm. Alternatively, a second individual can control the wheelchair using handles attached to the back of the chair.

Power wheelchairs use battery power to move the wheelchair. The size and weight of power wheelchairs limit their ability to negotiate obstacles without a ramp. Various control units are available that enable users to control the wheelchair movement, based on their ability (e.g., joystick control, breath controlled, etc.).

Maneuvering around a turn requires additional space for wheelchair devices. Providing adequate space for 180 degree turns at appropriate locations is an important element of accessible design.

Figure 40: Wheelchair – Typical Dimensions



FOR MORE INFORMATION:
 2004 AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities.
 2011 (Draft) United States Access Board, Public Right-of-Way Accessibility Guidelines.

Figure 39: Stroller – Typical Dimensions

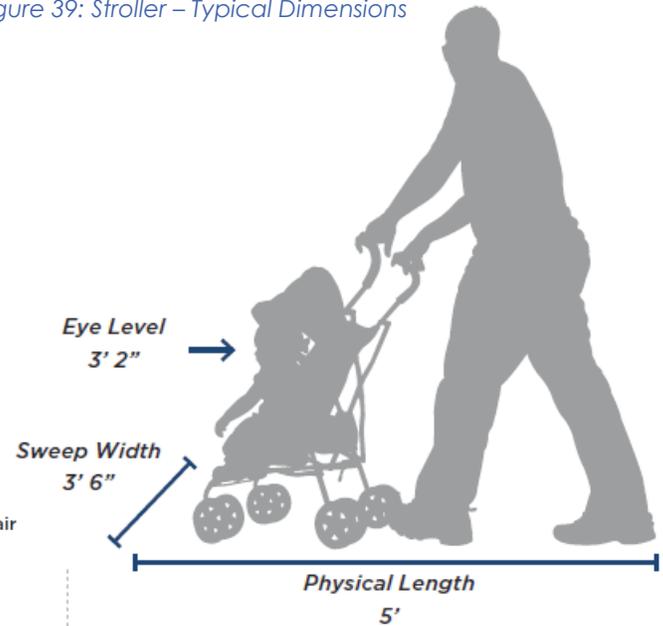


Table 14: Wheelchair Effect on Mobility and Design Solutions

EFFECT ON MOBILITY	DESIGN SOLUTION
Difficulty propelling over uneven or soft surfaces.	Firm, stable surfaces and structures, including ramps or beveled edges.
Cross-slopes cause wheelchairs to veer downhill.	Cross-slopes of less than two percent.
Require wider path of travel.	Sufficient width and maneuvering space.

Active Transportation Facility Consideration

This section provides guidance on considering and selecting an active transportation facility based on development context and roadway characteristics.

Overview of Steps in the Facility Consideration Process

Step 1: Evaluation of Need

Determine whether a pedestrian or bicycle facility should be considered based on development context (urban, suburban/commercial, rural center, or rural) and roadway characteristics (Table 15). If a facility should be considered, progress to step two.

Step 2: Facility Selection

Refer to the appropriate matrix based on the development context of the road (Figures 41-43). The matrix will indicate which facility types are preferred, potential, and not recommended based on the posted travel speed, AADT, and roadway classification. Proceed to step three.

Step 3: Determine Number of Sides

Consider whether to install a facility on both sides or only one side of the street, taking into account number of travel lanes, AADT, land use/density/concentrations of destinations, local plans and policies, and whether the project provides a link in the existing or planned pedestrian or bicycle network.

Beyond Engineering

When new facility types are installed in a community, an effort should be made to educate community members about proper use of the facilities. This can be accomplished through door and bike hangers, signage at the site of the new facility, and online communications.

Step 1: Evaluation of Need

Table 15: Should a Pedestrian and/or Bicycle Facility be Considered?

DEVELOPMENT CONTEXT	RECOMMENDATION
<p>Urban Populations typically above 5,000. Character of private development: more density, mixed land uses, larger buildings, more hardscape, attached buildings, aligned frontages, masonry buildings, building signage; Characteristics of public space: shallow setbacks, streets and alleys, street grid, wide sidewalks, dedicated parking, raised curbs, curb bumpouts, street lighting, aligned street trees, likely adjacent to suburban/commercial; Civic characteristics: Plazas and squares, regional institutions.</p>	<p>Pedestrian and bicycle facilities should be considered. Reference Step 2 for facility selection guidance.</p>
<p>Suburban / Commercial Populations typically above 5,000. Typically on edge of urban center. Character of private development: Less density, primarily residential, more greenspace, detached buildings, strip malls and parking lots, rotated frontages, wooden buildings, billboards; Characteristics of public space: deep setbacks, roads and lanes, larger turning radii, open swales, mixed tree clusters; Civic characteristics: parks and greens, local gathering places.</p>	<p>A pedestrian and/or bicycle facility should be considered. Reference Step 2 for facility selection guidance.</p>

Table 15: Should a Pedestrian and/or Bicycle Facility be Considered? (Continued)

DEVELOPMENT CONTEXT	RECOMMENDATION
<p>Rural Center Populations typically below 5,000. Character of private development: more density, mixed land uses, more hardscape, attached buildings, aligned frontages, masonry buildings, building signage; Characteristics of public space: shallow setbacks, street grid, Main Street, on-street parking, raised curbs, street lighting, aligned street trees, likely adjacent to rural; Civic characteristics: Plazas and squares, parks and greens.</p>	<p>Are any of the following true?</p> <ul style="list-style-type: none"> • The road is within a neighborhood, serves as a Main Street, and/or connects to one or more trip generators. • The road is identified on the state or local pedestrian or bikeway network. • Road is an edge, extending beyond rural center into rural, and connects to one or more trip generators such as a school, park, public transit route, or other destination. <p>If yes to any, a pedestrian or bicycle facility should be considered. Reference Step 2 for facility selection guidance.</p> <p>If no to all, a pedestrian or bicycle facility is not a priority</p>
<p>Rural Low density, surface waterbodies, protected wetlands/habitat, transport corridors, agriculture, conservation easements, riparian corridors, livestock.</p>	<p>Are any of the following true?</p> <ul style="list-style-type: none"> • The road connects to one or more trip generators such as a school, park, public transit route, or other destination. • The road is identified on the state or local bikeway network. <p>If yes to either, a pedestrian or bicycle facility should be considered. Reference Step 2 for facility selection guidance.</p> <p>If no to both, a pedestrian or bicycle facility is not a priority.</p>

Step 2: Facility Consideration

Figure 41: Urban Facility Consideration

URBAN

Posted Travel Speed (mph)	Average Annual Daily Traffic	Yield Street / Bicycle Boulevard	Advisory Shoulder	Bike Lane	Buffer Separated Bike Lane	Barrier Separated Bike Lane	Sidewalk	Shared Use Trail / Sidepath
Local / Collector								
25 and below	< 500	Preferred	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
30	< 500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
35 and above	< 500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	500-1500	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	1500-3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	> 6000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
Arterial								
30 and below	< 3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-10,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	10,000-15,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	15,000-20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	>20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
35 and above	< 3000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	3000-10,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	10,000-15,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	15,000-20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential
	>20,000	Potential	Not recommended	Potential	Potential	Potential	Potential	Potential

Legend

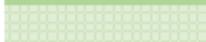
	Preferred
	Potential
	Not recommended



Figure 42: Suburban/Commercial Facility Consideration

SUBURBAN/COMMERCIAL

Posted Travel Speed (mph)	Average Annual Daily Traffic	Within built up area						Outside built up area			
		Yield Street / Bicycle Boulevard	Advisory Shoulder	Bike Lane	Buffer Separated Bike Lane	Barrier Separated Bike Lane	Sidewalk	Sidepath	Paved Shoulder	Bike Lane	Shared Use Trail / Sidepath*
Local / Collector											
25 and below	< 500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	500-1500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	1500-3000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	3000-6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	> 6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
30	< 500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	500-1500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	1500-3000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	3000-6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	> 6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
35 and above	< 500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	500-1500	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	1500-3000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	3000-6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	> 6000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Arterial											
30 and below	< 3000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	3000-10,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	10,000-15,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	15,000-20,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	>20,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
35 and above	< 3000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	3000-10,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	10,000-15,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	15,000-20,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	>20,000	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

*Outside of built up areas, a sidepath may be appropriate if pedestrian activity is expected.



Figure 43: Rural/Rural Center Facility Consideration

RURAL/RURAL CENTER

Posted Travel Speed (mph)	Average Annual Daily Traffic	Rural Center (or near destinations)					Rural (outside built up area)	
		Yield Street / Bicycle Boulevard	Advisory Shoulder	Bike Lanes*	Sidewalk	Sidepath	Paved Shoulder	Shared Use Path Sidepath
Local / Collector								
25 and below	< 500							
	500-1500							
	1500-3000							
	3000-6000							
	> 6000							
30	< 500							
	500-1500							
	1500-3000							
	3000-6000							
	> 6000							
35 and above	< 500							
	500-1500							
	1500-3000							
	3000-6000							
	> 6000							
Arterial								
30 and below	< 500							
	500-1500							
	1500-3000							
	3000-6000							
	> 6000							
35 and above	< 500							
	500-1500							
	1500-3000							
	3000-6000							
	> 6000							

*Conventional bike lanes, buffered separated bike lanes, or barrier separated bike lanes may be considered. On roadways with additional space and/or higher traffic speeds and volumes, separated bike lanes offer a higher level of comfort and are approachable for a wider range of potential users.

Step 3: Determine Number of Sides

Directional and on-street bicycle facilities should always be installed to allow for bicycle travel in both directions. When installed on a one-way street, on-street bicycle facilities should serve the direction of vehicle traffic.

Sidewalks on both sides of the street are recommended as the default approach to pedestrian facilities. However, in some cases, sidewalks and shared-use paths on one side of the street can effectively serve bicycle and pedestrian trips. The following considerations are intended to provide a general framework for evaluating whether off-street facilities such as sidewalks and shared use paths are needed on one or both sides of the street. Engineering judgement and an understanding of local needs, challenges, and connectivity should also be incorporated into evaluation, planning, and design.

Considerations

Number of Travel Lanes

Streets with more than one travel lane in each direction are good candidates for sidewalk or shared use path on both sides of the street. Streets with more than one travel lane in each direction are typically more challenging for pedestrians to cross, have lower driver yielding rates, and an increased risk of hidden threat collisions. Providing facilities on both sides reduces the need for pedestrian to cross the street in order to access a separated facility.

Average Daily Traffic Volumes (ADT)

Streets with traffic volumes above 6,000 ADT are good candidates for a sidewalk or shared use path on both sides of the street as higher vehicle volumes can make crossing the street more challenging to pedestrians. Providing facilities on both sides reduces the need for people to cross the street in order to access a separated facility.

Land Use, Density, and Concentration of Destinations

Pedestrian and bicycle demand typically increases with density. Streets in areas with medium to high density (existing or planned) are good candidates for a sidewalk or shared use path on both sides of the street to accommodate higher levels of pedestrian and bicycle activity and demand. Roads that serve vulnerable users such as low-income, children, or elderly populations are also good candidates for a sidewalk or shared use path on both sides of the street.

In locations where destinations are concentrated on one side of the street, it may be adequate to construct a sidewalk or shared use path on one side of the street. However, if a project is filling a pedestrian and/or bicycle gap on a roadway that has facilities on both sides, facilities should be constructed on both sides.

In low-density residential areas, a sidewalk or shared use path on one side of the street may be adequate on local streets.

Do Local Plans or Policies Recommend Facilities on One or Both Sides?

Presence of any local guidance or policies suggesting when facilities should be provided on one or both sides of the street should be noted.

Does the Project Provide a Link in the Existing or Planned Pedestrian or Bicycle Network?

Consider connections to existing and planned pedestrian and bicycle routes to maintain a consistent and well-connected network and reduce unnecessary street crossings. If the project is located along an existing or planned public transit route, consider pedestrian access to/from dedicated public transit stops.

State Bike Network

As part of ND Moves, NDDOT has developed a planned State Bike Network. The State Bike Network is a 20-year vision to connect key transportation and recreation destinations across the state. It is primarily meant for long-distance bicycle trips, with the understanding that some network segments may be used for shorter connections between urban areas and destinations outside of built up areas, such as State Parks. As a result, the State Bike Network will primarily follow rural roadways and is designed to address needs of users currently traveling longer distance across North Dakota on bike. It is not meant for casual or inexperienced bicyclists.

The backbone of the State Bike Network is rural, low-traffic roadways. These are referred to as Tier 1 and Tier 2 State Bike Corridors. These roadways are typically adequate for recreational bicycling today due to their low traffic volumes. The Stakeholder Advisory Committee, who oversaw the development of ND Moves, confirmed a preference for the State Bike Network to be composed primarily of low-traffic rural roadways due to bicyclist preference for riding on low-traffic roadways. As established, both Tier 1 and 2 have the level of infrastructure desired to meet projected demand. Little if any infrastructure outside of signing is needed to support Tier 1 and 2 corridor development.

In locations where a logical connection cannot be made on a low-traffic Tier 1 or 2 Corridor, shoulder bikeway connections are recommended. These connections are recommended on Tier 3 Regional Bike Connector Corridors. Tier 3 Corridors are higher-volume State roadways, which may be Level 1 Freight Corridors. Because these roadways carry higher traffic volumes and freight vehicles, the infrastructure expectation is shoulder bikeways that are at least 5 feet wide. The

purpose of this categorization is to promote bicycle safety, recognize bicycle user preferences, and ensure that NDDOT's limited resources are used most effectively to improve bicycling conditions where improvements are needed the most. This categorization also indicates the level of infrastructure that is desired.

The planned State Bike Network is not in place today.

The State Bike Network is not meant for the public to use to plan bicycle trips. While the network builds upon existing infrastructure, in some cases State Bike Network roadways are not currently up to the infrastructure expectations noted in Table 16. Over the 20-year ND Moves planning horizon, NDDOT intends to work with local partners to implement the plan and bring the State Bike Network up to the infrastructure expectation of each tier.

The State Bike Network follows state roadways wherever possible. However, in certain circumstances, the State Bike Network includes roadways under another public agency's jurisdiction.

Coordination with Local Public Agencies (LPAs) during future planning and design processes for the State Bike Network could also include design technical assistance from NDDOT. Coordination between NDDOT and LPAs is necessary to meet the infrastructure expectations outlined above. Producing a memorandum of understanding (MOU) between NDDOT and LPAs, such as county or city governments, is one approach to developing and documenting the specific details for implementing the State Bike Network. MOUs could discuss topics including corridor and intersection design, Little infrastructure is needed to support Tier1 and Tier 2 system development off the state highway system. None the less, NDDOT could assist with guiding the appropriate level of infrastructure design along corridors and at intersections to support elements of the State Bike Network not currently on state highway system.

State Bike Network Map

Because the current State Bike Network defined in ND Moves is not a meant for wayfinding for navigation, developing a public-facing state bicycle map is a key implementation recommendation for ND Moves. A state bicycle map would identify existing bicycle-friendly roadways, which, in turn, becomes a navigational tool. The mapping process would require data verification, fieldwork, and additional stakeholder engagement to identify recommended routes based on existing conditions. A state bicycle map could include information, such as ADT and shoulder width, to inform bicyclists about conditions they could expect on long-distance bicycle routes in North Dakota. Prior to development of the state bicycle map, the MOUs

between NDDOT and affected LPAs would need to be developed.

Principles

Purpose of the Planned Network

The purpose of the State Bike Network is to:

Provide connections to:

- Towns and cities
- Local bike networks
- State and national parks
- State Park Trails
- Neighboring state and provincial routes

Follow desirable routes that:

- Use scenic byways if possible
- Incorporate Adventure Cycling routes
- Include recreational bicycling routes
- Use roadways with lower traffic volumes (below 750-1,000 vehicles per day)
- Use roadways with near-continuous opportunities for safely exiting the traveling lane via wide shoulders (regardless of surface type), shallow inslopes, or other physical features that would typically allow a bicyclist to come to a controlled stop outside of the motor-vehicle travel lane in an emergency
- Utilize roadways with wide shoulders (regardless of shoulder surface type), in particular on roadways with traffic volumes above 750 vehicles per day
- Add value to roadway corridors for the benefit of North Dakota citizens
- Use State park trails where possible
- Avoid energy development and farm-to-market routes, where feasible

Relationship with the State Highway System

The State Bike Network should generally follow state highways, with the following additional considerations:

- In urbanized areas, it may be desirable to shift bike traffic to the local system where state highways carry very high traffic volumes (above 15,000 vehicles per day)
- In some locations, state trails may be able to provide a higher-quality connection between towns and other destinations
- Scenic byways and other attractive routes may be located on county or local roadways and may be more suitable to bicycling

Quality of the Network

Facility Type

- In areas with higher anticipated bike use, a higher quality of facility is desirable: shared use trails or physically separated bikeways
- In areas with high traffic volumes, speeds, and higher proportions of heavy commercial vehicles, physically

separated facilities will provide a higher level of safety and comfort

- On low-traffic rural roadways, shoulders and/or shallow inslopes are preferred but are not necessary due to low traffic volumes
- On higher traffic rural roadways, wide bikeable shoulders will generally be adequate for the State Bike Network. However, it should be noted that physically separated facilities will serve a wider range of bicyclists

Attractiveness

The State Bike Network should provide bicyclists with a safe way to see the highlights of North Dakota.

Tiers/Route Categories

Table 16 defines the three tiers of bike corridors identified in the State Bike Network. The purpose of this categorization is to ensure that NDDOT's limited resources are used most effectively to improve bicycling conditions where improvements are needed the most. Tier designations also indicate the level of infrastructure that is desired.

Table 16: State Bike Network Route Categories

ROUTE CATEGORY	DEFINITION	INFRASTRUCTURE EXPECTATION
Tier 1 State Bike Corridors	<p>Tier 1 Corridors are low traffic volume paved roadways on the state highway system, or paved County Major Collectors (CMCs). Conditions on Tier 1 Corridors are already suitable for confident, recreational bicyclists. These roadways generally do not have bikeable shoulders; however, their low traffic volumes make these roadways comfortable for most confident bicyclists. Additionally, it is desirable for these routes to have continuous and safe emergency-pull off opportunities (e.g. shallow inslopes; paved, unpaved, or grass shoulders, etc.). These pull offs are not intended to be continuously bikeable shoulders, just allowance for safe exit of the driving lane in an emergency. Tier 1 Corridors provide low-traffic alternates to shoulder bikeways on higher-traffic roadways and follow scenic byways and backways where possible. Tier 1 corridors connect to several North Dakota State Parks and other more local or regional based destinations across North Dakota.</p>	<p>There is no expectation of wide, bikeable shoulders on the Tier 1 network. However, as funding allows, safe, emergency pull off should be provided (e.g. shallow inslopes; paved, unpaved, or grass shoulders; etc.). Tier 1 routes have been established along roadways with traffic volumes that are generally below 750 ADT, with ADT of 1,000 considered acceptable in shorter segments of a Tier 1 route. Roadways with traffic volumes below 1,000 are typically suitable for confident bicyclists, even without the presence of a bikeable shoulder. Tier 1 Corridors are not on the Level 1 Freight Network.</p> <p>NDDOT could use signage to improve awareness of bicycle traffic among vehicle drivers. NDDOT could also publish maps of Tier 1 routes to build awareness of these among bicyclists.</p> <p>It is recommended that NDDOT monitor traffic volumes on these routes to understand if traffic volumes increase above 1,000 ADT. Tier 1 route designation may need to be modified if traffic volumes increase on a roadway.</p>

Table 16: State Bike Network Route Categories (Continued)

ROUTE CATEGORY	DEFINITION	INFRASTRUCTURE EXPECTATION
<p>Tier 2 State Bike Corridors</p>	<p>Tier 2 Corridors are low traffic volume roadways on the state highway system or County Major Collectors (CMCs). Tier 2 Corridors can be paved or unpaved roadways. Conditions on Tier 2 Corridors are generally suitable for confident, recreational bicyclists, though some bicyclists may prefer other routes in order to stay on paved surfaces. These roadways generally do not have bikeable shoulders. Tier 2 Corridors supplement the Tier 1 network by providing connections in areas where there are not roadways that meet Tier 1 criteria.</p>	<p>There is no expectation of wide, bikeable shoulders on the Tier 2 network. Additionally, many of these routes will have steep inslopes, no shoulders, and other features that may make exiting the driving lane difficult. Tier 2 routes have been established along roadways with traffic volumes that are generally below 1,500 ADT and are not on the Level 1 Freight Network. Tier 2 routes will generally be comfortable for confident recreational bicyclists due to low traffic volumes.</p> <p>As with Tier 1 routes, NDDOT and LPAs could use signage to improve awareness of bicycle traffic among vehicle drivers and publish bicycling maps of Tier 2 routes.</p> <p>While Tier 2 Corridors are typically paved roadways, some gravel roadways are included in the system to make key connections where low-traffic alternate routes do not exist. Gravel Tier 2 Corridors are expected to remain gravel roadways and Tier 2 designation is not expected to drive the paving of a gravel roadway.</p> <p>It is recommended that NDDOT monitor traffic volumes on these routes to understand if traffic volumes increase above 1,500 ADT. Tier 2 route designation may need to be modified if traffic volumes increase on a roadway. If traffic volumes increase, Tier 2 designation may need to shift to a different roadway, or the original roadway could shift to a Tier 3 designation.</p>
<p>Tier 3 – Regional Bike Connector Corridors</p>	<p>Tier 3 Regional Bike Connector Corridors are located along roadways with greater than 1,500 ADT that provide critical intra-urban, statewide, and interstate connections. These routes are typically high-volume and/or high-speed state roadways where separation between cyclists and motorists is important for bicyclist safety and comfort. Tier 3 Corridors have been identified in locations where there is no suitable Tier 1 or Tier 2 connection to a key destination.</p>	<p>The desired infrastructure for Tier 3 Corridors is a bikeable shoulder with a minimum width of 5 feet. The network has been designed to follow Interregional Corridors or State Corridors that in many cases already have bikeable shoulders. These routes may also be Level 1 Freight Corridors. These roadways are already a NDDOT priority for shoulder construction to support vehicle safety and provide other benefits. Bikeable shoulders should be provided to the greatest extent possible on these roadways.</p>
<p>US Bicycle Route System Alignment</p>	<p>US Bicycle Route System (USBRS) Alignments are identified to provide specific roadway segments following the USBRS National Corridor Plan. USBRS alignments can be any of the three tiers of the North Dakota State Bike Plan Network.</p>	<p>The infrastructure expectation for US Bicycle Routes follows the North Dakota State Bike Plan network tier.</p>

State Bikeway Design Recommendations

Tier 1 and Tier 2 Bikeways and Constrained Corridors

The primary design recommendation for rural Tier 1 and 2 bikeways is signage. Tier 1 and 2 bikeways follow low traffic roadways that are generally suitable for confident bicyclists. As funding and topography allows, safe emergency pull off locations are recommended, using designs such as shallow inslopes, or shoulders (paved, gravel, or grass).

The design options listed in the Table 17 are appropriate for Tier 1 and 2 bikeways and roadways that are constrained or where shoulder widening is not planned or prioritized.

Table 17: Design Options for Tier 1 and 2 Bikeways and Constrained Corridors

DESIGN FACTOR	BEST PRACTICES AND GUIDANCE	WHEN INTERVENTION IS APPROPRIATE
<p>Warning Signage – Rural Areas Option A</p> 	<p>On higher-speed rural roadways, best practices suggest using the MUTCD compliant W11-1 with a custom legend plaque reading “on Roadway.” This sign should be used on roadways with no shoulder, or where the shoulder clear width is less than 4 feet. Engineering judgement should be used to determine appropriate placement intervals.</p> <p>NOTE: The “Share the Road” (W11-1/W16-1P) assembly is not recommended for application on ND roadways. This sign’s usefulness has been challenged, based on arguments that it is ambiguous, imprecise, and frequently misinterpreted.⁴⁴</p>	<p>The infrastructure expectation for US Bicycle Routes follows the North Dakota State Bike Plan network tier.</p>
<p>Warning Signage – Rural Areas Option B</p> 	<p>An alternative option for rural roadway regulatory signage is MUTCD compliant W11 with custom plaque reading: “IN LANE”. Delaware DOT has adopted this sign assembly as the standard sign for rural bike route application. Engineering judgement should be used to determine appropriate placement. NDDOT would need to formally adopt the alternative “IN LANE” plaque.</p>	<p>Along Tier 1 and 2 routes. Along rural roadways where providing the target shoulder bikeway is not feasible or where they are not prioritized.</p>
<p>Flashing Beacons</p>  <p><small>Photo by Jonathan Fleas for Bike Portland</small></p>	<p>On constrained roadways where a shoulder bikeway cannot be provided, a potential safety enhancement is the addition of flashing activated warning beacons. Warning beacons can be passively activated by bicyclists riding by a sensor or manually activated with a push button. The warning beacon displays a flashing pattern to alert motorists of the presence of bicyclists and indicate the need to adjust their speed and passing behavior accordingly.⁴⁵</p> <p>No guidance for this design intervention is currently available, and engineering judgement should be used when considering installation.</p>	<p>This intervention should only be used at specific “pinch-point” locations, such as a tunnel, bridge, narrow roadway section, or at locations where sight distance is limited, such as sharp turns to provide a specific and clear signal to motorists to be aware of bicyclists through the pinch-point. It is not appropriate for long stretches of roadway.</p>

⁴⁴ Bike Delaware (2014) Why “Share the Road” is gone in Delaware. Available: <http://www.bikede.org/2014/04/07/why-share-the-road-is-gone>
 Pein W (2012a) The Share the Road Sign. Available: <http://bicyclingmatters.files.wordpress.com/2008/04/the-sharethe-road-sign3.pdf>

⁴⁵ It should be noted that the effectiveness of this strategy has not been studied extensively.

Table 17: Design Options for Tier 1 and 2 Bikeways and Constrained Corridors (Continued)

DESIGN FACTOR	BEST PRACTICES AND GUIDANCE	WHEN INTERVENTION IS APPROPRIATE
Uphill Shoulder Lane	<p>Uphill shoulder lanes can be considered in locations where there are sustained grades and limited places for uphill bicyclists to pull off the roadway. An uphill shoulder lane is a lane that can be used by bicyclists to climb the hill. Uphill shoulder lanes can be achieved through restriping the existing roadway cross-section or reconstructing the roadway on the uphill side of the road.</p> <p>The recommended shoulder widths table should be referenced to determine the appropriate width of the uphill shoulder lane. Additional guidance for this type of facility is provided in the AASHTO Bike Guide (pg 4-7).</p>	<p>The speed difference between a bicyclist travelling uphill and a vehicle travelling uphill is much greater than the speed difference between a bicyclist travelling downhill and a vehicle travelling downhill. Due to this disparity in speeds, it may be advantageous to provide an uphill shoulder lane. This strategy is most appropriate on roadways with consistent grade increase, such as roadways through hilly areas.</p>

Tier 3

The primary design recommendation for rural Tier 3 bikeways is a shoulder bikeway. The intent of these facilities is to provide a comfortable bicycling experience for recreational bicyclists as speeds and volumes increase. In rural areas, paved shoulder bikeways act similarly to bike lanes in urban areas, providing a dedicated space for bicyclists to ride adjacent to motor vehicle traffic.

Table 18 presents minimum desired shoulder widths by traffic volume and truck percentage of traffic mix for Tier 3 bikeways, based on Guide for the Development of Bicycle Facilities, 4th Edition Chapter 4.7, Rural Bicycle Level of Traffic Stress Methodology adapted by the Colorado and Vermont Departments of Transportation, and guidance established in the Minnesota Department of Transportation Bikeway Design Manual. As truck volumes increase on a roadway, bicyclist comfort and safety are negatively impacted. Wider shoulders provide greater maneuvering room for bicyclists to avoid larger vehicles and associated wind blast. The minimum desired shoulder width was developed with the assumption that rumble strip placement may encroach into up to one foot of the shoulder, effectively reducing bicyclist operating space.

Table 18: Minimum Desired Shoulder Widths for Tier 3 Bikeways⁴⁶

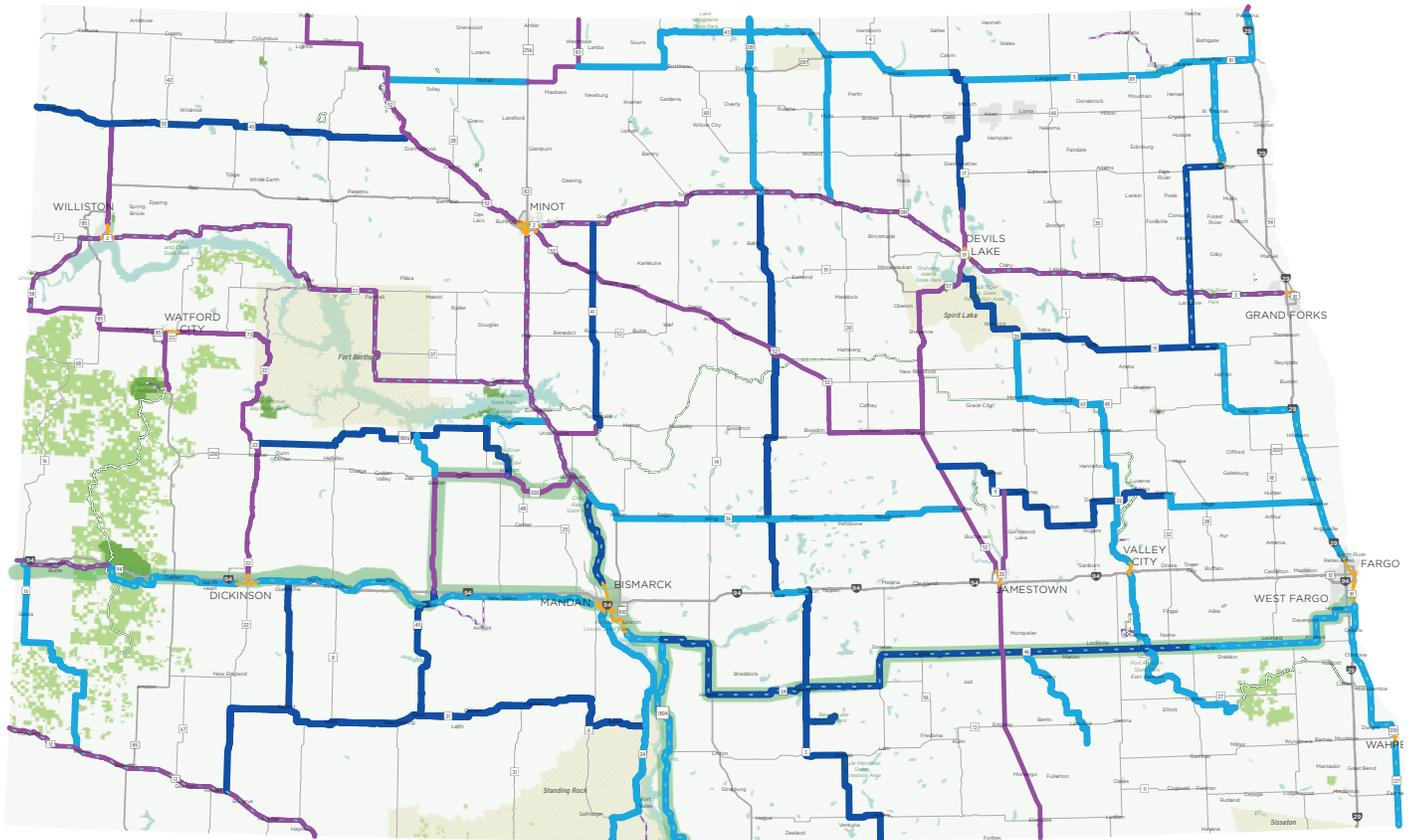
ADT	TRUCKS <10% OF TRAFFIC	TRUCKS >10% OF TRAFFIC
<2,000	5'	6'
2,000-10,000	6'	8'
>10,000	8'	10'

North Dakota State Bike Network

The principles and design recommendations described were employed to develop a state bike network for North Dakota. This network is depicted in (Figure 44). More detailed maps of the State Bike Network can be found in Appendix E. To complement the statewide system, urban area bicycle gaps (streets without existing bicycle infrastructure) were identified, and possible connections to the statewide system from urban areas have been identified. These possible connections include half-mile buffers identified for bicycle-focused improvements within urban areas that would connect to the statewide network. Maps of these possible urban area connections can be found in Appendix F.

⁴⁶ Note: Shoulder dimensions assume that rumble strip placement may encroach up to one foot into the shoulder.

Figure 44: North Dakota State Bike Network



The Draft State Bicycle Network shows proposed conditions for bicycling across North Dakota. Infrastructure expectations are recommended to be developed over a 20-year timeframe. Existing conditions may not match identified infrastructure expectations.

Tier 1 State Bike Corridors are low traffic volume roadways (less than 750 AADT) and connect to state and city destinations. Signage is a minimum infrastructure expectation.

Tier 2 State Bike Corridors are low traffic volume roadways (less than 500 AADT) and connect with Tier 1 routes. Signage is a minimum infrastructure expectation.

Tier 3 State Bike Corridors are higher traffic roadways that provide connections in locations without low-traffic roadways. Tier 1 and 2 should be a minimum infrastructure expectation.

Draft State Bike Network

- Tier 1 State Bike Corridors
- Tier 2 State Bike Corridors
- Tier 3 Regional Bike Connector Corridors
- Urban Bike Center Lines

Adventure Cycling Routes

- Proposed U.S. Bicycle Route System
- USFWS, Mouth Dash Hay, and North Country Trails

Roads

- Interstates
- U.S. Highways
- State Highways
- Arterial, Collector, and Local Roads
- Scenic Byways and Backways

Cities

- Tribal lands
- Parks
- National Parks and Grass
- Water bodies

APRIL 29, 2019
NORTH DAKOTA PLANNED STATE BICYCLING NETWORK

0 20 40 Miles

Map produced April 2019.

Recommendations to Address Active Transportation Network Gaps

As additional active transportation funding is available, it is recommended that NDDOT focus on addressing the gaps identified in the active transportation system, as discussed in Chapter 3 and highlighted in the tables below.

Table 19: Summary of Facility Needs – Urban Areas

GAP TYPE	GAP (MILES)	PERCENT GAP
Bike	46.4	45.5%
Bike + Walk	55.5	54.5%
Total	101.9	100%

Table 20: Cost Estimate of Future Urban State System Need

GAP TYPE	GAP (MILES)	COST PER MILE ⁴⁷	TOTAL COST
Bike	46.4	\$300,000	\$13,875,700
Bike + Walk	55.5	\$325,000	\$18,015,200
Total	101.9		\$31,890,900

⁴⁷ 2016 NDDOT Standard Specifications Manual



Bike gaps were assumed to be addressed with the addition of a 10-foot shared use path. Bike + walk gaps were assumed to be addressed through the provision of a 12-foot shared use path. The cost assumptions for each vary and are accounted for in the estimate of future need (Table 20).

Total urban system need is estimated at approximately \$31,900,000 to address the range of identified gaps. While the cost to address these gaps is high, most of these costs are likely to be accounted for as part of regular ongoing NDDOT and or LPA investments in the urban state highway system. For example, in the 2019-2022 STIP there are currently almost five miles of corridor reconstruction on Fargo Main Avenue (25th Street to 2nd Street) and Mandan Memorial Highway, which will integrate the costs to address gaps identified along those corridors, or nearly five percent of the identified gaps.

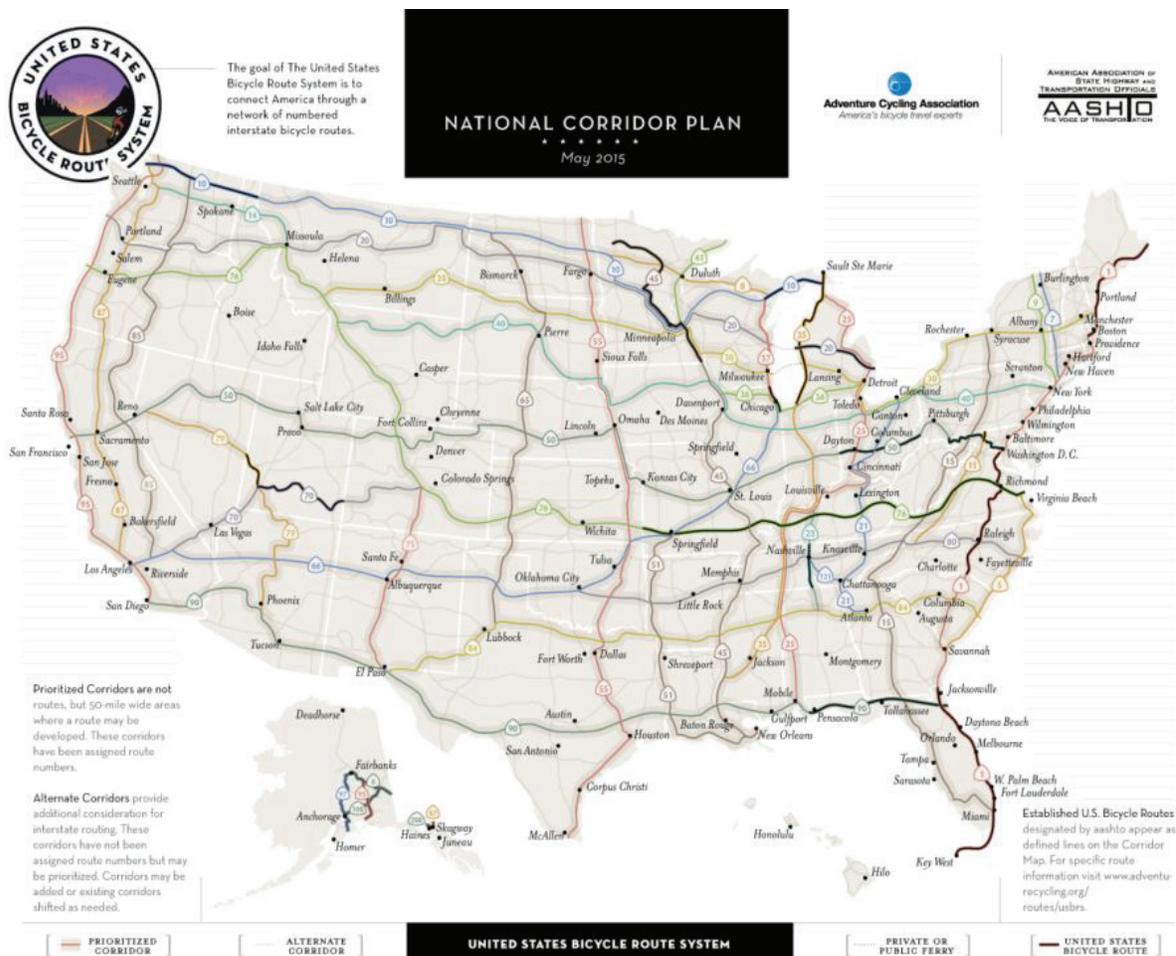
For non-urban incorporated areas (communities with a population less than 5,000), there are 261 miles of state highway. Availability of data to identify gaps is limited, but as data continues to be collected, gaps will be identified and quantified.

Figure 45: USBRS National Corridor Plan

United States Bicycle Route System Recommendations

As described in Table 16 and shown in Figure 44, the State Bike Network acknowledges the United States Bicycle Route System (USBRS) alignments within North Dakota. The USBRS is a developing network of over 13,000 miles of designated routes in 26 states. Routes are numbered and will be signed. The routes travel through urban, suburban, and rural areas along a variety of facility types including low traffic volume roadways, trails, and other contexts.

State departments of transportation nominate routes for official designation. They are reviewed and approved by the American Association of State Highway Transportation Officials (AASHTO). Figure X, produced by Adventure Cycling Association and AASHTO, shows a corridor plan for the completed and potential routes throughout the country. Adventure Cycling Association provides detailed information regarding route designation and other topics (www.adventurecycling.org).



Potential routes include those identified in the National Corridor Plan as 'undeveloped corridors'. These are 50-mile wide buffers that form a starting place for planners to develop potential routes within their state. Suggestions from Adventure Cycling Association formed the basis for beginning to develop suggested USBRS alignments. The following describes NDDOT's work toward establishing USBRS routes within the state.

USBRS Alignment Development

Figure 44 shows the proposed alignment of the USBR network through North Dakota. These route alignments were developed through the following process:

- USBRS alignment developed alongside the planned State Bike Network. Digital map files showing proposed USBR 65, 20, and 10 as well as proposed Adventure Cycling Routes were mapped along with existing trails and shoulders throughout the state. These were used within planning workshops to begin sketching the potential State Bike Network
- The project team consulted bike maps for Montana, South Dakota, and Minnesota when initially creating the planned network to help with route continuity between states. It should be noted that no USBRS are designated at the border of neighboring states. Posted speed limit
- As the planned network evolved, the project team shifted USBRS alignments accordingly to match the planned State Bike Network
- Proposed USBRS alignments fall along Tier One, Two, or Three corridors as designated by this plan. The development and designation of tiers occurred independent of USBR designation (i.e. proposed USBR routes in North Dakota are not correlated to a specific tier level but cross all tiers). The State Bike Network was developed to guide long-term planning decisions and route development over 20 years and was based on desktop analysis of existing data from NDDOT. As such, additional review is needed to ensure that the routes offer continuous, safe, bicycle-friendly routes that meet NDDOT expectations

Primary Routes

Route designation can occur in phases. The potential routes described below are organized according to implementation priority. Prior to beginning the nomination process, each potential route is contingent upon a thorough field review process to verify that the route meets NDDOT infrastructure expectations for bicyclist comfort. Criteria used to select a priority route included:

- Connections that consist of Tier One and Tier Two State Bike Corridors are preferred over Tier Three State Bike Corridors

- Connection through high population urban areas
- Connection through small communities
- Alignment with proposed USBR National Corridor Plan

Using this criteria, the project team identified the following priorities:

- Short-term Priority Route: Fargo to Montana border, east-west route (following ND 46, ND 30, US 83, ND 1804, I-94 and county roads parallel to I-94): This route is considered a priority for USBR designation, because it is composed of Tier One and Tier Two State Bike Corridors. Additionally, it would connect high population urban areas, including Fargo, West Fargo, Bismarck, Mandan, and Dickinson. It would also connect smaller communities
- Medium-term Routes:
 - Minot to South Dakota border, north-south route (following US 83 and ND 1804): This route is composed of Tier One and Tier Two State Bike Corridors and Tier Three Regional Bike Connector Corridors. It would connect Minot and Bismarck
 - Grand Forks to Montana border, east-west route (Following US 2, US 83, ND 23 and ND 1804): This route uses Tier Three Regional Bike Connector Corridors within the planned system. It would connect Grand Forks, Devils Lake, Minot, and Williston
- Longer-term Route: The north-south route on the state's eastern border requires additional coordination with roadway right-of-way owners. Some of this route uses NDDOT right of way, however there is significant use of non-NDDOT county corridors. This route would travel from the Canadian border, through Grand Forks County, Fargo, Wahpeton, and connect to the South Dakota border

USBRS Designation Next Steps

- Review high priority routes for infrastructure that meets expectations as specified in this chapter. The USBRS route criteria defers to State DOTs in terms of infrastructure expectations. However, the route should meet NDDOT standards
- Write turn-by-turn instructions to include in the designation application
- Secure local public agency support, where needed. The USBR potential alignment identification process attempted to stay within NDDOT right-of-way wherever possible. Coordination with local agency support is needed where potential routes are located outside of NDDOT right-of-way. The local connections through and adjacent to towns and cities will be critical to the success of this trail system. Local trail connections that link to services,

recreation and local attractions from the NDDOT Bikeways, will make this statewide bike system valuable at every scales. Local participation is critical

- Secure letters of agreement from neighboring states. A letter of agreement from the Province of Manitoba, Canada is also required when applying to designate the potential north-south route along North Dakota's eastern border
- Determine how to promote the routes to constituents, once they are designated. For example, the route could be included on any future bicycle user maps, as recommended within this plan
- Produce signage to identify the routes. The US Bicycle Route sign is contained within the MUTCD. The green version of the sign M1-9 is recommended instead of the black version of M1-9

Active Transportation Safety Countermeasures

Safety countermeasures are infrastructure-oriented safety treatments and strategies which are selected and applied based on proven effectiveness to reduce serious injuries and fatalities on roadways.

Countermeasures can be implemented to address specific crash types including roadway departure, intersection, and pedestrian and bicycle crashes. Several countermeasures have wide-ranging benefits and can be used to singularly address a range of crash types. Countermeasures can also be strategically combined to be more impactful at specific sites.

Sidewalks, raised medians, and road diets are all examples of safety countermeasures that can be applied to reduce crashes and improve safety for a variety of roadway users. The countermeasures outlined in this memorandum are specifically selected to address pedestrian and bicycle crashes.

For additional information and guidance on applying the safety countermeasures outlined in this memorandum, consult the *Active and Public Transportation Facility Planning Best Practices Recommendations*.

Understanding Risk Factors and Safety Countermeasures

Active Transportation Safety Analysis

As discussed in Chapter 3, a systemic safety analysis was conducted using data from 336 pedestrian or bicycle involved crashes from 2012-2016 on North Dakota state highways. A systemic safety analysis technique takes a proactive approach to crash prevention by analyzing characteristics from reported crashes to identify trends, determine risk factors, and mitigate crashes across an entire roadway network. While 1,000 crashes were

analyzed for a wide range of demographics and contributing factors, only 336 of them occurred on roads with reliable road characteristic data – the state network.

Road characteristics can be defined as the spatial, physical, and regulatory conditions along a roadway segment. These characteristics impact the safety and experience of a person walking, bicycling, or driving. For each crash location, the following road characteristics were analyzed:

- Urban or rural setting
- Functional classification
- Posted speed limit
- Location in the network (intersection or segment)

This analysis revealed what types of roadways experience a disproportionately high number of crashes and provided insight into where countermeasures can be implemented to have the greatest effect on safety.

While it can be valuable to analyze information about crash types and behavior of people walking, biking or driving leading up to a crash, crash records did not provide enough information to draw conclusions about the most common crash types and contributing behavioral factors.

Summary of Systemic Safety Analysis Results

The following roadway types had the highest raw number of pedestrian- and bicyclist-involved crashes during the time observed:

- Urban principal arterials with speeds less than or equal to 40 mph
- Rural principal arterials with speeds greater/equal to 40 mph

Additional analysis examined the total miles of roadway on the state network that shared common characteristics. By comparing the proportion of crashes on specific roadways to the mileage of roadways with those characteristics, the types of roadways overrepresented in reported crashes could be identified. For example, if 80 percent of reported pedestrian crashes occur on a roadway type that accounts for only 10 percent of the roadway network, that roadway type is overrepresented in reported pedestrian crashes. In that case, prioritizing pedestrian safety improvements on that ten percent of the network could potentially have significant impacts in overall pedestrian safety. Analysis of pedestrian- and bicyclist-involved crashes when considered by roadway mileage found that:

- Urban roadways account for 3 percent of state roadway miles but 82 percent of reported crashes
- Crashes on urban principal arterial roadways with speeds less than or equal to 40 mph account for 2 percent of state roadway miles but 76 percent of all crashes and 45 percent of fatal or severe injury crashes

- Crashes on rural roadways account for 18 percent of reported crashes but 52 percent of fatal or severe injury crashes
- 23 percent of all severe and fatal crashes occurred on rural principal arterials with posted speed limits greater than or equal to 40 mph
- Statewide, 58 percent of crashes occurred at intersections and 42 percent occurred along segments or were not intersection related

The analysis of high risk roadways suggest that crashes are more likely to occur in urban areas with posted speeds less than or equal to 40 mph. This is not surprising given that most walking and biking activity in North Dakota is concentrated in cities where destinations are closer, populations are higher, and environments are more naturally conducive for walking and biking. Within urban areas, crashes are more likely to occur at intersections and on arterial roadways. While there are fewer crashes in rural areas, they tend to result in greater injury are more likely to occur at non-intersections.

Crash Modification Factors

A crash modification factor (CMF) estimates a safety countermeasure's ability to reduce the number or severity of crashes. They are developed through safety effectiveness studies that explore safety impacts of a particular treatment, countermeasure, strategy, or combination of these methods. Transportation professionals can use CMFs to identify countermeasures with the greatest safety benefit for a specific crash type or location. Practitioners can also use CMFs to develop cost benefit ratios to evaluate and prioritize infrastructure projects.

Using Crash Modification Factors

Practitioners can use the following process to identify a CMF for prospective countermeasures to inform countermeasure selection:

- Develop a list of potential countermeasures that address the type of crashes occurring at the identified problem location
- Identify relevant CMFs for each prospective countermeasure, noting differences in effectiveness for different crash or injury types
- Confirm CMF applicability based on relevance to

the project site such as area, number of lanes, and traffic volume

- Select a single CMF for each countermeasure based on the highest quality rating
- Apply the CMF to calculate the expected change in crashes after countermeasure implementation

Selecting and evaluating countermeasures for the problem and context at hand can help NDDOT staff and project partners understand how changes to the built environment can reduce crashes and improve safety for roadway users.

Countermeasure Options

The following table includes a variety of countermeasures for pedestrian and/or bicycle-involved collisions. Some countermeasure treatments have the potential to reduce specific types of motor-vehicle crashes as well, such as left turn or rear end collisions. In addition to a brief description and application guidance, relative treatments costs are also included. These relative costs are highly variable, as many pedestrian and bicycle treatments can be integrated into routine maintenance or capital projects at minimal costs.

More information about planning and design considerations for the following countermeasures is available in the *Active and Public Transportation Facility Planning Best Practices Recommendations*. Guidance from the National Association of City Transportation Officials (NACTO) and the FHWA, including FHWA's Small Town and Rural Design Guide (STAR Guide), are linked from the treatment type.

Identifying the causes, contributing factors, and trends in traffic crashes is key in understanding systemic safety challenges. Once problems have been identified, safety countermeasures can be selected and evaluated to reactively and proactively address safety hazards and reduce the number and severity of crashes in the future. In addition to reducing crash risks for people walking and biking, safety countermeasures have the potential to improve safety, comfort, and community vitality for all modes, ages, and abilities.

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
Sidewalk NACTO STAR Guide	Sidewalks improve pedestrian comfort and safety by providing a dedicated space for pedestrians to travel that is separated from motorized traffic. Sidewalks are appropriate on any street where pedestrians are expected.	Segment Pedestrian (walking in road)	\$\$\$
Shared use path STAR Guide Sidepath STAR Guide	Shared use paths and sidepaths improve safety for people walking and bicycling by providing a dedicated space for pedestrians and bicyclists that is separated from motorized traffic. Shared use paths are appropriate in urban, suburban, and rural contexts. In areas where high numbers of pedestrians and bicyclists are expected, providing separate lanes or facilities for people walking and bicycling is advised.	Segment Pedestrian (walking in road) Segment bicycle	\$\$\$
Separated bike lane NACTO STAR Guide	Separated bike lanes (also called protected bike lanes or cycle tracks) improve comfort and safety for bicyclists by providing a dedicated space for bicyclists that is physically separated from motorized traffic by a vertical element such as a curb or post, and also distinct from the sidewalk. Separated bike lanes are recommended in urban and developed suburban areas with moderate to high traffic speeds or volumes.	Segment bicycle	\$\$\$
Conventional bike lane NACTO STAR Guide	Conventional bike lanes improve comfort and safety for bicyclists by providing a dedicated space for bicyclists that is visually separated from motorized traffic by paint. There are several design features that also impact comfort and safety including width, treatment at intersections, presence of parking, and adjacent traffic conditions. Bike lanes are appropriate in urban, suburban, and rural center settings with low to moderate traffic speeds and volumes.	Segment bicycle	\$\$

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions (Continued)

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
Buffered bike lane NACTO	Buffered bike lanes include a striped buffer zone that provides additional separation between bicyclists and adjacent on-street parking and/or motorized traffic lanes. While not physically separated from traffic, buffered bike lanes provide additional comfort for bicyclists beyond conventional bike lanes. Buffered bike lanes are appropriate on urban, suburban, and rural center streets with moderate traffic speeds and/or volumes, or on lower stress roadways with excess space.	Segment bicycle	\$\$
Advisory Shoulder* STAR Guide	Advisory shoulders improve comfort and safety for bicyclists and calm motorized traffic by providing a semi-dedicated space for bicyclists and combining vehicle traffic into a single center lane. Motorists traveling adjacent to an advisory shoulder generally travel in the middle of the street. Yielding to bicyclists, motorists may move into the shoulder to pass an oncoming vehicle. Advisory shoulders are appropriate on urban, suburban, and rural center streets with low traffic speeds and volumes.	Segment bicycle	\$\$
Bike boulevard NACTO STAR Guide	Bicycle boulevards are neighborhood streets that have been modified to calm vehicle traffic and prioritize bicycle travel. Bicycle boulevards might be located parallel to busier commercial corridors, providing bicyclists with an alternative low-stress route. They typically include striping, signage, and intersection improvements at major street crossings.	Segment bicycle	\$\$

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions (Continued)

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
Paved shoulders STAR Guide	Paved shoulders improve safety for pedestrians and bicyclists in rural areas by providing a separated space for people to walk or bike. Shoulders are not designated for pedestrian and bicycle use. Bicycle-friendly rumble strips can help to improve shoulder safety for bicyclists in rural areas.	Segment pedestrian (walking in road) Segment bicycle	\$\$
High-visibility crosswalk NACTO	High-visibility crosswalks improve pedestrian safety by clearly identifying where motorists should expect pedestrians to cross the street. They are appropriate at stop-controlled intersections that are served by sidewalks or shared use paths. High-visibility crosswalks should be installed with additional safety countermeasures such as curb extensions, median refuge, pedestrian activated flashing beacons, or other treatments when implemented at uncontrolled intersections or mid-block locations.	Intersection pedestrian Intersection bicycle	\$
Median refuge NACTO	Median refuges or refuge islands simplify pedestrian and bicyclists' decision-making process by allowing them to cross one direction of traffic at a time. Medians are also associated with a reduction in motor vehicle crashes by limiting passing and turning movements. Median refuges can be paired with other intersection countermeasures including high visibility crosswalk markings, curb extensions, and crossing beacons. Medians are appropriate at crossings of roads that are served by sidewalks, shared use paths, or dedicated on-street bikeways. They may be installed at controlled or uncontrolled crossings and at intersections or mid-block locations. Additional measures should be considered when median refuges are installed at uncontrolled locations with more than one lane of traffic in each direction due to the risk of hidden threat crashes.	Intersection pedestrian Intersection bicycle	\$\$

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions (Continued)

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
<p>Curb extensions</p> <p>NACTO</p>	<p>Curb extensions or bulb outs improve pedestrian safety by increasing visibility between motorists and pedestrians trying to cross the street and preventing motorists from parking too close to intersections or crossing locations. Curb extensions also have a traffic calming effect by physically and visually narrowing the roadway. Curb extensions are appropriate on streets that are served by sidewalks or shared-use paths. They are especially well suited at intersections in areas where on street parking is present.</p>	<p>Intersection pedestrian</p>	<p>\$\$</p>
<p>Colored pavement for bike lanes</p> <p>NACTO</p>	<p>Green colored pavement or paint can be applied to bicycle lanes to highlight potential conflict areas. Common applications include approaching and through intersections, public transit stops, where bike lanes cross dedicated turning lanes, and major driveways. Green may also be used to call attention to bike boxes including two-stage turn boxes.</p>	<p>Intersection bicycle – turn conflicts</p>	<p>\$</p>
<p>Bike box</p> <p>NACTO</p>	<p>A bike box provides a dedicated space at the front of a traffic lane at signalized intersections that provides bicyclists with a safe and visible way to get ahead of queuing motorized traffic during the red signal phase. Bicycle boxes can help prevent right-hook crashes by turning vehicles at the start of a signal phase. They can also improve comfort for pedestrians by deterring motorists from encroaching into crosswalks while waiting at a red light.</p>	<p>Signalized intersection bicycle – turn conflicts</p>	<p>\$</p>
<p>Two-stage turn boxes*</p> <p>NACTO</p>	<p>Two-stage turn boxes offer bicyclists a safe way to make left turns from right side bikeways or right turns from left side bikeways by allowing bicyclists to proceed straight across the through street and cross street with green signals. They can be used at signalized and non-signalized intersections, and at mid-block locations to help bicyclists properly orient themselves for safe crossing.</p>	<p>Signalized or uncontrolled intersection bicycle – turn conflicts</p>	<p>\$</p>

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions (Continued)

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
<p>Dedicated bike lanes and right turn lanes</p> <p>Through bike lane</p> <p>NACTO</p>	<p>There are a variety of ways to handle right turns and bike lanes to clarify bicycle and vehicle placement, increase awareness between bicyclists and motorists, and reduce conflicts between bicyclists and right turning motorists. Strategies might include striping, vertical separation, and/or signalization. A common approach is to shift dedicated bicycle lanes to the left of dedicated right turn lanes ahead of an intersection and use paint to highlight conflict areas or "mixing zones." See "Bicycle signal" for more information about separating bicyclists and turning movements with through signalization.</p>	<p>Intersection bicycle - right turn conflicts</p>	<p>\$</p>
<p>Combined bike lane/turn lane</p> <p>NACTO</p>	<p>Bicycle signals are signal heads that provide bicycle-specific signalization. They are typically used to improve identified safety or operational challenges involving bicycle facilities and provide guidance for bicyclists at intersections where they may have different needs from other road users. They can help improve safety for contra-flow bicycle movements, where high-volume turns cross a bikeway, and/or where concurrent phases are possible.</p>	<p>Signalized intersection bicycle - Left turn and right turn conflicts</p>	<p>\$\$</p>
<p>Bicycle signal*</p> <p>NACTO</p>	<p>Pedestrian signal indicators demonstrate to pedestrians when to cross at a signalized crosswalk. Countdown signals are particularly valuable as they provide specific information about how long a pedestrian has to cross the street. Pedestrian signals can be programmed in a variety of ways to reduce conflicts and prioritize pedestrian movement.</p>	<p>Signalized intersection pedestrian</p>	<p>\$\$</p>
<p>Pedestrian signal</p> <p>NACTO</p>	<p>A Leading Pedestrian Interval (LPI) improves safety by giving pedestrians a 3 to 7 second head start when entering an intersection before motorists in the same direction are given a green light, increasing pedestrian visibility and encouraging turning traffic to yield before turning.</p>	<p>Signalized intersection pedestrian - Left turn and right turn conflicts</p>	<p>\$</p>
<p>Leading Pedestrian Interval</p> <p>NACTO</p>			

Table 21: Safety Countermeasures for Pedestrian and Bicycle Collisions (Continued)

TREATMENT	SAFETY IMPACTS AND APPLICATION	CRASH TYPE ADDRESSED	COST
<p>Pedestrian-Actuated Rectangular Rapid-Flashing Beacon (RRFB)*</p> <p>NACTO</p>	<p>RRFBs are pedestrian-actuated signals that increase pedestrian safety by indicating to motorists when a pedestrian intends to cross the street. When activated, RRFBs immediately display rapidly flashing lights in a stutter pattern. Studies have shown RRFBs are much more effective at getting motorists to yield to pedestrians than a painted and signed crosswalk alone. RRFBs can be installed at uncontrolled intersections and crossing locations where pedestrians and trail users are expected to cross the street.</p>	<p>Uncontrolled intersection or midblock crossing – pedestrian and bicycle crossings</p>	<p>\$</p>
<p>Protected intersection**</p> <p>NACTO</p>	<p>Protected intersections combine a variety of features including dedicated (ideally separated) bikeways, median refuges, pedestrian and bicycle signalization, and other striping, geometric, and signal strategies to minimize conflicts between bicyclists and motorists at signalized intersections.</p>	<p>Signalized intersection bicycle – turn conflicts</p>	<p>\$\$\$</p>
<p>Roundabouts</p> <p>FHWA - Roundabouts: An Informational Guide</p> <p>FHWA - Making Roundabouts Work for Pedestrians and Bicyclists</p>	<p>When properly designed, roundabouts can reduce the number of severe and fatal vehicular crashes at intersections by keeping traffic moving consistently but slowly in a circular motion. Pedestrians and bicycle circulation and crossings need to be carefully considered in planning and design to improve safety for all modes. Single lane roundabouts are preferred over multilane roundabouts for pedestrian and bicycle mobility.</p>	<p>Intersection – pedestrian and bicycle severe or fatal crashes</p>	<p>\$\$\$</p>
<p>Lane reduction or reconfiguration</p> <p>NACTO</p>	<p>Reconfiguring and/or reducing the number and width of travel and parking lanes can help calm traffic, reduce conflicts, and free up space for pedestrian and bicycle improvements. Lane reductions or reconfigurations can be integrated with repaving or restriping projects for a relatively low additional cost or planned as part of roadway reconstruction.</p>	<p>All crash types</p>	<p>\$-\$\$\$</p>

* As of May 2018, these treatments have received Interim Approval by the Federal Highway Administration. Before installing these treatments, agencies must submit a written request to the FHWA, Director of the Office of Transportation Operations.

** Common elements of protected intersections including bicycle signals and use of green paint for bicycle lanes are under FHWA Interim Approval.

Public Transportation Recommendations

Public Transit Best Practices

As discussed in the Active Transportation Recommendations, the *Active and Public Transportation Facility Planning Best Practices Recommendations* document was developed as part of ND Moves to provide a reference for best practices in active and public transportation facility planning in North Dakota. It is recommended that NDDOT champion the public transit best practices, consider them for state roadways, and encourage the public transit providers and municipalities across the state to consider them as well.

The *Active and Public Transportation Facility Planning Best Practices Recommendations* document provides an expanded range of facility design guidance and tools related to active and public transportation facilities and highlights key considerations when planning for active and public transportation infrastructure.

This document supports the development of project concepts for consideration at the planning and scoping phase of a project and supports the inherent design flexibility afforded by the adopted NDDOT design manuals. Additionally, this document highlights resources that can be referenced for recommendations or considerations. It is important to note that this document is not a design manual, and NDDOT's design manual and applicable FHWA guide manuals adopted by NDDOT's design manual should be used for design.

Public Transit Design Considerations

Appropriate Adjacent Land Use

Surrounding land uses and site design have an impact on the success of public transit service. Specifically, public transit thrives in places with mixed land uses, higher residential densities, and compact site design. Although public transit service itself cannot change the adjacent land use or site design, it is important for capital infrastructure to reflect and react to the surrounding built environment in order to properly address the needs of riders.

For example, consider a bus stop that serves a far set-back apartment building does not have a shelter. On rainy days, riders have to choose between waiting in the rain for the bus or waiting inside the building and running to the stop when the bus becomes visible. The bus was not visible from blocks away and, as such, many riders missed the bus, because they were waiting inside. The addition of the capital infrastructure (e.g. a shelter or a "Bus Approaching" indicator at the stop) could have resolved this rider need.

Safe, Comfortable Boarding and Alighting Options

It is essential that passengers feel safe and comfortable at public transit stops, platforms, and stations. This includes adequate lighting and security cameras and designing stops, platforms, and stations such that no hiding places are possible.

Reliable and Comprehensive Service Information

Removing the unknown from public transit service with service maps and timetables and/or real-time schedule information will increase passenger comfort while waiting for their next leg of the trip.

Designs Consistent with Community Context

Capital improvements can vary greatly in application. While there are guidelines for sizes, finishes, and spacing of enhanced public transit features, some deviation from the guided specification is encouraged such that the capital infrastructure fits within the context of a community.

Multimodal Connections

Public transit users are users of at least one other mode sometime in their trip. Ensuring that other modes have easy and convenient access to public transit is an important element of public transit infrastructure.

Public Transit-Supportive Roadway Design

Roadway design is important for the success of public transit. The following design features are for consideration when public transit is a priority.

Travel Lane Width

A balance is necessary with travel lane widths between easy on-street bus operations and minimizing street crossing distances for passengers once they have exited the bus. Public transit functions best in general purpose travel lanes that are at least 11 feet wide.

In congested areas, buses may opt to travel on freeway shoulders to bypass traffic. In these scenarios, shoulder widths are recommended to be at least 10 feet wide and bus speeds are recommended to not exceed 35 mph⁴⁸.

Speed Limits

Vehicle speeds greater than 30 mph can make pedestrians and transit riders feel unsafe while waiting for public transit. Streets with 30 mph speed limits are excellent locations for public transit facilities because they can:

- Accommodate medium to high volumes of traffic
- Achieve a balance of access and mobility for all modes
- Include a diverse set of walkable destinations

- Accommodate boarding and alighting in the travel lane from curb-extended stops or stations
 - When public transit stops exist on streets with speed limits over 30 mph, it is recommended that public transit stops be designed as off-street or pull-out stops. Taper lengths for pull-out stops are largely dependent on the speed of general traffic.
 - When public transit stops exist on streets with speed limits at or below 30 mph, depending on traffic volumes, the bus can safely stop in the travel lane to allow passenger boarding or alighting.

Turning Radii

Public transit vehicles typically require an effective turning radius of approximately 20–30 feet, and the smallest turn radius that still accommodates all bus movements is optimal. A wide turn radius requires a bus to stop further from the intersection, which causes riders to walk farther and can reduce the availability of on street parking. Narrow turning radii reduces street crossing distance and may benefit operations by reducing the number of clear lanes needed to make a turning movement.

Bus Stops

A basic bus stop may include a small bus shelter and a sign indicating a bus stop and potentially the route(s) serving the stop. Bus stops require sidewalk and curb space. Sidewalk space provides an area for riders to wait for the bus as well as board and exit the bus. The curb space allows the bus operator to safely maneuver the bus out of traffic and up to the edge of the sidewalk.

Design Dimensions

- Curb length: Varies depending on design speed of roadway and length of bus in operation. On 30 mph roads, the minimum curb length needed to accommodate pull-out bus stops can be estimated as two times the length of the bus plus a 10 foot taper
 - For instance, 40-foot buses operating on 30 mph roads need at least 90 feet clear curb space for the bus to pull into the boarding area, align doors with the curb, and pull out into general traffic
 - For stops serving more than one bus at a time, add an extra bus length and 10 feet for each bus that will be at the stop at the same time
 - Nearside stops need less pull-in length than farside stops because the bus can pull-in to the

stop while navigating through the intersection

- Lane width: Public transit functions best in travel lanes that are 11 feet or wider
- Boarding area: The front of the bus shall be adjacent to a minimum of 5 feet wide by 8 feet deep unobstructed sidewalk space (ADA Std. 810.2.2)⁴⁹
- Distance to intersection: Bus stops that are located before an intersection (nearside stops) should be set back at least 15 feet so that they do not block the visibility of pedestrians⁵⁰
- Signage: Placing bus stop signs at the front of the stops indicates the approximate location where the front of the bus will be when stopped

Other Street Design Features to Consider

- On-street parking: If the speed limit is low enough, the platform may be shorter to allow for more parking
- Bicycle lanes: Maintain bicycle lanes in existing conditions when possible, dotting the bike lane across bus stops and/or turn outs

Bus Stop Location and Geometric Considerations

When possible, locate bus stops at intersections to enable safe and easy pedestrian crossing movements. However, locating a stop near an intersection can produce pedestrian-vehicle conflicts and vehicle-bus conflicts. Additionally, bus operations and schedule are affected by the stop location within and geometry of the intersection.

Platforms

A platform refers to a larger, defined public transit waiting area at a stop. This could be at a bus stop or at a stop for other modes, such as trains, light rail public transit (LRT), streetcar, or bus rapid transit (BRT). A bus stop typically does not include curb modifications while a platform may require some curb extensions to provide additional waiting space for public transit riders. A platform may or may not include additional amenities outside of an open waiting space and can also include the amenities detailed in the Station subsection as appropriate and space can accommodate.

Significant differences between a stop and platform include the addition of detectable warning strips as well as, potentially, raised curbs and bump-outs.

Detectable warning strips are two-foot-wide tactile plates that signify the edge of the platform to visually-impaired riders and provide additional footing for all riders during inclement weather.

⁴⁸ <https://ops.fhwa.dot.gov/publications/fhwahop15023/ch1.htm>

⁴⁹ <https://www.access-board.gov/guidelines-and-standards/transportation/facilities/about-the-ada-standards-for-transportation-facilities/ada-standards-for-transportation-facilities-single-file#a209>

⁵⁰ <https://nacto.org/publication/transit-street-design-guide/stations-stops/stop-design-factors/stop-placement-intersection-configuration/>

Raised curbs are similar to standard curbs, but the height is increased to allow easier mobility in boarding and exiting the bus.

Bump-outs are extensions of the curb into the street. By extending the curb, the bus does not need to spend time navigating from the traffic lane to the platform, rather the bus stops briefly in the traffic lane while riders board and exit.

Street Design Features

Platforms may require more curb space than a standard bus stop, especially if the platform uses curb bump-outs. Access points, alleys, and driveways may conflict with the space needed for a platform. If possible, closing the access points creates a greatly improved public transit and pedestrian experience by removing possible vehicle-bus and vehicle-pedestrian collisions. If access points cannot be closed, the platform may be located elsewhere along the curb so that the access point is near the platform but not bisecting it.

- Curb Length: Same as stop with taper length
- Boarding area: Same as stop or wider
- Optional detectable warning strip: 2-foot deep tactile plates placed directly behind the curb. Can run along the entire length of platform or just length of one bus
- Possible raised curb: Curb height increased to nine inches
- Bump-outs: Taper bump-outs that extend into the street at 5:1 (five feet in length for every foot in depth). Platform length only needs to be equal to one bus length (plus one bus length + 10 feet for every additional bus stopped at the same time)

Other Street Design Features to Consider

- On-street parking: Same as stop
- Bike parking: Provide ample bike parking to facilitate multi-modal connections to public transit
- Bicycle lanes: Without bump-out, do not reroute bicycle lane. With bump-out, use floating public transit stop (defined below)
- Right-turn lanes: Same as stop
- Access points/nearby business curb cuts: Close curb cut or relocate platform

Stations

A station is an enhanced facility that requires more space than a traditional bus stop or platform. The necessary space depends on the type of public transit served by the station. An LRT station, for example, must accommodate several train cars and could be several hundred feet long, while a station that only serves buses may not require as much space.

Amenities

A station may also include many of the following characteristics:

- Shelter(s)
- Level-boarding platforms
- Off-board fare collection
- Unique name
- Passenger and route information
- Lighting, heating, and security technology
- Seating
- Bicycle parking
- Real-time arrival information

The key difference between platforms and stations is pedestrian access to the infrastructure. The connotation of a platform is that it is adjacent to sidewalk or trail, whereas a station may be center aligned and, therefore, require additional space to allow for pedestrian access into the station area.

Stations ideally provide separate spaces for pedestrians, amenities, and riders. The space nearest the curb shall have a detectable warning strip and provide a clear boarding area for riders to board and exit the bus (ADA Std. 705). The space behind the boarding area is recommended as a furnishing area dedicated to station amenities and a place for riders to wait for the bus. Active sidewalk is recommended behind the furnishing area. The space provides continual access to the furnishing and boarding areas along the entire station length.

Design Dimensions

- Curb length, boarding area, detectable warning strip: Same as platform
- Furnishing area: Furnishing areas shall be at least four feet deep (ADA Std. 305) and must be set back eight feet from the curb to allow clear bus boarding space along the entire platform (ADA Std. 810.2.2)⁵¹
- Signage: Station signs and other markers are best placed approximately ten feet from the shelter. Front of bus aligns with station sign, not the shelter

Other Street Design Features to Consider

Same considerations as platforms, plus:

- Ensure sidewalk space is located behind the furnishing area. Mixing the furnishings, pedestrians, and boarding area creates conflicts
- Remove right turn lanes for nearside bump out stations

Floating Stations

Stops and stations with bump-outs on streets with bicycle lanes may need to use a floating station design to avoid bicycle-bus and bicycle-vehicle collisions. In this case, the bicycle lane is routed behind the station so

⁵¹ <https://www.access-board.gov/guidelines-and-standards/transportation/facilities/about-the-ada-standards-for-transportation-facilities/ada-standards-for-transportation-facilities-single-file#a209>

that bicyclists travel between the active sidewalk and bus station. Because this design creates pedestrian-cyclist conflicts, other pedestrian safety features are recommended in coordination with floating stations.

Depots

While a station typically only serves one or two local public transit types like bus and light rail at one or two platforms, a depot is the compilation of several platforms and many times includes several modes. Depots can have buildings with public seating, restaurants, and bathrooms to accommodate passengers with long transfers. Depots are typically where intercity public transit transfers occur.

Design Dimensions

- Platform length: Identify public transit services to be accommodated in order to determine the platform length needed
- Include space for additional amenities
- Allow at least a six-foot-wide active sidewalk to pass through the depot
- Bus Lanes: Bus lanes operate best for passenger boarding and layovers in lanes that are 11 feet wide. An adjacent lane ensures that a stopped bus can easily be passed by another bus

Other Design Features to Consider

- Nearby businesses
- Whether modes other than public transit will use the space
- Parking demand
- Bike parking: in addition to short-term use outdoor racks, depots may provide long-term secure bike parking and/or covered bike parking

Transit Signal Priority

Transit Signal Priority (TSP) is a general term for the technology that can be utilized at signalized intersections on a corridor or intersection level to prioritize traffic flow for public transit. Implementation of TSP varies greatly, but the goal is to reduce dwell time at traffic signals for public transit vehicles. This can be done by holding green lights longer or shortening red lights.

Although TSP does not need any physical space in public right-of-way outside of the signal infrastructure, the application of TSP should be included in roadway design criteria. Urban corridors identified for improved public transit service could be good candidates for TSP at signalized intersections.

Design Considerations

- Volume of intersection compared to volume of public transit passengers
- Presence of BRT or other enhanced public transit service
- Right-turn movements
- Intersection spacing
- Intersection level-of-service
- Corridor delay

Recommendations to Address Public Transportation Network Gaps

As additional public transportation funding is available, it is recommended that NDDOT focus on addressing the gaps identified in the public transportation system, as discussed in Chapter 3. An estimate of existing and future system resources to support public transit in North Dakota was developed using both existing and projected needs (Table 22). Resource needs were based on revenue hours per capita by both urban and rural systems separately. (The analysis of the urban system focused only on fixed route service for consistency across providers.) While urban and rural systems individually show a wide variation in service gap, the overall system resource needs were banded together to provide an overall aggregate assessment of system needs for both urban and rural systems.

Table 22: Existing and Projected Resources Needed for Public Transportation in North Dakota

PROJECT SYSTEM NEEDS	BASE (2016)	2040
URBAN FIXED ROUTE		
Revenue Hour – Fixed Route Service Gap (Urban)	32,000	111,570
Additional Resources Needed to Address Gap ⁵²	\$2,048,000	\$7,140,480
Total Resources Needed (Includes Existing Funding) ⁵³	\$12,636,930	\$17,729,410
RURAL		
Revenue Hour- Service Gap (Rural)	74,440	221,226
Additional Resources Needed to Address Gap	\$3,498,680	\$10,397,810
Total Resources Needed (Includes Existing Funding)	\$14,526,510	\$21,425,640
STATEWIDE		
Total Statewide Revenue Hour - Service Gap	106,440	332,797
Additional Resources Needed to Address Statewide Gap⁵⁴	\$5,546,680	\$17,538,290
Total Resources Needed (Includes Existing Funding)⁵⁵	\$27,163,440	\$39,155,057
Assumes \$47.00 per revenue hour (Rural) and \$64.00 (Urban) based on state averages from 2016 data from the National Transit Database		

Winter Maintenance

Design Considerations

Designing and building facilities with winter and seasonal maintenance in mind provides high-quality, comfortable facilities for people walking, biking, and taking public transit year-round.

Bicycle and Pedestrian Facilities

Separated facilities like sidewalks, protected bike lanes, and trails require separate equipment to maintain, but are ultimately easier to maintain to a high standard.

Providing adequate buffer space for these facilities is key to year-round use as it provides space to store snow. Facilities placed back of curb or directly on the roadway are difficult to maintain and can become narrow or impassable in winter.

Milling the area of pavement 3mm in depth where thermoplastic pavement markings are applied has shown to be effective in reducing damage as a result of snowplows in a recent study. While this method results in more expensive installation costs, if the bike lane is

located on a street that receives heavy plowing, it may save in long-term maintenance costs (and help preserve safety conditions along the roadway).

Public Transit Stops

A stop, platform, or station benefits from a small area dedicated to emergency snow storage. Heavy snowfalls may not be adequately cleared immediately, but the public transit facility shall be made fully operational soon after the weather event (28 CFR §35.133). Additionally, spacing amenities apart from each other on platforms and stations allows for a rotary power brush to clear snow between them.

Snow Removal Best Practices

Anti-icing pre-treatment, timely plowing, and clear communication between agencies and with the public are important to efficient and effective snow removal.

Anti-Icing Treatments

Apply anti-icing treatment to trails or separated bike lanes up to 24 hours before snow or freezing rain events to reduce the amount of snow clearing required during

⁵² The urban analysis focused only on fixed-route service. Therefore, this cost estimate does not include additional funding that will be needed for urban paratransit service.

⁵³ Includes existing funding for urban paratransit service but does not include additional funds needed for this service in the future

⁵⁴ Does not include additional funding that will be needed for urban paratransit service.

⁵⁵ Includes existing funding for urban paratransit service but does not include additional funds needed for this service in the future

or after a snow event. Following the snow, the facility shall be cleared and additional anti-icing material should be added as necessary (28 CFR §35.133). This approach saves anti-icing material and time spent plowing.

Snow Removal Timing

Plow and/or treat walking and biking facilities within 24 hours of the end of a snowfall.

- Remove snow from walking and biking facilities after the adjacent street is plowed
- Ensure that snow is removed from curb ramps and crosswalks after bike lanes are plowed. A maintenance worker will likely need to shovel these locations after the bike lane is cleared to reduce the likelihood of snow accumulating on curb ramps and crosswalks

Winter Prioritization Network

Prioritization and scheduling is a key component of a successful winter network. For most jurisdictions, keeping all walking and biking facilities completely clear during or immediately after a heavy snow event is infeasible. Primary facilities should be cleared first, providing the best access to the greatest number of people possible following a heavy storm event. Destinations should be taken into consideration as well. If roadway clearing and anti-icing begins first thing in the morning, primary routes leading to schools and business districts should be cleared first.

Paths that are less heavily used but are the only means of making a key connection should also be prioritized.

Isolated trails that serve recreational users may be reserved for use by cross country skiers and snowmobile and fatbike users.

Ordinances and Communication

It is important for state and local agencies to understand their maintenance responsibilities. Standards for the maintenance of state roads by local authorities should be specified in a maintenance agreement.

Public Transit Agencies

Public transit agencies may create maintenance agreements with municipalities regarding winter maintenance. Often a bus stop can be cleared at the same time as a sidewalk. However, platforms and stations may require additional clearing and equipment outside the scope of sidewalk cleaning alone.

Because platforms and stations typically have improved levels of public transit service, upgraded winter maintenance is beneficial. The public transit agency would then need to ensure the municipality has enough operational rotary power brushes and an available maintenance workforce schedule to keep the stations clean. If an agreement cannot be made, the public transit agency would be responsible to keep the stations, platforms, and bus stops free of snow and ice.

CHAPTER 4:

Strategic Action and Implementation Plan



CHAPTER 4: Strategic Action and Implementation Place

Introduction

The Strategic Action & Implementation Plan specifies potential next steps to implement ND Moves. This plan is based on public input, existing issues, projected and emerging trends and a detailed review of existing NDDOT practices and policies. Actions steps also reflect recent recommendations developed by the Governors Institute on Community Design report prepared for NDDOT.

Every action on the part of NDDOT requires the investment of time and resources. Some elements recommended by ND Moves do have cost associated with them, specifically investments in new infrastructure. However, given the broad nature of ND Moves, several programming and operational related recommendations are not cost quantified. It is expected that NDDOT would need to more thoroughly review proposed programming and operational recommendations for cost-benefit for deciding on implementation.

The Strategic Action and Implementation Plan provides a concise background on the context of issues and then a specific plan to address the following broad issue areas:

- **Planning** – Expand efforts to improve continuous planning at the statewide, regional/MPO and local level to support active and public transportation, and local decision-making tools. This includes partnering with other state agencies (Bureau of Indian Affairs, State Parks, State Health, etc.) to achieve mutual health goals.
- **Funding Programs** – Considerations to strengthen and improve funding programs to support active and public transportation across North Dakota.
- **Statewide Task Force** – Develop a committed statewide task force to support the efforts of NDDOT in implementing ND Moves across the State of North Dakota.
- **Emerging Trends** – Proactively approach changing trends in the areas of active and public transportation in North Dakota.
- **Barriers** – Address barriers to mobility in several contexts across the State of North Dakota.
- **Connections & Linkages** – Strengthen the coordination between state and local transportation systems and improve access to the State's natural and cultural resources. This includes the development of the State Bike Network.

- **Public Transit Mobility** – Improve public transit-based mobility across the State of North Dakota, through improved intercity and regional bus systems, development of new small urban systems and expansion and preservation of existing systems.
- **Safety, Education, and Encouragement Programs** – Continue to improve safety for active and public transportation users in North Dakota through both legal and engineering-based solutions. Enhance existing programming with new safety education and encouragement programs.

Review and considerations for the following items are also included in this chapter:

- Active Transportation Design
- Traffic Laws and Statutes
- Active Transportation in Work Zones

Planning

Throughout North Dakota, a range of planning processes are ongoing on a regular basis. At a statewide level, NDDOT has put more focus in recent years on a regular and timely update of statewide planning documents to respond to both changing Federal guidance and evolving statewide conditions.

Planning Readiness

Within the state's largest urban areas, North Dakota's three Metropolitan Planning Organizations (MPOs) continue to implement the federally required 3-C (continuing, cooperative and comprehensive) planning process. The MPO planning programs focus on all modal areas, including active and public transportation. The MPO planning process provides several best practices in the identification of active and public transportation needs. The MPO process is also successful at developing and refining project needs to assist with the selection and eventual funding and programming of projects.

Current MPO practices are potentially transferable to the gradual development of regional planning program throughout North Dakota. Many parts of North Dakota are currently served by de facto regional planning agencies through either existing Regional Development Commissions or Councils and the related work of North Dakota's regionally based Community Action Agencies (CAAs). These agencies are only loosely coordinated with the overall modal planning processes of NDDOT and transportation elements should be more integrated to coordinate actions.

Several larger communities in North Dakota have adopted comprehensive plans that support the active and public transportation planning process. However, most communities in the state do not have regularly updated comprehensive plans or the resources to complete a plan. The following actions are intended to support positive areas of past practice on the part of NDDOT and local public agencies (LPAs) and to suggest opportunities to strengthen areas where stronger planning is needed.

Table 23: Action Plan – Planning Readiness

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Review ND Moves to address changes in statewide trends and conditions regarding active and public transportation	Annually	NDDOT
Update ND Moves planning document	Every 5 years	NDDOT with input from stakeholder agencies and MPOs
Integrate key findings of ND Moves into subsequent updates to TransAction III, NDDOT's Statewide Long-Range Transportation Plan, and other relevant modal plans and programming documents developed by NDDOT	As plans are updated	NDDOT
Support potential linkages between the Highway Safety Improvement Program (HSIP) and active transportation programming, review the Strategic Highway Safety Plan (SHSP) to strengthen programming support for active transportation	Ongoing	NDDOT
Explore formalizing relationships with agencies to develop regional planning partnerships that support active and public transportation	Ongoing	NDDOT ND Department of Health Regional Development Councils Community Action Agencies
Continue to support the development of Metropolitan Transportation Plans (MTPs) for each MPO in North Dakota, and other locally developed long range plans in urban areas; and treat these plans as the primary starting point for the decision-making process for future transportation needs and investments	Ongoing	NDDOT MPOs
Encourage the smaller urban areas to develop and then update their transportation plans no less than every 10 years	Every 10 years	Non-MPO urban areas

Limited Right-of-Way & Environmental Issues

Limited right-of-way and environmental permitting issues can be a challenge to fully integrating active transportation facilities into transportation projects. Although challenges differ depending on project setting, expanding right-of-way to accommodate active transportation elements can often involve property acquisitions or easements, which are sometimes perceived as politically infeasible. This can result in limited and disconnected facilities. In urban areas, built constraints and property impacts can limit the space available for creating new separated facilities such as shared use paths. In rural areas, ditches, waterways, and sensitive habitats provide potential

regulatory barriers, and active transportation projects are often focused outside of the State's right of way or abandoned altogether. The proposed State Bike Network is divided into three tiers to provide context-sensitive infrastructure expectations. Where possible, recommended infrastructure expectations identify opportunities to install signage rather than provide a facility like bikeable shoulders or physically separated infrastructure. Nonetheless, as noted in Chapter 3, physical infrastructure, where appropriate, encourages ridership by a wider range of potential bicyclists. If acquisition of right-of-way is not feasible, other accommodations within the roadway can be made to allow more space for active transportation facilities. Table 24 provides NDDOT actions for consideration to address issues related to limited right-of-way and the environment.

Table 24: Action Plan – Limited Right of Way & Environmental Issues

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Ensure corridor studies and project scoping efforts fully evaluate environmental issues, including right-of-way, early in the planning and scoping process	Ongoing	NDDOT
Expand State right-of-way through new dedication during the platting and/or subdivision process. NDDOT should establish preferred right-of-way standards and work with city and county officials to ensure adequate dedication ordinances exist	Ongoing as opportunities arise	NDDOT Local jurisdictions
Use the Active and Public Transportation Facility Planning Best Practices Recommendations to balance land use and transportation considerations, incorporate context sensitive design principles to reduce project impacts, and allow for more flexibility in the design and inclusion of active transportation assets into project designs	Ongoing	NDDOT Local jurisdictions
Continue to allow flexibility for 11-foot travel lanes on heavily urbanized segments of the State highway system	Ongoing	NDDOT
Evaluate opportunities for four-lanes to three-lane conversions on the State highway system through urban centers and small towns to maximize existing right-of-way	Ongoing	NDDOT Local jurisdictions
Review and consider revising current shoulder widening practices pursuant to Section 1.06.02 of the NDDOT Design Manual to account for potential addition of shoulders to support the State Bike Network	2019-2024 (next 5 years)	NDDOT FHWA

Integrate Active Transportation into Corridor Management

There are significant gaps and barriers to active transportation along the State highway system in urban areas. When project needs are identified along these corridors they should be fully evaluated to determine opportunities to improve active transportation mobility. To support existing practices, Table 25 identifies elements for NDDOT consideration during the planning phase of corridor improvement projects. These elements are particularly useful in non-metropolitan areas where corridor studies are less frequently conducted prior to roadway projects.

Table 25: Action Plan – Integrate Active Transportation into Corridor Management

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Expand the project scoping process to require consideration of active transportation facilities using the Active and Public Transportation Facility Planning Best Practices Recommendations and consultation with the State Bike Network	2019-2024 (next 5 years)	NDDOT Local jurisdictions
In addition to the current commission meeting process which is open to the public, implement direct outreach to school districts and public health officers during the project scoping process. Consider consultation with the Healthy and Safe Communities Division of the Department of Health	2019-2024 (next 5 years)	NDDOT School districts ND Department of Health
Provide training opportunities for NDDOT staff and local officials to expand knowledge and understanding of active transportation facility planning and design. Train staff on integrating relevant active transportation project concepts into the project scoping phase of a project life cycle.	2019-2024 (next 5 years)	NDDOT Local jurisdictions

Funding Programs

NDDOT uses its Federal funding programs for active and public transportation to meet the needs established in previously developed statewide plans and programs. ND Moves considers a range of trends, issues, and the results of a robust statewide outreach process to recommend changes to current funding practices for active and public transportation in North Dakota.

Programming Practices

NDDOT currently applies generally accepted programming practices to Federal aid programs targeted at both active and public transportation in the State of North Dakota. Funding for these two modes are well-established and implemented efficiently through a series of statewide and metropolitan level programming procedures. NDDOT can adjust and modify current practices, within Federal rules, to meet existing and projected needs. Table 26 provides actions for NDDOT to consider to improve programming practices.

Table 26: Action Plan – Programming Practices

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Programs such as the Recreational Trails Program (RTP) and Transportation Alternatives (TA) are a portion of the Surface Transportation Block Grant (STBG) program. Explore the potential to increase funds dedicated to the RTP or TA programs.	Ongoing	NDDOT
Consider the development of a state funded Safe Routes to School (SRTS) program to support the planning and development of lower cost projects around the State of North Dakota	Ongoing	NDDOT
Consider establishing a sub target of the HSIP investments into active transportation, provided those projects are consistent with the SHSP	Next HSIP update	NDDOT
Encourage public transit providers to continue to work through entities such as the Dakota Transit Association (DTA) to support advocacy for local and state funding for public transportation	Ongoing	NDDOT DTA Local transit providers
Encourage MPO areas to consider using STBG funds to meet public transit capital needs relating to significant public transit facilities and rolling stock	Ongoing	NDDOT MPOs
Continue to monitor public transit needs in North Dakota and work with the DTA and the North Dakota legislature to evaluate changes to existing state and federal funding formulas, as needed, to assist in providing services to meet existing and projected public transit needs	Annually	NDDOT DTA ND Legislature
Continue to use available flexibility in Federal Transit Administration (FTA) funding to satisfy existing and projected public transit capital needs in North Dakota. This will be beneficial for identifying the additional funds necessary to maintain the state's transit infrastructure in a state of good repair	Ongoing	NDDOT

Statewide Active Transportation Task Force

NDDOT has the opportunity for the efforts undertaken in ND Moves to have long lasting impacts to active and public transportation in North Dakota. This would be best accomplished through the development and ongoing commitment of a Statewide Active Transportation Task Force.

There is an existing Transportation Alternatives Project Selection Committee that is tasked with reviewing funding applications and selecting Transportation Alternatives projects. This committee may be expanded to play the recommended role of a Statewide Active Transportation Task Force. NDDOT should review the intent of the Transportation Alternatives Project Selection Committee and determine if it could fulfill the recommended membership and roles of a Statewide Active Transportation Task Force. Table 27 provides NDDOT with actions for consideration relative to a Statewide Active Transportation Task Force.

Statewide Active Transportation Task Force Membership

Recommended representation of a Statewide Active Transportation Task Force includes:

- League of Cities:
 - City > 50,000
 - City between 5,000 and 49,999
 - City < 5,000
- MPOs
- Tribal Nations
- Association of Counties
- State Agencies
 - Department of Health
 - Department of Commerce
 - Parks and Recreation
- Statewide Active Transportation Advocacy Groups (E.g. ND Active Transportation Alliance)
- Target Groups (I.e. AARP, Aging, Disabled, Health & Wellness, etc.)
- Others as deemed necessary by NDDOT

Table 27: Action Plan – Statewide Active Transportation Task Force

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Review role and membership of existing Transportation Alternatives Project Selection Committee and determine if it could function as a Statewide ND Active Transportation Task Force	2019	NDDOT
Expand existing TA Project Selection Committee, or establish a new Statewide Active Transportation Task Force	2019-2020 (next 2 years)	NDDOT
Serve as “champions” for NDDOT in demonstrating the multi-disciplinary and interagency benefits of active transportation across North Dakota.	Ongoing	Statewide Active Transportation Task Force
Implementation of ND Moves Action Plan through the development of a two-year work program of tasks and activities.	2019-2020 (next 2 years)	NDDOT Statewide Active Transportation Task Force
Lead subsequent plan updates on a five-year cycle.	Ongoing	NDDOT Statewide Active Transportation Task Force

Table 27: Action Plan – Statewide Active Transportation Task Force (Continued)

RECOMMENDED ACTION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Provide input into the development and update of other NDDOT or relevant State agency plans and programs.	Ongoing	Statewide Active Transportation Task Force
Serve as a sounding board for new policies and programs to advance active transportation North Dakota.	Annually	Statewide Active Transportation Task Force
Support the development of outreach and education efforts aimed at a broad range of statewide groups and stakeholders.	Ongoing	NDDOT Statewide Active Transportation Task Force
Assist in the development of an Annual North Dakota Active Transportation Summit, potentially coordinated through the annual ND League of Cities conference.	2019-2024 (next 5 years)	NDDOT Statewide Active Transportation Task Force ND League of Cities

NDDOT Coordinating Committee

NDDOT should establish a multi-disciplinary internal coordinating committee among several key functional areas to support the Active Transportation Task Force. The Coordinating Committee could be comprised of staff from Planning and Asset Management, Local Government, Programming, Design and Environmental and Transportation Services. Table 28 provides NDDOT with actions for consideration related to the NDDOT Coordination Committee.

Table 28: Action Plan – NDDOT Coordinating Committee

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Ensure active movement towards key implementation items identified in ND Moves	Annually	NDDOT Coordinating Committee
Engage with the Active Transportation Task Force	Twice annually	NDDOT Coordinating Committee

Emerging Trends

Effective management of the emerging trends and issues discussed in Chapter 2 will require an ongoing, proactive commitment by NDDOT and its statewide partners. Table 29 presents an action plan of long-range approaches to managing changing conditions.

Changing Context Around the State System

Across North Dakota, the state highway system (arterial network) often acts as the primary connection to and between communities with the collector local system feeding this regional and statewide network. In many of North Dakota's larger urban settings, there is

growing interest in reinvestment and redevelopment along to the state highway system. In these areas, local leaders, technical experts, and the public are seeking options and opportunities to modify the state system to match the changing context of surrounding land uses. This presents challenges and choices in how mobility needs are balanced between automobiles and active transportation users.

Table 29: Action Plan – Changing Context Around the State

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Review the North Dakota Design Manual and Traffic Operations Manual and consider revising state standards in urban areas to be more flexible to multimodal mobility and level of service expectations and responsive to the surrounding land use context.	2019-2020 (next 2 years)	NDDOT
Use demonstration projects to assist with education, testing, or vetting concepts with both the public and technical stakeholders	Every 2 years	NDDOT Local jurisdictions
Evaluate and quantify before-and-after impacts of roadway and facility changes such as added bike lanes, road diets, etc. The results of these studies can be used to support future decision making (e.g. Bike lanes on US 81B [Fargo] or three-lane conversion of US10 [Fargo])	Ongoing	NDDOT Local jurisdictions
Proactively develop corridor studies on regional segments of State Highway in advance of major reconstruction projects three to five years prior to the development of an environmental document	Ongoing	NDDOT Local jurisdictions
The I-94 Business Loop designation is a perceived barrier to active transportation improvements. Evaluate the utility of the I-94 Business Loop designation to support local business and economic development	2019-2024 (next 5 years)	NDDOT

Rapidly Changing Technology

Rapidly changing transportation technology has wide ranging impacts to mobility. The rise of autonomous vehicles, ridesourcing (Uber, Lyft, etc.), bikeshare, and carsharing can change the demand for single-occupancy vehicles or public transit. A variety of predictions suggest an equal number of possible futures. As rideshare and car share become more prevalent, public transit use could decline, or autonomous vehicles

and microtransit could reduce the cost to provide public transit service, making it more competitive to expand service coverage and/or frequency. Integrating carshare, rideshare, and bikeshare technologies into public transit platforms can address first mile/last mile challenges. The state, working together with public transit providers and local agencies, may have a role to play in evaluating, adopting, and regulating technology as appropriate. Table 30 provides NDDOT actions for consideration in regard to rapidly changing technology.

Table 30: Action Plan – Rapidly Changing Technology

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Form strategic partnerships with North Dakota's higher education researchers to prepare for, accommodate, and test autonomous vehicles	2019-2024 (next 5 years)	NDDOT Public transit agencies

Table 30: Action Plan – Rapidly Changing Technology (Continued)

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Engage in knowledge sharing with other state DOTs exploring public private partnerships with ride-sharing companies, microtransit, and autonomous vehicles	Ongoing	NDDOT
Consider necessary legal considerations to accommodate the operation of microtransit and other shared mobility services	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Create guidance on the use of curb space for bikeshare, rideshare, carshare, public transit, and other forms of shared mobility	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Make updated pedestrian and bicycle infrastructure data and updated public transit data publicly available for use by app developers and the general public	Ongoing	NDDOT
Facilitate the integration of rideourcing, carsharing, bikesharing, and other shared mobility platforms with established, fixed-route public transit	2019-2024 (next 5 years)	NDDOT Public transit agencies
Develop a pilot program with public transit agencies where microtransit service is used to supplement existing fixed-route public transit service and/or paratransit service (e.g in relation to major public transit generators)	2019-2029 (next 10 years)	NDDOT Public transit agencies
Do not allow autonomous vehicles to operate in North Dakota if they rely exclusively upon pedestrians and bicyclists carrying detection devices	Ongoing	NDDOT
Work cooperatively with the Advance Traffic Analysis Center (ATAC) and MPOs through their existing model programs to ensure travel demand modeling tools reflect changing conditions regarding shared mobility and AVs	Ongoing	NDDOT MPOs ATAC

Downtowns and Walkable Areas

Increasing statewide interest in creating walkable environments such as downtowns and main streets will require a robust review of a range of current policy practices of NDDOT and other State agencies. Creating a successful walkable place involves the integration of concepts from a variety of design professionals, as well as coordination between multiple government entities

and public and private interests. A collaborative process that begins with identifying the purpose of the roadway and adjacent area is imperative. For example, is the roadway's primary purpose to move people and goods through the area, or is the area's primary purpose to attract people of all ages to congregate on foot for commerce and social interaction? Both types of places are necessary in today's communities. Attempting to accommodate all needs along all roadways will likely

degrade the use of the roadway and adjacent built environment for all users. The recently implemented Urban Grant Program (UGP) put forth by NDDOT dramatically changes how Federal aid for active and public transportation can be targeted for downtowns and main streets in North Dakota's urban communities. A technical assistance program may be necessary for communities to ensure planning follows best practices. Table 31 provides NDDOT with actions for consideration related to downtowns and walkable areas.

Table 31: Action Plan – Downtowns and Walkable Areas

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Champion interdisciplinary program development to support downtowns and main streets across North Dakota. This includes better linkages between NDDOT, the Department of Commerce, and other state agencies who have an interrelated role in supporting community development initiatives that support downtowns	Ongoing	NDDOT Department of Commerce Governor's Office - Main Street Initiative Local jurisdictions
Coordinate with other state agencies on the development of annual training and workshops for local and state level leadership on supportive policies to improve downtowns and main streets through public infrastructure and policy making	2019-2024 (next 5 years)	NDDOT Department of Commerce
Review policies and manuals and consider edits to support multimodal mobility and community development principles inherent in supporting vibrant and active downtowns and walkable areas. Examples include the NDDOT Design Manual and other policy level tools used by NDDOT to support decision making impacting downtowns and main streets	2019-2021 (next 2 years)	NDDOT Local jurisdictions
Integrate elements of the Active and Public Transportation Facility Planning Best Practices Recommendations into the North Dakota Design Manual to assist communities in creating a multimodal network for all abilities, specifically in downtown/mainstreet context	2019-2021 (next 2 years)	NDDOT FHWA
Work with local communities to test approaches to supporting active transportation in downtowns through demonstration projects and support the conversion of successful projects into permanent changes	Ongoing	NDDOT Local jurisdictions

Barriers

The state highway system often present as active transportation barriers in urban and urbanizing communities. The state system often provides regional connections important for economic development and freight movements as well as desirable locations for locating businesses. Throughout the public engagement efforts, these barriers for active transportation for all communities were identified.

State System as a Transportation Backbone

In many communities, especially mid-sized urban areas, the state highway system serves as the backbone of the local transportation network. Because of this, active transportation facilities along the state highway system can be critical to providing needed linkages throughout a community. Ensuring a balanced, yet continuous active transportation system along the state highway system in North Dakota is an important issue. Table 32 provides NDDOT with actions for consideration related to the state system as a transportations backbone.

Table 32: Action Plan – State System as a Transportation Backbone

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
While not required, consider a multimodal corridor study as the minimum level of study needed to develop project concepts on all reconstruction and major rehabilitation projects on the Urban and Regional System, with a focus also on understanding the range of adjacent conditions around the roadway. Included within this corridor study could be an opportunity to understand how the adjacent land use is intended to function	2019-2024 (next 5 years)	NDDOT
Prioritize roadways with high numbers of crashes for focused investments. Because a high number of crashes occur on a low percentage of roadways, the state could see significant safety benefits from applying this focus	Ongoing	NDDOT
Strengthen the project scoping process to increase the consideration and evaluation of active transportation facilities. This is particularly critical along small urban or rural state system corridors. This could be accomplished through integrating better public engagement elements, active transportation considerations, a review of the Active and Public Transportation Facility Planning Best Practices Recommendations, and a consideration of the State Bike Network	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Continue to support a range of existing coordination processes between NDDOT and local communities to continue the goal of shared responsibility for managing the State highway system and cooperative decision making required to support the benefits of active transportation	Ongoing	NDDOT Local jurisdictions

Limited Mobility on Urbanizing Corridors

In many communities in North Dakota, the state highway system also serves as the primary growth corridor. Investments in active transportation facilities along growing and urbanizing sections of state highway are lacking. In these instances, barriers emerge between existing developments and new commercial (and residential) areas that develop along the state highway system. The situation serves to disconnect elements of the community and present conditions where access to new developments are limited for active transportation users. Table 33 provides NDDOT with actions for consideration related to limited mobility on urbanizing corridors.

Table 33: Action Plan – Limited Mobility on Urbanizing Corridors

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Utilize the Active and Public Transportation Facility Planning Best Practices Recommendations to ensure development of appropriate active transportation infrastructure when roadways are maintained, improved, or widened	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Proactively communicate the need for shared responsibility with local communities for the planning and funding to support active transportation	Ongoing	NDDOT

System Connectivity

The state highway system is in many cases the primary transportation corridor through communities in North Dakota. Where a community is dominated by the state highway system, such as Minot, limited accessibility along and across the state highway system can serve to segregate various neighborhoods and districts within a community. Without appropriate active transportation connections, the state system can be perceived as dividing and segregating parts of a community, thus reducing mobility and connectivity for the active transportation users.

Active transportation systems are well developed in urban areas across North Dakota. It is important to strengthen the connectivity between both the state and local systems through local/regional active transportation planning that focuses on filling gaps between local and state systems. Coordination of state system assets with local system assets can serve to build a truly connected system of active transportation systems. Table 34 provides NDDOT with actions for consideration related to system connectivity.

Table 34: Action Plan – System Connectivity

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Expand the project scoping process to require consideration of active transportation elements as discussed in earlier sections to assist in identifying and remediating system gaps between the State highway system and locally developed networks	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Continue to actively participate in MPO and locally led active transportation planning to ensure consideration of needs along and connecting to the State highway system are a primary consideration	Ongoing	NDDOT

Table 34: Action Plan – System Connectivity (Continued)

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Support transportation planning in non-MPO areas to develop systemwide active transportation network needs. Encourage the identification of “critical gaps” for use in supporting development of project concepts to support programming requests for future funding	Ongoing	NDDOT Local jurisdictions
Encourage connections from rural areas to the State Bicycling Network	Ongoing	NDDOT
Continue tracking crash data related to rural/urban settings, speed limit, functional classification, and crash severity	Ongoing	NDDOT
Develop context sensitive crossing solutions to improve mobility along the State highway systems. For example, consider design elements like road diets, narrower lanes, bump outs, raised crosswalks, and grade-separated pedestrian and bicycle crossings	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Integrate safety needs related to active transportation into the SHSP to strengthen linkages between NDDOT’s HSIP program and active transportation improvements along community segments of the State highway system to address system gaps and spot needs	Next HSIP update	NDDOT

Active Transportation Design

The physical design and operation of roadways has a tremendous impact on the mobility, health, and vitality of a community and the individuals who live, work, and play there. Often, the ultimate design of roadways and public space reflects internal planning processes and the design and operations guidance available to planners, engineers, and other key staff.

This study included a larger process to provide resources to support NDDOT in planning and designing infrastructure for active transportation. The Facility Planning Best Practices Recommendations provides ideas and key information that can be used when planning for active transportation infrastructure, including a selection matrix. This section summarizes the review of processes, policies, and documents NDDOT uses in current design practices.

Design Guidance Review and Recommendations Operations Manual

The NDDOT Traffic Operations Manual (November 2018) was reviewed for its applicability to pedestrian, bicycle, and public transit infrastructure design and operations. The Traffic Operations Manual describes typical NDDOT practice for traffic operations work including guidance for traffic operations studies to provide recommendations for traffic control, turn lanes, lighting, signals, beacons, and other safety improvements. The Traffic Operations Manual additionally includes checklists, flowcharts, and tables to encourage consistency in decision making.

The comments in Table 35 are provided as considerations for better incorporating non-motorized and public transit infrastructure into operational assessments.

Table 35: Recommendations for NDDOT Traffic Operations Manual

PAGE	TOPIC	CONSIDERATION
4-8	Operational Considerations by Type of Road or Intersection	<p>When identifying railroad crossings on rural segments, identify the use of rail lines as freight and/or passenger. If known, supply the number of crossings that occur daily at that location (Page 4).</p> <p>Include existing or planned pedestrian accommodations, bike routes, and bus stops into the urban and rural segment and intersection analyses. Consider expanding the bus stop presence note to detail any public transit infrastructure including bus stops, public transit signal infrastructure, and pedestrian accommodations (Pages 4-8).</p>
9-12	Operational Considerations by Specific Analysis	<p>Include pedestrian and bicycle trip generation in traffic impact analysis of new developments (Page 9).</p> <p>Language regarding pedestrian and bicycle accommodations in work zones could be added to describe the need for contractors and other personnel to maintain dedicated space for people walking and biking in construction zones. The ND Moves memorandum Recommendations for Active Transportation in Work Zones provides specific guidance on accommodating pedestrians and bicyclists in construction areas (Page 10).</p> <p>Include pedestrian and bicycle level of service in capacity analysis. Level of service models for pedestrians and bicyclists incorporate quality of service metrics by accounting for measures like comfort, safety, and ease of mobility in addition to factors like speed, delay, and space (Page 11).</p> <p>Include identification of any public transit operational needs (such as queue jump or public transit signal priority) as a typical item in the capacity analysis of urban intersections (Page 11).</p> <p>Include collisions involving pedestrians and/or bicyclists in crash analysis (Page 12). In this section, the text states, "Safety improvements must consider all road users (pedestrians, bicycles, etc.)" (Page 12).</p>

Table 35: Recommendations for NDDOT Traffic Operations Manual (Continued)

PAGE	TOPIC	CONSIDERATION
14-18	Turning Movement and Lane Operations	<p>Add a reference to dedicated bike lanes and curb-running public transit lanes on the flow chart for right-turn lane design. For bike lanes, consider options to continue bikeways through intersections, keep bicyclists left of dedicated right turn lanes, and separate merging and turning movements. For curb-running exclusive public transit lanes, consider mixing right-turning traffic and public transit vehicles at intersections to reduce conflicts with vehicles turning across the public transitway (Page 15).</p> <p>Include public transit stop, pedestrian activity, or bicycle infrastructure as a Yes/No question after the Volume criteria is met and/or in the "Typical Questions for engineering judgement" section (Page 15). Include additional considerations:</p> <ul style="list-style-type: none"> • Best practices in more urban areas is that right turn lanes are not desired due to conflicts with other modes • Consider trade-offs such as pedestrian crossing distance / signal timing, safety, and overall quality of the pedestrian realm • If a public transit stop exists at the intersection, its location should determine whether a right-turn lane is appropriate. Except for curb-running public transit-exclusive lanes, avoid co-locating public transit stops and right turn lanes. A bus stop far-side from a right turn lane can be appropriate
21-24	Signal Features and Warrants	<p>Include Transit Signal Priority (TSP) warrants or justification for future signals in the Traffic Signal Warrants section (page 21). Consider mentioning that signal installation may be warranted based on pedestrian need or future public transit alignment(s). Justification for a signal could include future pedestrian volumes or the need to control conflicting public transit/vehicular movements.</p> <p>Include recommended public transit operations, if applicable, such as queue jump, protected turn phasing across public transit lanes, or public transit-only phasing in the topics to be included in the traffic study signal analysis topics (Page 20). Additionally, it is recommended that any conflicts with public transitways be considered within the Left Turn Phasing Type flowchart (Page 23).</p> <p>Include recommended pedestrian signal timing such as Leading Pedestrian Intervals and coordinating pedestrian crossing indication with protected turn phasing (Page 23).</p> <p>Include consideration for enhanced pedestrian and bicycle crossings when signal meets removal warrants (Page 24). Consider mentioning that pedestrian or bicycle crossing enhancements should be evaluated if removing a traffic signal where people walk or bike. Options may include curb extensions, median refuge islands, HAWKs, or other accommodations.</p>

Table 35: Recommendations for NDDOT Traffic Operations Manual (Continued)

PAGE	TOPIC	CONSIDERATION
25	Pedestrian Crosswalks	<p>Include public transit stops as a criterion before the intersection or mid-block location question on the pedestrian crossing flow chart. Mark crosswalks near busy public transit stops .</p> <p>Consider directing users to treatment guidance for uncontrolled locations at both intersections and mid-block crossings.</p> <p>Consider specifying a minimum number of pedestrian crossings per peak hour(s) to warrant a marked crossing or crossing improvement that is lower than the FHWA minimum, much like NDDOT has reduced volumes to warrant turn lanes, traffic signals, and other motor-vehicle related accommodations. Warrants could be met over a single peak hour or grouping of consecutive hours. For example, minimum pedestrian volume thresholds may include:</p> <ul style="list-style-type: none"> • 15 pedestrians in any one hour • 12 pedestrians per hour in any two hours • 10 pedestrians per hour in any three hours • 10 school aged pedestrians traveling to / from school in any one hour • Count young, elderly, or disabled pedestrians at 2x towards volume threshold • Consider counting bicyclists, especially if riding on a sidewalk or path <p>Include geometric improvements such as median refuge islands and curb extensions in pedestrian crossing flow chart.</p> <p>Include circumstances where a marked crosswalk at a stop or yield controlled intersection may be considered such as commercial or high-pedestrian areas, connecting to public transit stops, or other locations.</p>

Design Manual

Chapter Three: Roadway Design

Chapter Three of the NDDOT Design Manual, Roadway Design, was reviewed to assess whether the policies and guidance enable successful pedestrian and bicycle infrastructure design. The document was last revised on August 10, 2007. Table 36 includes a summary of sections that pertain to pedestrian and bicycle travel and comments for consideration.

Table 36: Recommendations for NDDOT Design Manual, Chapter 3 Roadway Design

SECTION	TOPIC	CURRENT STANDARD	CONSIDERATION
1.02.03	Right-of-Way	<p>Eight feet is the adequate recommended right-of-way to accommodate street hardware, sidewalk, and a boulevard for new construction or major reconstruction projects on urban or urban extension systems, or in cities with a population of less than 50,000.</p> <p>Widths may be reduced to below eight feet at particular locations provided space for a sidewalk and street hardware is maintained.</p> <p>Deviation to the eight-foot width during design or construction should be coordinated with the Design Engineer.</p>	<p>Identify eight feet as a minimum acceptable width (instead of an adequate recommended width) for accommodating street hardware, sidewalks, and boulevard.</p> <p>Coordinate with the Design Engineer for deviations below eight feet and encourage widths greater than eight feet to accommodate street furnishings, planted boulevards, public transit amenities, and provide more pedestrian travel space.</p>
6	Surfacing	<p>Shoulders are selected for paving based on the following guidance. If guidance results in a patchy network of paved and aggregate shoulders, paving should be considered based on logical termini and not on traffic context.</p> <p>Typically paved:</p> <ul style="list-style-type: none"> • Median and outside shoulders on the Interstate System • Shoulders or segments with more than 2,000 ADT on the Interregional System • Shoulders on designated Congressional High Priority Corridors • State or District Corridor shoulders on the National Highway System with more than 2,000 ADT <p>Typically aggregate:</p> <ul style="list-style-type: none"> • Shoulders or segments with less than 2,000 ADT on the Interregional System • State or District Corridor shoulders not on the National State highway system and/or with less than 2,000 ADT • District Collector shoulders <p>The shoulder and edge line rumble strip pattern for undivided roadways with shoulders 1' or greater in width shall provide an intermittent pattern of 40' length of rumble strips with 10' gaps of no rumble strips to accommodate bicycle maneuvers from one side of the rumble strips to the other. If the roadway is identified on the United States Bicycle Route System (USBRS), an executive decision for the installation of rumble strips will be determined during the Environmental Documentation process.</p> <p>Standard drawings generally illustrate 12" wide rumble strips placed 6" outside of shoulder edge lines. Where shoulders are less than 4' in width, narrower rumble strips may overlap the edge line such that the interior edge line and rumble strip are aligned.</p>	<p>Upon completion of the ND Moves Plan, add roadways identified on the Tier 1 and Tier 2 State Bike Network to the list of qualifiers for shoulder paving and widening.</p> <p>Update NDDOT Investment Strategies to reflect recommendations to implement the Tier 1 and Tier 2 State Bike Network as part of roadway projects on the state highways, as recommended in the Shoulders section of the Facility Planning Best Practices Recommendations.</p> <p>Update guidance to include minimum and preferred acceptable widths for paved shoulders on the Tier 1 and Tier 2 State Bike Network, as recommended in the Shoulders section of the Facility Planning Best Practices Recommendations.</p> <p>Update guidance on lateral rumble strip placement to integrate bicycle-friendly rumble strip designs referenced in the Shoulders section of the Facility Planning Best Practices Recommendations.</p>

Table 36: Recommendations for NDDOT Design Manual, Chapter 3 Roadway Design (Continued)

SECTION	TOPIC	CURRENT STANDARD	CONSIDERATION
7	Pedestrian and Bicycle Facilities	<p>Section 7 refers users to AASHTO's "Guide for the Planning, Design, and Operation of Pedestrian Facilities" and "A Guide for the Development of Bicycle Facilities" for pedestrian and bicycle facility design details, respectively.</p> <p>Sidewalks and bikeways shall be considered on new or reconstruction projects.</p> <p>Sidewalks must meet accessibility guidelines.</p> <p>Grade separated crossings should be considered where pedestrian volumes and traffic conditions favor their use.</p> <p>When on the Urban Regional System, cities should include curb ramps at all intersections with sidewalks and updated existing ramps to meet current ADA requirements.</p> <p>Bicycle facilities may be on- or off-road and may be implemented as stand-alone projects.</p> <p>Bicycle projects should be consistent with local bicycle plans, if available.</p>	<p>Include references to Facility Best Practices Recommendations and additional national best practice guides for design guidance.</p>
9	Signing	<p>Presence of pedestrians or bicyclists may warrant installation of warning signs.</p> <p>Bikeway signage should be placed between 3 and 6 feet from the edge of the bikeway.</p>	<p>Direct users to outside resources for guidance on the use and placement of pedestrian- and bicycle-related signage including warning, wayfinding, and regulatory signs.</p> <p>Consider noting that placement of signs should not obstruct sidewalks or bikeways.</p> <p>Consider providing additional direction outlining when the installation of pedestrian or bicycle warning signage is warranted.</p>

Table 36: Recommendations for NDDOT Design Manual, Chapter 3 Roadway Design (Continued)

SECTION	TOPIC	CURRENT STANDARD	CONSIDERATION
10	Markings	<p>Stop line markings:</p> <ul style="list-style-type: none"> • 24-inch bar placed 4 feet behind crosswalk markings. • Stop lines are not required except in locations where it is determined to be important to indicate the point, beyond which, vehicles should stop in compliance with stop signs or traffic signals. • Stop lines for actuated signals may be required because if the stop location is not indicated, there may be erratic signal operation or traffic movement. <p>Crosswalks markings:</p> <ul style="list-style-type: none"> • Two 6-inch parallel lines spaced 6 feet apart. • Crosswalks should be marked at designated non-intersection crossings if legally permitted. • Marked crosswalks should be provided at intersections where there is substantial conflict between pedestrians and motorists, or where directional guidance is needed. • Marked crosswalks may be omitted at locations where above criteria do not suggest usage. 	<p>Include additional guidance for crosswalk, stop bar, and bike lane marking application such as frequency and implementation flexibility.</p> <p>Consider upgrading standard crosswalk markings to a more visible style such as continental markings.</p> <p>Consider recommending stop bars in specific contexts such as high-pedestrian areas and along public transit or truck routes. Set stop bars back further from intersections to provide additional space for large vehicle turning movements.</p>
12	Traffic Control Signals	<p>Traffic signals may be used to interrupt heavy traffic at intervals to permit pedestrian crossings.</p>	<p>Include specific mention of pedestrian or bicycle activated signals.</p>

Design Guidelines, Investment Strategy, and Design Exceptions

Section 1-06 of The NDDOT Design Manual, Design Guidelines, Investment Strategy, and Design Exceptions was reviewed to assess whether the policies enable successful pedestrian, bicycle, and public transit infrastructure design. The document was last revised on April 5, 2017.

The page numbers listed in this section refer to both the number in the PDF document and the number listed in the top left corner of the Design Guidelines. The number listed in the top left corner of the document is shown in this review document as in parenthesis (##), and the actual PDF page is noted in parenthesis.

Environmental Documentation & ADA Guidelines

Page 6 (59) & Page 9 (62) address ADA requirements with "Improvements for ADA requirements will be addressed in the environmental document; "Improvements for ADA requirements will be considered and addressed in the environmental document". Improvements described in the environmental document should use sufficient detail to note existing compliance issues and to illustrate how the planned change will meet ADA requirements. NDDOT also addresses ADA improvements within the NDDOT ADA Transition Plan (2015). Updates to the transition plan would continue to document NDDOT's efforts towards ADA compliance and plans for future improvements.

Major rehabilitation projects in particular provide an opportunity to improve pedestrian and bicycle infrastructure and often require ADA upgrades to bring corridors or intersections into compliance. These improvements, which can be incorporated into major rehabilitation projects, would be a great benefit to public transit stops.

Roadway and Bridge Widths

Current NDDOT policy requires a minimum of 12-foot lanes on state roadways, regardless of traffic or land use context. However, NDDOT considers reduced lanes on a project by project basis according to the individual project situation. This has been done without needing design exceptions when the minimum roadway width meets AASHTO standards. (If a roadway width does not meet AASHTO standards, then a design exception is needed). Allowing travel lanes below 12 feet frees up space for pedestrian or bicycle improvements as part of repaving or reconstruction projects and naturally calm traffic in combination with other factors. For instance, within State Corridors there may be urban sections that warrant narrower lanes.

Implementing the State Bike Network through Roadway Projects

Currently, NDDOT has approved investment strategies to maximize roadway life expectancy. These investment strategies have been developed in cooperation with FHWA and have been codified through the NDDOT Design Manual (Section I-06.02). The investment strategies identified desired roadway and shoulder widths to be established as part of roadway projects.

Roadway projects are an opportunity to implement the State Bike Network through signage and shoulder widening to meet minimum expectations for the three identified tiers. The Active and Public Transportation Facility Planning Best Practice Recommendations includes recommendations for shoulder widening on Tier 2 and Tier 3 routes based on Highway Performance Classifications and specific investment strategies. It provides a linkage between the development of a North Dakota State Bike Network and current design guideline and investment strategies utilized by NDDOT. It is recommended that NDDOT consider incorporating recommendations for shoulder widening on the State Bike Network into the ND Design Manual.

Design Exceptions

It is recommended that page 35 (88) include existing or planned bike routes, pedestrian activity, and the presence of specific public transit infrastructure as a potential reason to warrant a deviation from standards.

Statewide Safety Program

Calculate crash rates for pedestrian and bicycle crashes to identify and prioritize locations that would benefit from targeted pedestrian and/or bicycle improvements.

Safety Countermeasures

Replace the term "Accident Type" with "Crash Type" or "Collision Type".

Incorporate public transit infrastructure into the crash countermeasures. Page 41 (94) could include relocation or placement of public transit stops as a possible safety enhancement under the following possible causes:

- Driver has inadequate warning of frequent mid-block crossing
- Lack of crossing opportunity
- Pedestrians/bicycles on roadways
- Long distance to nearest crosswalk

Page 43 (96) could include public transit Stops as a possible cause of rear-end collisions at unsignalized intersections. Buses frequently stopping in the travel lane or pulling in/out of traffic could be a cause of rear end crashes. Relocation of the public transit stop, reducing general purpose speeds, reducing lane widths, or adding visual friction to slow general purpose vehicles down could be possible safety enhancements for this scenario.

Connections and Linkages

Improving connections for active and public transportation can improve its safety and attractiveness and ultimately increase demand for these types of facilities and services. This section outlines recommendations for developing the State Bike Network, regional connections, and stronger connections to cultural and historic destinations. These recommendations are based on technical analysis and public engagement feedback.

State Bike Network

As part of ND Moves, NDDOT has developed a planned State Bike Network. The State Bike Network is a 20-year vision to connect key transportation and recreation destinations across the state. The backbone of the State Bike Network is rural, low-traffic roadways. These are referred to as Tier 1 and Tier 2 State Bike Corridors. These roadways are typically adequate for recreational bicycling today due to their low traffic volumes. In locations where a logical connection cannot be made on a low-traffic Tier 1 or 2 Corridor, shoulder bikeway connections are recommended on Tier 3 Regional Bike Connector Corridors.

The planned State Bike Network is not in place today and is not currently meant for the public to use to plan bicycle trips. While the network builds upon existing infrastructure, in some cases State Bike Network roadways are not currently up to the infrastructure expectations established by ND Moves. The State Bike Network is intended to identify infrastructure expectations that NDDOT should consider over the 20-year planning horizon. Table 37 provides NDDOT with actions for consideration in regard to the State Bike Network.

Table 37: Action Plan – State Bicycle Network

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Proceed with formal implementation of the State Bike Network based on ND Moves	2019-2039 (next 20 years)	NDDOT Local jurisdictions
Integrate appropriate signage along Tier 1 and Tier 2 corridors as part of future roadways projects and as stand-alone projects initiated on a district by district basis	2019-2039 (next 20 years)	NDDOT Local jurisdictions
Develop a program to fund wayfinding and route signage for Tier 1 and Tier 2 routes. Work with affected counties across North Dakota to highlight funding opportunities to install and maintain State Bikeway signage on Tier 1 and 2 routes that follow County roadways	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Pursuant to other recommendations within ND Moves, integrate consideration of the State Bike Network and the related infrastructure considerations into the NDDOT Project Scoping process	2019-2024 (next 5 years)	NDDOT Local jurisdictions
Develop a funding program to widen shoulders on Tier 3 corridors	2019-2024 (next 5 years)	NDDOT

Table 37: Action Plan – State Bicycle Network (Continued)

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Consider evaluation and modification of Section I-06.02 of the NDDOT Design Manual to reflect pavement strategies that support development of a bikeable shoulder along Tier 3 Corridors	2019-2024 (next 5 years)	NDDOT
Consider shoulder improvements (e.g. sliver widening) or other smaller shoulder improvements as part of Minor Rehabilitation or greater investments on both Tier 1 and 2 Corridors	Ongoing	NDDOT
Work with cities and MPOs to ensure smooth transition through urban areas in North Dakota through appropriate coordination with locally developed systems and facilities	Ongoing	NDDOT MPOs Local jurisdictions
Review existing active transportation facilities along state highways through rural centers and engage residents to understand needs for additional or improved facilities along and across state highways. Further study would reveal strategic locations for NDDOT investment within these rural centers	2019-2024 (next 5 years)	NDDOT Rural jurisdictions
Work with NDDOT Districts, Counties, Cities and MPOs to monitor and evaluate changing conditions on the State Bike Network. Update tier designations or route alignments as needed to reflect the infrastructure expectations of the State Bike Network	Every 2 years	NDDOT Local jurisdictions
Develop a public-facing state bicycle map. A State Bicycle Network map would identify existing bicycle-friendly roadways, including information such as ADT and shoulder width to inform bicyclists about conditions they could expect on long-distance bicycle routes in North Dakota	2019-2029 (next 10 years)	NDDOT Department of Tourism

Regional Connections

There are several examples across North Dakota where the state highway system can serve to better link communities and provide intraregional connections. However, in many instances the state system is perceived as a barrier between communities, even those within short distances from one another. Ensuring active transportation connections between places in North Dakota is an important consideration, especially places perceived as being within similar “regions”. Table 38 provides NDDOT with actions for consideration for regional connections.

Table 38: Action Plan – Regional Connections

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Utilize the Active and Public Transportation Facility Planning Best Practices Recommendations and State Bike Network when developing projects on the rural State highway system, particularly for segments of roadway between communities in close proximity	Ongoing	NDDOT Local jurisdictions
Support development of regional connections based on the Statewide Bicycle Network that serve to better connect destinations in North Dakota	Ongoing	NDDOT Local jurisdictions
Through future efforts at the District and regional level, identify and implement “critical connections” for active transportation facilities through the development of more regional based active transportation plans	Ongoing	Local jurisdictions

Cultural & Historic Connections

There is interest in exploring options to utilize segments of currently designated Scenic Byways and Backways around the state. These corridors can assist in providing access to existing recreational and historical/interpretive sites around the state. Linkages between these assets, active transportation, and tourism and economic development are well documented around the country. Table 39 provides NDDOT with actions for consideration related to cultural and historic considerations.

Table 39: Action Plan – Cultural & Historic Connections

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Support efforts to develop and expand corridors such as the Old Red Trail as an interpretive and recreational corridor	Ongoing	NDDOT
Support local/regional efforts to develop and nurture cultural and historic transportation corridors across North Dakota through planning done at the district or regional level	Ongoing	NDDOT MPOs Regional development councils (RDCs)
Encourage the development of active transportation facilities along corridors with connections to local or regional facilities, Scenic Byways and Backways, nature trails, etc.	Ongoing	NDDOT ND Parks and Recreation Local jurisdictions

Table 39: Action Plan – Cultural & Historic Connections (Continued)

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Consider the incorporation of active transportation facilities during roadway projects along corridors within, adjacent to, or providing access to National or State Parks or other significant recreational or natural areas	Ongoing	NDDOT ND Parks and Recreation Local jurisdictions
Further study the development and implementation of Byways and Backways and other nature trails and rail to trails	Ongoing	NDDOT
Develop a statewide rails to trails plan to support better understanding of opportunities around the state of North Dakota and best practice guidance to local communities and organizations regarding rail conversions	2019-2029 (next 10 years)	NDDOT ND Parks and Recreation
Work with railroads to identify opportunities to transfer or facilitate use of right-of-way when rail lines are decommissioned	Ongoing	NDDOT Railroads Local jurisdictions
Formalize a partnership with North Dakota Parks and Recreation to better coordinate parks and natural features with existing and future State Highway Investments, including joint planning to support better linkages between both departments	2019-2024 (next 5 years)	NDDOT ND Parks and Recreation

Public Transit Mobility

Shifting demographic trends across the state, including urban growth, particularly among young adults and families, and the aging of the state's rural centers, create a range of implications for mobility. With these changes in mind, public transportation is and will continue to be an important component of a connected multimodal transportation in both urban and rural communities across North Dakota. Investing in public transportation can help support mobility in all communities by allowing residents to maintain quality of life and supporting economic development by creating an independent workforce and attracting and retaining young talent.

Public Transit System Development

Addressing public transportation mobility in medium-sized urban areas in North Dakota is an important issue identified by the public and among key stakeholders. In some of North Dakota's medium-sized urban areas,

there is an emerging need for more dependable fixed-route or flexible schedule public transportation options. The demand response systems currently utilized in these areas no longer appear appropriate to meet the demand.

North Dakota's four largest urban areas all currently operate varying levels of fixed-route service with complementary paratransit service. In communities such as Williston and Dickinson, public transit systems are not structured to meet the emerging need for a more urbanized scale of public transportation. Dickinson has recently undergone a public transit system analysis, and future changes may assist in meeting growing public transportation demands. Williston currently lacks an overall framework for public transportation service strategies. Comparable cities, such as Mandan (population 22,228) and West Fargo (population 33,597), receive higher levels of public transit service given their location within a larger urban area. Table 40 provides NDDOT actions for consideration regarding public transit system development.

Table 40: Action Plan – Public Transit System Development

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Evaluate existing state and federal funding available to assist in providing service for existing and projected public transit needs in North Dakota	Ongoing	NDDOT
To address required State of Good Repair regarding Transit Asset Management (TAM) requirements of the FAST Act, NDDOT should continue to work with public transportation agencies to ensure projects submitted for State and Federal aid through NDDOT are aimed at meeting State of Good Repair	Ongoing	NDDOT Transit providers
Provide additional planning resources (technical guidance) for small urban communities to evaluate, modify, or expand existing public transit services	Ongoing	NDDOT
Continue to support MPO led public transit development plans (TDPs), with a focus on improving urban mobility and travel demand management efforts	Ongoing	NDDOT
Develop public transit studies in all urban areas in North Dakota in coordination with the local/ regional provider, including development of regional public transit needs; update every five years	Ongoing	NDDOT Local jurisdictions Transit providers
Establish local/regional public transit advisory committees to assist with development of local and regional public transit planning across North Dakota	Ongoing	NDDOT
Engage Community Action Agencies and RDCs in regional and small urban public transit planning efforts	Ongoing	Local jurisdictions
Promote knowledge sharing between urban and non-urban providers in North Dakota through the Dakota Transit Association (DTA) and NDDOT Provider Meetings	Ongoing	NDDOT DTA

Intercity (or Interregional) Public Transit Connections

In a rural state like North Dakota, intercity bus transportation is important for linking regional centers. A key issue discussed in all geographic areas of North Dakota was the current lack of intercity bus transportation connecting regional centers across North Dakota. Table 41 provides NDDOT actions for consideration regarding intercity public transit connections.

Table 41: Action Plan – Intercity (or Interregional) Public Transit Connections

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Work with existing regional public transit providers and intercity bus service providers to develop marketing campaigns to inform the public of existing and future intercity bus service	2019-2024 (next 5 years)	NDDOT Transit providers
Work with intercity bus service providers to evaluate expanded service connections, especially in the northern and western parts of the state where there is limited intercity service	Ongoing	NDDOT Transit providers
Evaluate regional service expansion opportunities by funding existing publicly funded rural transportation providers to bridge gaps between major destinations in North Dakota, specifically those areas lacking in intercity bus service	2019-2029 (next 10 years)	NDDOT Regional Advisory Committee Transit providers
Coordinate future intercity bus facility investments with existing or projected facility infrastructure of existing urban/regional public transit systems	Ongoing	NDDOT Transit providers

Demonstrating the Value of Public Transit

Public transit systems are highly valuable community assets. Public transit connects people to jobs, education, medical care, and social opportunities. It helps young and old members of the communities be independent. Table 42 provides NDDOT with actions for consideration related to demonstrating the value of public transit.

Table 42: Action Plan – Demonstrating the Value of Public Transit

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Evaluate and recommend best practices for locally generated public transit revenue for both urban and rural providers	Ongoing	NDDOT Transit providers

Traffic Laws and Statutes

Pedestrians and bicyclists are a growing part of the transportation landscape in North Dakota. As more communities work to make their streets more inviting to people walking or biking, conflicts between modes may also increase. State laws and statutes that govern behavior and enforcement of people walking, biking, and driving play an important role in ensuring that roadways are safe and comfortable for all users.

There are opportunities for the North Dakota Legislature and NDDOT to consider additional opportunities to further define how policies and statutes impact walking and biking and reevaluate current policies to provide better guidance to roadway users, planners, designers, and law enforcement officials to improve transportation options, and minimize risks to pedestrians and bicyclists.

Comparing North Dakota to Peer States

League of American Bicyclists' Bicycle Friendly Report Card for North Dakota

Every year, the League of American Bicyclists publishes Bicycle Friendly State report cards highlighting information about each state to provide a useful comparison between states and to serve as a reference for state efforts related to bicycling. Report cards evaluate states based on five categories including infrastructure and funding, education and encouragement, legislation and enforcement, policies and programs, and evaluation and planning. A sixth discretionary scoring category is also included to account for erroneous or missing survey data, or factors that don't easily fit into the other five categories. Report cards include a summary of the state of bicycling in each state, national and regional rankings, detailed scores for each of the five categories, and feedback for improving rankings. These ratings include an assessment of actions related to policy and laws that make walking or riding a bicycle more appealing.

At the time the 2017 report card was published, North Dakota was one of three states (along with Iowa and Montana) that achieved zero League-recognized Bicycle Friendly Actions. Those actions include a Complete Streets policy, a safe passing law, and anti-harassment laws.

Alliance for Walking and Biking, 2016 Benchmark Report

The Walking and Biking Benchmark Report is published biannually by the Alliance for Walking and Biking, a coalition of more than 200 organizations working to improve conditions for pedestrians and bicyclists. The report collects and analyzes data on walking, bicycling, and public transit ridership in all 50 states and the 52 largest U.S. cities, along with selected midsized cities.

Despite relatively high per capita funding for transportation projects, including pedestrian and bicycle projects specifically, North Dakota spends less than one percent of federal transportation dollars on active transportation projects – considerably less than the 4.9 percent total pedestrian and bicycle mode share.

Many state policy gaps highlighted in the Benchmark Report are consistent with feedback points identified in North Dakota's Bicycle Friendly Report Card, including adopting a Complete Streets Policy, three-foot safe passing requirement, and vulnerable road user law.

Statute Recommendations

The following table includes recommendations for statutes affecting pedestrian, bicycle, and motorists based on national best practice regarding pedestrian and bicycle safety and comfort. To achieve changes to statutes, coordination is needed between NDDOT, the North Dakota Legislative Assembly, and the Office of the Governor. Although NDDOT does not have authority to enact legislation, NDDOT can provide agency support for the following recommended statutes, especially recommendations contained in multiple planning documents. NDDOT can support recommended statutes through the following actions under the agency's authority:

- Enhance active transportation infrastructure along the state highway system
- Support LPA's plans for enhancing active transportation infrastructure along non-state-owned roadways
- Create and promote education and encouragement campaigns aimed at behavior change
- Collect and analyze crash trends involving active transportation users

Table 43: North Dakota Statute Considerations

PRIORITY	NO.	CONSIDERATION
High Priority	SR.1	<p>Statewide Active and Public Transportation Task Force or Advisory Committee</p> <p>Consider establishing a state-level pedestrian and bicycle task force or advisory committee to meet regularly and carry momentum forward to guide infrastructure projects, education and encouragement programming, and policy changes that impact people walking and bicycling.</p> <p>Rationale: An ongoing, representative advisory committee or task force will assist NDDOT staff in plan implementation by providing guidance and accountability.</p>
	SR.2	<p>Vision Zero Implementation Strategy</p> <p>NDDOT launched a Vision Zero initiative in 2018, which includes the 2018 North Dakota Vision Zero Plan. Continued resources for funding and implementing Vision Zero recommendations will be an essential component of any successful Vision Zero strategy. The Vision Zero Plan priority safety strategies related to reducing pedestrian and bicyclist crashes include implementing a variety of infrastructure including⁵⁶:</p> <ul style="list-style-type: none"> • Curb extensions • Median refuge islands • Road diets • Rapid rectangular flashing beacons (RRFB) • High-intensity activated crosswalk (HAWK) signals • Count down timers and leading pedestrian intervals at traffic signals • Adoption and implementation of bike friendly edge rumble strips <p>Rationale: Vision Zero is a multi-national roadway safety project aimed at reducing traffic fatalities and serious injuries through a variety of strategies. It is one of the League of American Bicyclists' key Bicycle-Friendly Actions.</p>
	SR.3	<p>Complete Streets Statute and Implementation Strategy</p> <p>NDDOT may also consider adopting a statewide Complete Streets policy and implementation strategy to accommodate the needs of all users in planning, design, and operation of transportation facilities.</p> <p>Rationale: Complete Streets Policies ensure that all modes are considered and/or accommodated in new street construction or roadway reconstruction. It is one of the League of American Bicyclists' key Bicycle Friendly Actions.</p>

⁵⁶2018 North Dakota Vision Zero Plan, 5-12. https://www.dot.nd.gov/divisions/safety/docs/FINAL_NDDOT_SHSP.pdf

Table 43: North Dakota Statute Considerations (Continued)

PRIORITY	NO.	CONSIDERATION
	<p>SR.4</p>	<p>Safe Passing Law</p> <p>Safe passing laws require vehicles to pass each other at a safe distance. In most states, legislatures have recognized that “safe distance” requires greater specification, especially in regards to motor vehicles passing bicyclists. The majority of states that have chosen to define a “safe distance” between a passing motor vehicle and a person on a bicycle have chosen three feet as a minimum acceptable passing distance.</p> <p>Safe passing laws may also include language to clarify that motorists may, when safe to do so, cross double yellow centerline strips to pass bicyclists or pedestrians in the roadway. Consider working with other stakeholders to revise legislation.</p> <p>Rationale: Safe Passing Laws provide clarity to motorists and improve comfort and safety for bicyclists by specifying the minimum distance by which a driver may pass someone on a bicycle.</p> <p>Examples: Model Safe Passing Law, League of American Bicyclists</p>
	<p>SR.5</p>	<p>Vulnerable Road User Law</p> <p>Coordinate with the North Dakota Legislative Assembly and Office of the Governor to consider adding a vulnerable road user law that increases penalties for motorists who harass, injure, or kill pedestrians, bicyclists, or other vulnerable road users.</p> <p>Rationale: Vulnerable Road User (VRU) Laws provide important legal protections to pedestrians, bicyclists, and other people traveling outside of motor vehicles. The law is intended to increase awareness amongst motorists about the importance of driving attentively when sharing the road with non-drivers by providing strong punishments for people who seriously injure or kill a pedestrian, bicyclist, or other vulnerable users while driving. The increased level of punishment helps fill a gap between normal traffic citations and criminal vehicular homicide, manslaughter, or driving while intoxicated laws.</p> <p>Examples: Model VRU Law, League of American Bicyclists</p>
	<p>SR.6</p>	<p>Distracted Driving Law</p> <p>Coordinate with other stakeholders to consider whether increasing penalties such as fines for subsequent offenses, points against violator’s driving records, insurance premium increases, or upgrading distracted driving to a primary offense would improve compliance. Additionally, consider enhancing the state distracted driving law.</p> <p>Rationale: Distracted driving is a safety hazard for all roadway users; however, people walking and bicycling are particularly vulnerable in crashes involving distracted drivers. Increasing penalties for participating in distracted driving is one strategy for discouraging such behavior.</p>

Table 43: North Dakota Statute Recommendations (Continued)

PRIORITY	NO.	CONSIDERATION
	<p>SR.7</p>	<p>Moving Violation Penalties</p> <p>Coordinate with other stakeholders to assess current fee structure and point schedule and determine whether the following modifications would improve driver compliance:</p> <ul style="list-style-type: none"> • Overall increase in fines and penalties for speeding • Higher fines for moving violations committed in school zones • Increasing fine and penalty structure for repeat offences • Temporary or permanent increases in insurance premiums <p>In addition, greater flexibility in fee and point structures could improve safety by enabling municipalities to issue more context-sensitive citations. Higher fines or points may be appropriate in more urbanized or developed communities where pedestrian and bicycle demand is greater.</p> <p>Rationale: Vehicle speeds are one of the greatest determinants of whether a pedestrian or bicyclist survives a crash and can significantly alter the safety and comfort of a street. Consequences for moving violations in North Dakota, such as speeding, are among the weakest in the country and could be increased to discourage risky and repeat behavior.</p>
<p>Medium Priority</p>	<p>SR.8</p>	<p>Where to Ride Law</p> <p>Consider adopting a Where to Ride Law to enable bicyclists to make safe decisions about lane positioning and provide greater clarity for inexperienced bicyclists, other road users, and law enforcement. As discussed throughout this section, the legislation would require coordination with elected officials.</p> <p>Rationale: Where to Ride laws regulate a bicyclists' use of the road. In most states, including North Dakota, the law that applies to bicyclists regarding lane positioning requires that bicyclists ride "as far to the right as practicable". The commonly used "practicable" is often misunderstood as "possible," and usually does not provide enough clarity for drivers, bicyclists, and other users to understand how to behave appropriately.</p> <p>Examples: Model Where to Ride Law, League of American Bicyclists</p>
	<p>SR.9</p>	<p>Automated Enforcement Law</p> <p>Work with state, county, and local law enforcement agencies to explore the potential use of automated enforcement by municipal governments in North Dakota.</p> <p>Rationale: Automated enforcement methods including red light and speed cameras give local law enforcement agencies the ability to remotely enforce speeding and traffic light laws.</p> <p>Examples: Washington</p>

Table 43: North Dakota Statute Recommendations (Continued)

PRIORITY	NO.	CONSIDERATION
	SR.10	<p>Stopping, Standing, or Parking in Prohibited Areas</p> <p>Assess current statute requiring where motorists may or may not stop or park to determine whether additional distance from crosswalks or intersections would improve pedestrian visibility. Recommended stopping and parking restrictions include no parking within 20 feet of a crosswalk at an intersection and within 20 to 30 feet of a flashing beacon, stop sign, or traffic control signal.</p> <p>Additionally, consider revisions to specifically prohibit driving, stopping, or parking in dedicated bicycle lanes. Exemptions may include public transit vehicles or school buses stopping in curbside bicycle lanes for loading and unloading only.</p> <p>Rationale: Improve pedestrian safety by increasing visibility at crossings and intersections. Improve bicycle safety and predictability by clarifying that bicycle lanes are travel lanes and prohibiting motorists from stopping or parking in them.</p> <p>Examples: Minnesota, Missouri, Washington</p>
	SR.11	<p>Stopping for Pedestrians</p> <p>Assess driver yield rates to pedestrians in crosswalks. Discuss the issue with North Dakota State Highway Patrol, including whether requiring motorists to stop would improve pedestrian safety. Changes to the existing statute would require action by elected officials.</p> <p>Rationale: Requiring motorists to come to a complete stop for pedestrians crossing the street improves communication and understanding between people driving and walking and increases comfort and safety for pedestrians.</p>
Low Priority	SR.12	<p>Pedestrian Yielding Distance</p> <p>Assess the statute that requires drivers yield to pedestrians in their half of the road. Consider working with elected officials to revise language to state motorists must yield right-of-way to pedestrians within their half of the road, or within one lane of their half.</p> <p>Rationale: Improve comfort and safety of pedestrians crossing the street and allow for greater reaction time in case of unexpected maneuvers.</p>
	SR.13	<p>Bicycle Stop Law and Dead Red Law</p> <p>Research peer states that have legislation that allows bicyclists, when safe to do so, to treat stops signs as yield signs and proceed through red lights in the event that they fail to trigger traffic sensors. Consider coordinating with other stakeholders to create related legislation.</p> <p>Rationale: Bicycle stop and dead red laws improve traffic flow by allowing bicyclists to proceed through intersections at a faster pace when safe to do so. Dead Red Laws improve bicycle safety and level of service by discouraging disregard for traffic signals and eliminating the need for bicyclists to turn right and go out of their way, activate pedestrian signals, or position themselves dangerously so that upcoming motorists can trigger sensors.</p> <p>Examples: Idaho, Delaware</p>

Table 43: North Dakota Statute Recommendations (Continued)

PRIORITY	NO.	CONSIDERATION
	SR.14	<p>Sidewalk Riding</p> <p>Statute 39-10-52.1 prohibits any person from driving a vehicle upon the sidewalk or sidewalk area except upon a permanent or duly authorized temporary driveway. Under current statute and definitions, that includes bicyclists. Assess §39-10-52.1 to evaluate whether explicitly allowing bicyclists to ride on sidewalks in specific contexts and providing guidance on bicycle / pedestrian interactions would better address current needs and behaviors. Coordinate with policymakers regarding this and other potential legislation changes.</p> <p>Rationale: In general, the safest place for bicyclist to operate is on the roadway. However, there are times when it may be appropriate for bicyclists to ride on a sidewalk or within a crosswalk. Examples include crossing high speed roadways or when the skills or ability level of the rider is not suited for the adjacent roadway, as may be the case with children.</p>
	SR.15	<p>Electric Bicycles</p> <p>Consider legislation to define types and allowed uses of electric bicycles (also called "e-bikes") on highways, roads, bikeways, and trails in North Dakota. Together with this consideration of legislation, define specific technologies and whether they should be allowed or disallowed on bicycle infrastructure, both on- and off-street (for example: e-bikes, motorized scooters, motor vehicles, golf carts, gasoline powered bicycles, segways).</p> <p>Rationale: Electric or pedal assist bicycles are currently not defined in the North Dakota Century Code. Defining electric bicycles and clarifying allowed uses will provide guidance for existing and future riders and improve safety, comfort, and understanding for all modes.</p>
	SR.16	<p>Dooring Law</p> <p>Consider working with legislators and other stakeholders to modify state statute 39-10-54.1 Opening and Closing Vehicle Door to specifically clarify that bicyclists and pedestrians are part of traffic and protected by dooring laws.</p> <p>Rationale: Dooring crashes can result in serious injuries to people walking and bicycling. Clarifying that pedestrians and bicyclists are protected by dooring laws will increase awareness among all users and expand protections for people walking or bicycling.</p>
	SR.17	<p>Pedestrian Use of Sidewalks</p> <p>Consider working with legislators and other stakeholders to modify state statute 39-10-33 to specify that "pedestrians walking along a roadway must walk on the sidewalk if provided, practicable, and in good repair."</p> <p>Rationale: A sidewalk that is not in good repair may not be safe, comfortable, or accessible for all users. In the case that sidewalks are not properly maintained, pedestrians should not be legally obligated to use them.</p>

Table 43: North Dakota Statute Recommendations (Continued)

PRIORITY	NO.	CONSIDERATION
	SR.18	<p>Crossing at Other than Crosswalk</p> <p>Consider clarifying state statute 39-10-29 item 2, and explicitly granting pedestrians the right-of-way at intersections regardless of whether a pedestrian tunnel or bridge is provided, unless specifically posted otherwise. Clarifying the statute would require coordination with elected officials.</p> <p>Rationale: Presence of a grade separated crossing should not automatically supersede pedestrian right-of-way at intersections. It is plausible for grade separated crossings to exist or be built such that they don't serve pedestrian crossing needs due to limitations in connectivity, accessibility, convenience, or other factors.</p>
	SR.19	<p>Share the Road License Plates</p> <p>Consider bicycle-themed motor vehicle license plates to improve awareness and generate funding for bicycle infrastructure development and maintenance.</p> <p>Rationale: Increase awareness and tolerance among modes and generate funding for projects that improve conditions for people biking.</p>

Funding Considerations

Providing high quality pedestrian and bicycle infrastructure is one of the most significant ways to improve the comfort, safety, and rate of people walking and biking. The current mode share for walking and biking in North Dakota is nearly five percent. In contrast, only one percent of federal funds for transportation are currently spent on projects that increase infrastructure or improve conditions for pedestrians and bicyclists.

Consider creating a dedicated funding source for pedestrian and bicycle projects and or obligating existing funding streams in a way that better reflects current and projected mode share in North Dakota. Infrastructure and program funding is key to building and maintaining a multimodal transportation network that works for all users, today and into the future. Table 44 provides NDDOT actions for consideration related to pedestrian and bicycle funding.

Table 44: Action Plan – Funding Considerations

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Consider creating a dedicated funding source for pedestrian and bicycle projects and or obligating existing funding streams in a way that better reflects current and projected mode share in North Dakota.	2019-2024 (next 5 years)	NDDOT

Policies and Funding Strategies Not Recommended

The following policies and statutes are specifically not recommended. These policies have proven or potential negative consequences for pedestrian and bicycle comfort and safety, equity, and/or bicycle ridership. Many of the laws below have been and could be used to target people of color and place disproportionate burdens on people with lower incomes or limited mobility options.

NDDOT does not have the authority to reject legislation, should any of the discouraged statutes be proposed. However, the following discouraged statutes could negatively impact this plan's vision, goals, and objectives.

Table 45: Policies and Funding Strategies Not Recommended

NO.	DISCOURAGED STATUTE / POLICY
SL.20	<p>Mandatory Helmet Law</p> <p>Mandatory helmet laws requiring all bicyclists to wear helmets are not effective at increasing helmet usage without significantly and negatively affecting ridership and disproportionately impacting low-income communities. Education and encouragement initiatives including free or subsidized helmet programs have been shown to be an effective intervention to increase helmet use and ownership without a mandate. Other strategies and policies such as providing separated bicycle facilities, adopting and enforcing safe passing laws, and providing bicycle and motorist safety education are more effective at improving behavior, increasing ridership, and reducing cycling injuries.</p>
SL.21	<p>Mandatory Use of Bicycle Facilities</p> <p>There are many safety and operational reasons why a bicyclist may choose not to use a dedicated bikeway including accumulation of debris, illegally parked vehicles, or the need to make a turn. In such cases, it is important that cyclists are able to ride in adjacent or parallel lanes without the fear of prosecution.</p>
SL.22	<p>Mandatory Single-File Riding</p> <p>Whether riding with friends or family, or out for an organized ride, social or conversational bicycling is common practice. Mandatory single-file riding is not effective at improving bicycle safety without negatively affecting ridership. Maintain current language that bicyclists may not ride more than two abreast unless operating on a dedicated bikeway.</p>
SL.23	<p>Liability Exemptions for Motorists Who Injure or Kill Individuals Obstructing Traffic</p> <p>Excusing motorists from liability for injuring or killing individuals obstructing traffic stands in direct opposition to efforts to improve comfort and safety of people walking or biking. Such exemptions shift the burden of proof in a collision from the motorist to the pedestrian. Possible long-term effects stemming from this legislation could include limitations to the rights to assembly and expression. House Bill 1203 failed to pass in February 2017. Residents who opposed this and similar legislation in other states were concerned that the measures could have unintended consequences for gatherings such as parades or other organized events as well as discouraging walking and bicycling.</p>
SL.24	<p>Flat Tax on Bicycle Sales</p> <p>Flat rate tax of bicycle sales is inequitable and likely not profitable in North Dakota. Such a tax may compel potential buyers to purchase lower-priced bicycles from big-box stores or shop used bikes from private sellers. It is likely to hurt local bike shops and not result in any significant revenue.</p>
SL.25	<p>Mandatory Bicycle Registration, Licensing, or License Plate Programs</p> <p>Bicycle registration, licensing, or license plates are unlikely to raise more than such programs would cost to administer. They also create enforcement challenges, could reduce bike use, and negatively impact public health.</p>
SL.26	<p>Sneaker Tax</p> <p>Sneaker tax is a flat tax added to the purchase of athletic shoes. This has been proposed (but not adopted) in other states as a way to generate revenue for athletic programs. A sneaker tax is not recommended as it is impractical and not advised to charge people a fee to walk along public ways.</p>

Safety, Education, and Encouragement Programs

Safety, education, and encouragement programs can help improve safety for people who walk and bicycle in North Dakota and support more people in choosing active transportation. Recommendations included here discuss the potential to create new safety education and encouragement programs as well as to enhance existing programming.

Program Evaluation and Recommendations

Role of State DOTs in Education and Encouragement Program Delivery

Generally, the role of State DOTs in delivering education and encouragement program recommendations are summarized in Table 46.

Table 46: Action Plan – State's Role in Education and Encouragement Program Delivery

ACTION FOR CONSIDERATION	TIMEFRAME	RESPONSIBLE PARTY(IES)
Provide funding for active and public transportation education and encouragement programming and infrastructure.	2019-2024 (next 5 years)	NDDOT
Promote mode shift to result in increased safety and normalize walking and bicycling.	Ongoing	NDDOT ND Department of Health Local jurisdictions
Coordinate best practices across DOT Districts and urban and rural areas.	2019-2024 (next 5 years)	NDDOT
Create standardized education and encouragement materials that can be modified to fit local communities. Distribute these materials throughout all Districts. This helps communities produce social media content, videos, and other materials without requiring the technical knowledge that would be required to create the materials themselves.	2019-2024 (next 5 years)	NDDOT
Collect and analyze transportation safety, usage, and infrastructure data.	Ongoing	NDDOT
Coordinate with other State departments to accomplish related goals.	Ongoing	ND Department of Health ND Parks and Recreation ND Tourism

Evaluation of Existing Safety Programs

Existing NDDOT education and encouragement programs and media campaigns were reviewed during winter 2017-2018. The following list shows materials reviewed for ND Moves.

Roadway Safety Education Materials

- News Release, "Tips for sharing the road with pedestrians"
- News Release, "Motorists sharing the road with bicycles"

- North Dakota Department of Health Bicycle Safety Downloadable Brochures

Driver's Manuals and Law Enforcement Officer Training

- Noncommercial Driver's License Manual (2017-2019)
- Standard Behind the Wheel Curriculum for Class D Commercial Driving Schools
- Law Enforcement Officer Training

Youth-focused Education

- Department of Health Bike Rodeo Toolkit
- Safe Routes to School Program Guidelines and Toolkit (2010)⁵⁷
- International Walk to School Day news releases

Campaigns

- Bicycle Safety PSA
- Bicycle Safety: Sharing the Road Video
- Pedestrian Safety Video

Reports

- Code for the Road: North Dakota Strategic Highway Safety Plan (2013)
- North Dakota Highway Safety Plan: Fiscal Year 2018 (2017)
- NDDOT Safety Division Annual Report (2016)

North Dakota Statewide Education and Encouragement Program Recommendations

Education and Encouragement Program Management Recommendations

North Dakota has a great deal of information available about bike and pedestrian safety. This information is based on sound ideas and national best practices. However, materials could benefit from reorganization. For instance, some print materials are repetitive or unclear. The videos and safety press releases produced by NDDOT contain good information but could be reorganized into more robust materials.

Education has the opportunity to encourage active and public transportation to create a statewide culture of safety, respect, acceptance, and normalcy. These best practices can be applied to existing or new initiatives:

- Print materials in a succinct and a graphically-rich manner. Where possible, create separate publications for targeted safety behaviors
- Make printed and online materials accessible to people with disabilities. For example, include alternative text descriptions for visually impaired readers for images. Websites and print materials should be usable with screen readers. Additional resources for adaptive cycling could be included to target potential cyclists that do not know that there may be an adaptive solution to allow them to ride themselves
- Utilize graphics on printed and online material uniformly. For example: use the same graphics for helmet fitting across all publication and use graphics that are easy to print. Utilize graphics to show the

correct behavior without requiring verbal/written explanation

- Integrate bike and pedestrian safety and education materials into other initiatives. Include bike and pedestrian materials with any other material offered by the NDDOT or North Dakota Department of Health. These are currently sequestered on their own sites. Distribute materials in the same fashion for any topic area
- Continue using the NDDOT website as a clearinghouse for educational materials. Regularly update active and public transportation materials. Provide materials on the website for local agency download whenever possible
- Suggest a Social Media Campaign. The costs are substantially less than printed media and will be more likely to reach the target audience
- Seasonal Reminders could be broadcast over local news media, informing the public that with nicer weather, the cyclists and pedestrians will be more active, and provide a reminder of local laws and where to find out more
- Identifying a priority list of targeted safety behaviors helps focus proposed education and encouragement programming recommendations on the most important issues. Other priority behaviors can be added to the list over time to suit the needs of NDDOT and partner agencies
- One of the objectives of safety education programming is to reduce the likelihood that active transportation users are involved in crashes, particularly those that cause serious or fatal injuries. As such, findings from the ND Moves Active Transportation Safety Analysis inform safety programming recommendations. The safety analysis studied the demographics of roadway users involved in walking and bicycling crashes, crash contributing circumstances, crash location, and the physical characteristics of high-crash roadways in urban and rural environments
- Stakeholder input additionally informed the list's creation by documenting behaviors that are of particular interest to active transportation advocates. This feedback is necessary given the limitations of the crash reports studied in the safety analysis. The need to reduce distracted driving, for example, is recognized as a prominent topic of conversation within active transportation advocacy and among elected officials. Yet, distracted driving is seldom documented in crash reports

⁵⁷ NDDOT also provided the consultant team with PDF copies of fiscal year 2014 and 2016 materials

Priority List of Targeted Safety Behaviors

The list below proposes recommended targeted safety behaviors to address through education and encouragement:

- **Reduce distracted driving:** Crash reporting protocols make it difficult to discern how often distraction is a crash contributing factor. Nonetheless, citizens and decision makers share concerns about the need to reduce distracted driving, particularly involving mobile devices and other electronics
- **Encourage youth and young adult transportation safety:** Crash data from 2012 to 2016 show that 32 percent of people bicycling involved in crashes and 23 percent of people walking involved in crashes were age 17 or younger. Crash data also show that drivers under 35 are more frequently involved in crashes
- **Encourage senior active transportation safety:** Crash data from 2012 to 2016 show that 17 percent of people walking and involved in crashes were over 56 years old
- **Educate drivers about active transportation safety:** Nationwide data show the prominent role that motor vehicle speed plays in influencing crash severity. Additionally, although the majority of crash
- reports cited “no clear factor”, motorist failure to yield was listed as a contributing factor for other reports 21 percent of the time
- **Encourage context-sensitive safety education programming (i.e., customizable for urban and rural contexts):** Discussions with NDDOT staff and stakeholders across North Dakota illustrate the need for program customization based on whether a target audience is located in an urban or a rural area. Although crashes on rural roadways accounted for 18 percent of all bicycle and pedestrian crashes from 2012-2016, 52 percent of these crashes resulted in a fatality or severe injury
- **Encourage increased rates of active transportation:** National data show that increased rates of active transportation result in decreased crash rates involving people walking and bicycling (called the “Safety in Numbers” principle)
- **Continue to support State employees in promoting active transportation:** NDDOT employees promote active transportation through infrastructure projects and non-infrastructure education and encouragement programs. Preparing State employees with national best practice methods related to encouraging safe active transportation will ensure staff remain informed to implement effective education and encouragement programs

Recommendations to Improve Safety

The recommendations presented in this section are intended to encourage safe walking and bicycling in North Dakota. Each of the recommended education and encouragement programs corresponds with at least two targeted safety behaviors.

New Education and Encouragement Programs

Ongoing Statewide Media Campaign

An ongoing statewide media campaign uses a variety of formats to convey safety messaging to people driving, bicycling, and walking. A media campaign could unite the various pieces of content that NDDOT has developed over time, including fact sheets and press releases. Possible media to share safety messages include social media ads and posts, outdoor advertising, websites, online ads, posters distributed to partners and local communities, and more. Table 47 highlights education and encouragement programs and topics that they could address. Potential target audiences and specific behaviors include:

- **Motorists:** Campaigns to changing unsafe behavior and recognizing the rights of other roadway users. Other specific behaviors include distracted driving and impaired driving
- **Bicyclists:** Campaigns to promote and normalize bicycling and remind bicyclists about the rules of the road
- **Pedestrians:** Campaigns to remind motorists to look for pedestrians, especially children and the elderly. Campaigns could remind pedestrians to follow the rules of the road

Example campaigns include:

- **NCDOT “Watch for Me” campaign:** The campaign involves educational safety messaging for people driving, bicycling, and walking as well as related enforcement efforts by local police⁵⁸
- **“THINK!” road safety campaign from the UK Department for Transport:** This ad campaign includes customized material for urban and rural areas. The umbrella campaign houses ads that are targeted to specific safety problem behaviors and to specific audiences⁵⁹

⁵⁸<http://www.watchformenc.org/>

⁵⁹<http://think.direct.gov.uk/>

Table 47: New Education and Encouragement Programs

	Reduce Distracted Driving	Encourage Youth and Young Adult Transportation Safety	Encourage Senior Active Transportation Safety	Educate Drivers About Active Transportation Safety	Encourage Context-Sensitive Safety Education Programming	Encourage Increased Rates of Active Transportation	Continue to Support State Employees in Promoting Active Transportation
Ongoing Statewide Media Campaign	X	X	X	X	X	X	
Safety Training Resources for NDDOT Staff	X			X	X		X
Safe Routes for Seniors			X		X	X	
Bicycle Safety Education Classes		X			X	X	X
Promote Participation in the National Bike Challenge					X	X	
Create a Statewide Counts Program					X	X	
Enhance Tourism Resources					X	X	X

Table 48: Implementation Details for an Ongoing Statewide Media Campaign

Promotional Methods	Use a strong emphasis on social media as well as in-person events, ad placements, and other forms of media. Media releases and media events are recommended to attract earned media.
Action Items	<ul style="list-style-type: none"> Develop a strategy for planning and implementing the campaign. The strategy could provide cost estimates, publicity ideas, and roles of participating agencies. The first step will be to develop a campaign name and umbrella branding that is appropriate for all targeted campaigns that will be housed beneath it Develop specific messaging to address each of the targeted safety behaviors
Partner Agencies	North Dakota Department of Health

Safety Training Resources for NDDOT Staff

NDDOT staff play a crucial role in delivering effective safety programming. Providing staff with robust, ongoing training will help accomplish this goal. These recommendations focus on training related to education and encouragement programming. Staff training can take a variety of formats, which are discussed below.

Staff Training Opportunities

Connecting Health and Equity with the Built Environment Training

National research supports the connections between socioeconomic disparities in health outcomes and the impacts of the built environment, including transportation. These connections are complex and findings continue to emerge. Training State staff in public health, transportation, and related fields would enable education and encouragement planning to support positive health and equity outcomes.

Law Enforcement Officer Training

Law enforcement officers participate in ongoing professional education to keep up on changing laws. Many states have created such professional development opportunities related to bicycling and walking safety, crash data, and laws. Modules could refresh officers' understanding of common crash

contributing factors, the role of law enforcement officials in keeping roadway users safe, and State law related to active transportation and driving. Vermont Agency of Transportation offers training for new recruits to the Vermont State Police Academy. Louisiana, North Carolina, and New York also offer law enforcement officer training.

Conferences and Professional Associations

NDDOT could encourage staff to participate in professional associations such as the Association of Pedestrian and Bicycle Professionals (APBP), Institute of Traffic Engineers (ITE), and other organizations. Local, State, and national conferences provide opportunities for staff to learn about best practices involving education and encouragement safety countermeasures. For example, the NDDOT bicycle and pedestrian coordinator could be encouraged to attend the annual meeting of State bicycle and pedestrian coordinators. The meeting occurs annually and alternates between the Walk/Bike/Places conference (formerly Pro Walk, Pro Bike, Pro Place Conference) and the Association for Pedestrian and Bicycle Professionals conference. Webinars are another way for staff to stay informed of best practices and emerging trends. APBP, the Pedestrian and Bicycle Information Center (PBIC)⁶⁰, America Walks, and the Safe Routes to School National Partnership all host relevant learning opportunities.

Table 49: Implementation Details for Training Opportunities

Promotional Methods	<ul style="list-style-type: none"> Email updates to NDDOT staff regarding upcoming trainings Press release to District staff Direct communication with partners such as the State Highway Patrol
Action Items	<ul style="list-style-type: none"> Evaluate training needs Evaluate the effectiveness of trainings held
Partner Agencies	<ul style="list-style-type: none"> ND Department of Health ND Indian Affairs Commission and tribal leaders Transportation and/or social/racial equity organizations ND State Highway Patrol NDDOT District leaders

Safe Routes for Seniors Program

A Safe Routes for Seniors education and encouragement grant program could be administered by NDDOT in a similar fashion to the existing Safe Routes to School grants or active transportation demonstration projects. NDDOT would provide support to selected communities by working with local agencies and organizations. Together, the selected communities and NDDOT would provide technical assistance for improving walking infrastructure, such as crossings and sidewalks, especially those in high crash areas. The program's resulting recommendations would

⁶⁰Note: PBIC is a useful source for important emerging FHWA policy guidance. For example: https://safety.fhwa.dot.gov/ped_bike/ped_focus/webinar.cfm

include infrastructure improvements (i.e., sidewalk infill, marked crossing improvement) and ideas for education programming to encourage seniors' improved mobility (i.e., group walks). Given NDDOT's statewide focus, specific details would remain the responsibility of local jurisdictions. NDDOT would provide consistency and program oversight.

Table 50: Implementation Details for a Safe Routes for Seniors Program

Promotional Methods	<ul style="list-style-type: none"> • Create a statewide call for participation for interested communities • Organize resulting materials on the NDDOT website (i.e., community maps, planning documents, safety brochures)
Action Items	<ul style="list-style-type: none"> • Create a program scope similar to the State's existing Safe Routes to School framework, including recommendations presented in this memorandum
Partner Agencies	<ul style="list-style-type: none"> • ND Department of Human Services • ND Department of Health

Bicycle Safety Education Train-the-Trainer Classes

"Train-the-Trainer" classes educate community members in bicycle safety best practices. Once they pass training modules, newly certified community members can then teach others. The League of American Bicyclists offers League Certified Instructor (LCI) training, which certifies that participants who pass in-classroom and on-bike educational modules are prepared to teach bicycle safety courses to adults and children. Increasing the number of LCIs registered in North Dakota can increase the availability of bicycle safety educational courses. The educational LCI courses could be promoted to residents including advocates, community leaders, State staff, including NDDOT employees and State Highway Patrol officers. State employees' course attendance paid for by NDDOT could increase interest in pursuing the certification. For example, Minnesota Department of Transportation has previously paid for staff to complete LCI training. Two North Dakota residents are currently listed in the League's LCI database. As the number of LCIs grows, NDDOT staff can help communities connect with nearby LCIs.

Table 51: Implementation Details for Bicycle Safety Education Classes

Promotional Methods	<ul style="list-style-type: none"> • The League of American Bicyclists offers existing communication tools and educational guides. These materials can be used to communicate directly with District staff and others throughout NDDOT
Action Items	<ul style="list-style-type: none"> • Research upcoming LCI training opportunities scheduled to be held in North Dakota • Publicize training opportunities within NDDOT and fund NDDOT staff attendance
Partner Agencies	<ul style="list-style-type: none"> • Active Transportation Alliance

Promote Participation in the National Bike Challenge

The National Bike Challenge is a nationwide competition for individuals and organizations with the intent of encouraging more people to try commuting by bicycle.⁶¹ The challenge occurs during May, which is considered National Bike Month. NDDOT can use the National Bike Challenge as North Dakota's statewide bike commuting challenge in recognition of Bike Month. Using the system would avoid creating a duplicative program. NDDOT can work with the Office of the Governor to further promote the program. NDDOT could sponsor prizes and/or recognition of the highest-ranking teams in the state.

⁶¹ Nationalbikechallenge.com

Table 52: Implementation Details for Participation in the National Bike Challenge

Promotional Methods	<ul style="list-style-type: none"> • Use social media posts and a press release to publicize the program • Work with large employers and North Dakota cities to promote employee participation
Action Items	<ul style="list-style-type: none"> • Plan publicity materials to promote the 2019 National Bike Challenge
Partner Agencies	<ul style="list-style-type: none"> • Office of the Governor • Large employers

Create a Statewide Counts Program

A statewide bicycle and pedestrian counts program would enable NDDOT to monitor changes in active transportation usage over time. State DOTs across the country develop data collection frameworks to help Districts, counties, and local jurisdictions collect, analyze, and manage data. These functions are similar to DOTs' interest in maintaining accurate and precise motor vehicle counts. Sub-state agencies would be responsible for choosing to collect data manually (with volunteers) or using automated equipment. Among other uses, the resulting data would provide additional context for interpreting pedestrian and bicycle crash data. Having access to robust data is important for several reasons. Data make it possible to assess changes over time, draw conclusions about the impact of new facilities, and improve the design of future facilities. Additionally, data help to quantify the benefits of walking and biking, which ultimately makes active transportation projects more competitive for funding.

Table 53: Implementation Details for Creation of a Statewide Counts Program

Promotional Methods	<ul style="list-style-type: none"> • Direct communication with NDDOT District leaders, regional, and local decision makers
Action Items	<ul style="list-style-type: none"> • Assess existing count programs throughout the state • Work with NDDOT Districts to develop a vision for the unified count program's next steps
Partner Agencies	<ul style="list-style-type: none"> • NDDOT District leaders • MPO leaders

Enhance Tourism Resources

Bike Guide and Online Resources

NDDOT could explore a partnership with the North Dakota Tourism Division to share information about bicycle resources and safety. For instance, enhancing NDTourism.com and other online/print resources with information about bicycle tourism could increase the number of people who participate in bicycle tourism across the state. NDDOT could provide information to the Tourism Division for use on its website and promotional materials, and coordinate with ND Tourism on other promotional materials such as an annual or semi-annual bike guide (similar to the existing Regional Hunting and Fishing Guide or the Scenic and Outdoor brochure).

Statewide Bicycle Map

A statewide bicycle map could be created to promote awareness of existing bicycle-friendly routes and destinations across the state. Maps could also include safety tips to help riders learn about lane positioning, hand signals, pavement marking/traffic device meanings, and other rules of the road. The statewide bike map would be different and distinct from the planned State Bike Network in development for ND Moves. This network represents planned future routes suitable for active transportation. Colorado Department of Transportation, Illinois Department of Transportation, and other agencies produce similar materials to help residents and visitors select routes that best suit their interests and fitness ability. NDDOT may choose to distribute the maps electronically or as printed maps (which may also be ordered through the NDDOT or ND Tourism websites).

Table 54: Implementation Details for Enhancing Active Transportation Tourism Resources

Promotional Methods	<ul style="list-style-type: none"> • NDTourism.com is a comprehensive resource for tourism in North Dakota. NDDOT can work to provide safety information (i.e., text, graphics, and links to other resources)
Action Items	<ul style="list-style-type: none"> • Work with the Department of Commerce to update online and print materials. • Review existing and proposed material to ensure content includes safety information about riding in rural areas.
Partner Agencies	<ul style="list-style-type: none"> • Department of Commerce

Recommendations to Improve Existing Programs

Recommendations to improve existing programs include five broad topics:

- Vision Zero
- Safe Routes to School
- Driver Licensing
- Funding
- Materials and Outreach

Table 55 identifies the recommendations' relationship to the proposed targeted safety behaviors.

Table 55: Existing Education and Encouragement Programs

	Reduce Distracted Driving	Encourage Youth and Young Adult Transportation Safety	Encourage Senior Active Transportation Safety	Educate Drivers About Active Transportation Safety	Encourage Context-Sensitive Safety Education Programming	Encourage Increased Rates of Active Transportation	Continue to Support State Employees in Promoting Active Transportation
Vision Zero	X	X	X	X	X		X
Safe Routes to School	X	X		X	X	X	X
Driver Licensing	X		X	X			X
Funding	X	X	X	X	X	X	X
Materials and Outreach	X	X	X	X	X	X	X

Vision Zero

Providing adequate funding resources to implement education campaigns and other features could increase the reach of the overall initiative. The Vision Zero initiative's current framework offers opportunities to add active transportation safety information to current programs. Links to PDF brochures, graphics, and text can be added to the existing NDCodefortheroad.org website. Materials could include safety tips to remind

motorists to look for people bicycling and walking and remind all roadway users about all modes' rules and responsibilities. Adding a spotlight article about people who walk, bike, and use public transit to "The Programs" section of the Vision Zero website could work to invoke empathy and increased understanding for North Dakota residents who use active transportation. NDDOT can consider joining the Road to Zero Coalition, organized through the National Safety Council (NSC). The initiative was launched in 2016 by NSC, Federal Motor Carrier

Safety Administration, and National Highway Traffic Safety Administration. The organization's goal is to eliminate roadway deaths by 2050.⁶² Coalition members, including State DOTs, receive access to toolkits, webinars, posters, and other resources to promote throughout their agency or organization. Members can compare safety and health data with other members and can apply for grants administered by NSC.

Safe Routes to School

Currently, North Dakota's Safe Routes to School (SRTS) program is one of North Dakota's largest statewide active transportation education and encouragement programs. However, the funding for this program is limited, and the program will be completed once all funding has been expended. Expanding the State's role in fostering SRTS safety education and encouragement across North Dakota, while funds remain, can be accomplished through several methods. Elements from Minnesota statewide SRTS planning are valuable models for North Dakota:

- **Create an online resource center:** Assemble and organize free assets, such as those offered by the Safe Routes to School National Partnership, to form an online repository of resources for communities across the state. NDDOT's website already features SRTS grant information and other building blocks of such a resource center
- **Organize training calls and make online training videos available to offer remote technical assistance:** MnDOT hosts monthly conference calls for community planners and other interested parties, such as school administrators, oriented around a specific topic each month. Following this model could answer local communities' questions about education and encouragement programming and could strengthen SRTS outcomes across the state
- **Seek partnerships with statewide companies or organizations who could help sustain safety programming:** Minnesota uses a coalition model whereby supporting partners volunteer monetary and in-kind resources to sustain program funding. MnDOT, Minnesota Department of Health, Bicycle Alliance of Minnesota, and the Blue Cross Blue Shield Prevention Center are participating partners
- **Organize an idea matrix to help communities offer innovative and effective safety education, encouragement, and enforcement programs:** Communities who participate in the MnDOT SRTS program gain access to an online matrix to

encourage ideas to increase safety around schools. Community leaders can search by program type, topic, format, target audience, and primary desired outcomes to learn more about approaches such as drop-off student valet programs, bike trains, idling reduction campaigns, and more

Driver Licensing

Statewide driver's education materials contain a voluntary module on pedestrian and bicycle safety. Increasing the content's integration within noncommercial and commercial licensing curricula and examinations could increase drivers' understanding of how to legally, safely, and considerately operate a vehicle around people walking and bicycling. The following recommendations could be reviewed with the State Highway Patrol and are dependent upon existing legislation.

Commercial Driver's Education Recommendations

- Revise commercial driver's education materials to include information on driving near bicyclists riding in the roadway
- Remove the recommendation that commercial drivers honk or flash lights when passing a person bicycling
- Review licensing test questions for the presence of questions that specifically address rights and responsibilities of commercial drivers near people walking and bicycling
- Outreach with commercial driver's education providers is necessary to inform educators and commercial driving companies about safety devices, such as truck guards, that could reduce the likelihood of fatal injuries resulting from a truck-bicycle crash
- Include a module that focuses on commercial drivers as a target audience in any media campaign created by NDDOT or other partners to discuss active transportation safety

Noncommercial Driver's Education Recommendations

- Update the Driver's License Manual with the following:
 - Specify a suggested minimum distance for motorists to pass people bicycling
 - Enhance existing content about motorist hand signals to indicate that bicyclists will use the same hand signals. Content could also specify that bicyclists can signal with the right arm

⁶² <http://www.nsc.org/learn/NSC-Initiatives/Pages/Road-to-Zero-Grants.aspx>

- Require active transportation modules be taught within driver education courses. Include outreach with instructors to learn about how best to fit content within the course structure
- Monitor the delivery of active transportation modules within driver education courses
- Review licensing test questions for the presence of questions that specifically address rights and responsibilities of noncommercial drivers near people walking and bicycling

Materials and Outreach

NDDOT has already created a variety of resources that provide information about roadway safety. Expanding these resources into content that is highly memorable and well publicized across the state will help motorists know to watch for people walking and bicycling. Recommendations to improve existing print and online materials include:

- Update existing educational materials for customization by local jurisdictions. This could include “plug and play” social media content, videos, existing brochures, and other materials
- Update safety videos so that they are viewable without sound. Operate the narration and visuals independently from the audio content; mirror the narration in closed captioning, which could be turned on by default. Show clear positive and negative behaviors. If possible, add graphics to the video to assist with the behavior being demonstrated. Use highly descriptive narration; describe what is being shown and do not assume the viewer/listener understands the terms used. Utilize audio that is comprehensible without the visual
- Add active and public transportation metrics to NDDOT reports that currently lack this information
- Continue and expand involvement with State bicycling advocacy groups, such as the ND Active Transportation Alliance

Active Transportation in Work Zones

NDDOT recognizes its role as a leader in the state in providing safe transportation options for all traveler types. This document provides recommendations to evaluate and maintain travel for people walking and biking through and around construction areas on state roadways and offers detailed background to support NDDOT staff in implementation.

This guidance was created specifically for NDDOT but can also be useful to other jurisdictions in the state. The intent is to create guidance that could also be applicable to other agencies in North Dakota.

Existing NDDOT Guidance

The primary guidance currently used by NDDOT is contained in the 2009 MUTCD, the North Dakota DOT 2014 Standard Specifications for Road and Bridge Construction, North Dakota DOT CADD Standard Drawings, and ADAAG/PROWAG. Availability of federal funding is contingent on compliance. The North Dakota Century Code requires the NDDOT Director to adopt a manual to establish consistency of traffic control devices across the state. NDDOT adopted the MUTCD to fulfill this function. The North Dakota Century Code also states that traffic control devices must conform to the manual’s standards.

Additions to that body of guidance would improve the support provided to pedestrian and bicyclists in work zones. Traffic Incident Management areas will not be addressed in this document.

Recommendations

Create rules and regulations to enforce contractor requirements and compliance with approved traffic control plans (TCPs)

Examples of existing rules and regulations that could be used as reference include:

- SF, Regulations for Working in San Francisco Streets, 8th Edition, https://www.sfmta.com/sites/default/files/pdfs/BlueBook8thEd_Accessible.pdf
- City of Seattle, Director's Rule 10-2015, Pedestrian Mobility in and around Work Zones, <http://www.seattle.gov/transportation/docs/DR10-2015PedestrianMobility.pdf>
- City of Oakland, Accommodating Bicyclists through Construction Zones, October 2016, <http://www2.oaklandnet.com/oakca1/groups/pwa/documents/memorandum/oak061424.pdf>
- City of Portland, TRN-8.12 Safe Accommodation for Pedestrians and Cyclists In and Around Work Zones, <https://www.portlandoregon.gov/citycode/article/595633>
- Chicago, Rules and Regulations for Construction in the Public Way, March, 2016, https://www.cityofchicago.org/content/dam/city/depts/cdot/Construction%20Guidelines/2016/2016_CDOT_Rules_and_Regs_112316.pdf

Utilize existing diagrams or create typical application diagrams for Section 6H showing these guidelines applied to common work zone settings

Illustrative examples of work zone accessibility as applied to common work zone settings can be adapted to a broad range of conditions and used in various ways. These diagrams can be used as the basis for temporary traffic control work zone plans. They can be referred to by in-field personnel creating or modifying work zones.

Create new training or augment existing training for personnel responsible for the creation, review, approval, installation, monitoring and enforcement of TCPs

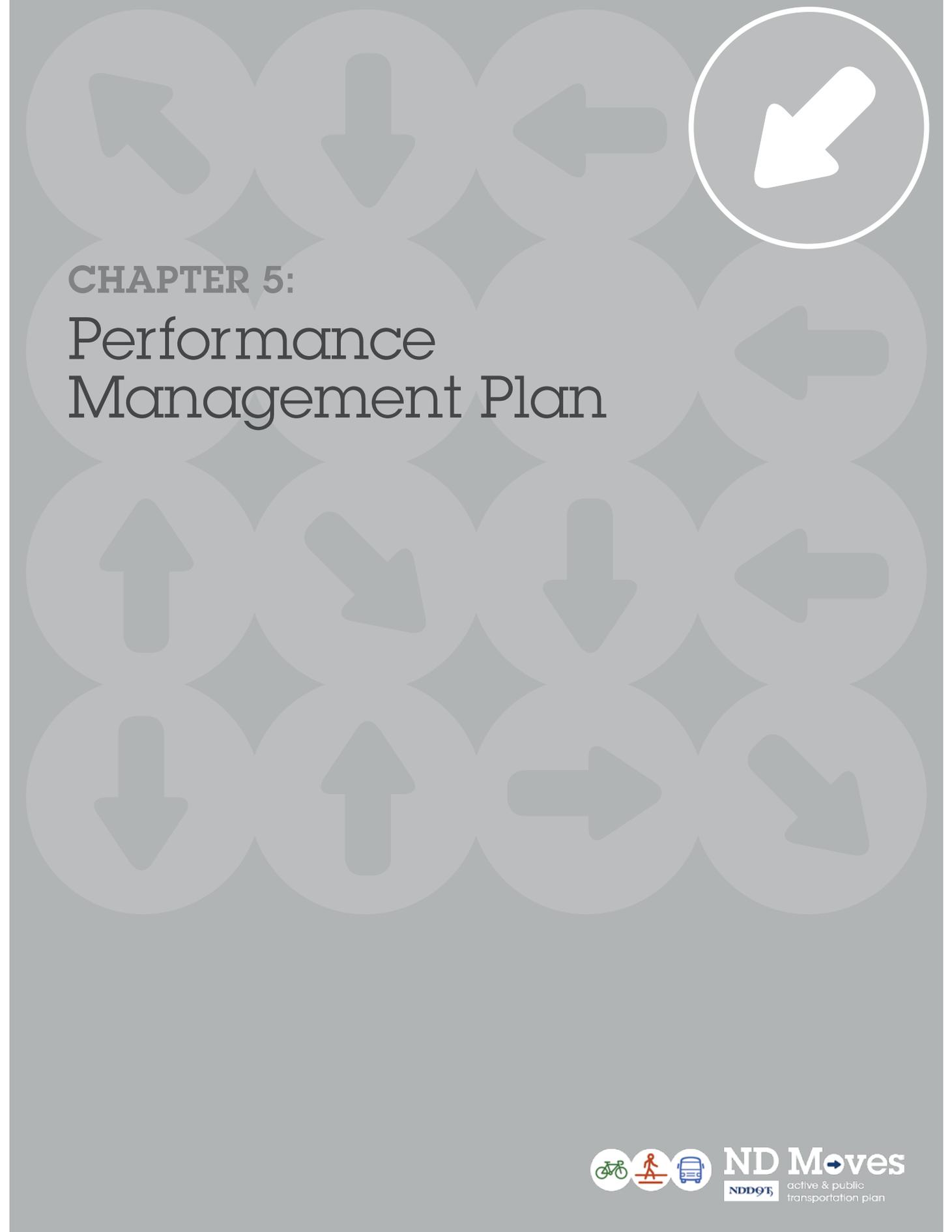
Consider requiring trainees to negotiate work zones with substandard facilities in wheelchairs or on bicycles. Reducing their physical strength, vision or coordination to simulate the effects of aging or disabilities could be crucial in allowing trainees to understand access from the perspective of less-abled travelers.

Create checklists and summary guidance to aid personnel responsible for the creation, review, approval, installation, monitoring and enforcement of TCPs

Guidance summaries and checklists make application of guiding principles easier by allowing personnel to rapidly verify that the most important principles have been covered. Tools which allow quick, easy verification that a traffic control plan or work zone configuration meets accessibility requirements helps to ensure that these checks are performed and repeated use of these tools embeds this knowledge in a practitioner's normal course of work.

Develop a communication strategy for publicizing pedestrian and bicycle detours

Consider creating a dedicated web page for active transportation projects, programs, and updates, and establish a process for communicating relevant construction and detour information to the public. For example, an active transportation page may include a section about upcoming projects and route planning that links to a central construction page for details about construction schedules and recommended detours.



CHAPTER 5:
Performance
Management Plan



CHAPTER 5: Performance Management Plan

To meet the guidance established by Fixing America's Surface Transportation (FAST) Act, ND Moves was developed with a performance management element. The FAST Act establishes a set of national goals to guide the development of transportation investments and focuses on performance-based approach to transportation planning and has developed seven national planning goals:

- Safety
- Infrastructure Condition
- Congestion Reduction
- System Reliability
- Freight Movement and Economic Vitality
- Environmental Sustainability
- Reduced Project Delivery Delays

Through the existing conditions analysis and public engagement, primary issues were identified for the active and public transportation network in North Dakota. These issues were compared to the overall planning goals to develop a set of modal specific (active and public) goals. The project goals and associated performance measures and long-term performance goals are based on the 20-year horizon of this plan. This process is described below. Shorter-term goals (or performance targets) are typically developed through separate programming or investment strategies and address a specific programming horizon (typically one to five years). As such, shorter-term performance targets are not included in this plan.

Defining Performance Management

The following terminology will be used to guide the development of the Performance Management Plan.

- **Goal** — Overall guiding result or outcome related to the active and public transportation system
- **Objective** — Desired action or initiative that is perceived as meeting the intent of the overall goal. Further, the objective is designed to assist in achieving the defined performance level
- **Performance Measure** — Measure used to evaluate system performance
- **System Performance** — Current level of the performance measure
- **Long-Term Performance Goal** — Desired level of the performance measure
- **Consistency Monitoring** — Effort used to monitor, evaluate, and track performance levels

The development of a performance management element of ND Moves related to active and public transportation was based on the following key components:

- Comparison measure and indicator development within other state plans
- Comparison with other system measures from neighboring states
- Relationship with baseline funding levels and existing infrastructure levels

Vision

The North Dakota DOT will support the safe integration of active and public transportation facilities and services into and connecting to state facilities, offering transportation choices that connect to a variety of geographies and other transportation modes and are accessible to all North Dakotans.

Performance Management for Active Transportation

The goals for the active transportation element of ND Moves as related to the FAST Act National Planning goals as shown in Table 56.

Table 56: FAST Act and ND Moves Active Transportation Goals

FAST Act National Planning Goals	Mobility/Accessibility	Modal/Funding Priority	Asset Management	Sustainability	Marketing & Communications	Modal Integration	Safety	Technology	Community Health
Safety					X		X		
Infrastructure Condition			X						
Congestion Reduction									
System Reliability	X		X		X				
Freight Movement and Economic Vitality					X				X
Environmental Sustainability	X	X		X		X			X
Reduced Project Delivery Delays								X	

Goals & Objectives

Mobility & Accessibility

Increase active transportation use in North Dakota

Objective 1: Plan, design, construct, manage, and support a comfortable and connected transportation network that accommodates people of all ages and ability levels

Objective 2: Create active transportation connections to the public transportation network and to major destinations throughout all NDDOT districts

Objective 3: Remove the barriers to active transportation throughout the state

Objective 4: Implement education and information campaigns to encourage North Dakotans to use active transportation, including information about the health benefits of using active transportation

Table 57: Active Transportation Mobility & Accessibility Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Annual state bicycle commuting mode share	US Census American Community Survey	1.00%	0.48%
Annual state walk commuting mode share	US Census American Community Survey	8.00%	3.86%

*Current system performance based on a five-year average of 5-Year ACS estimates.

Modal/Funding Priority

Dedicate appropriate funds to promote active transportation infrastructure, education, and encouragement programming

Objective 1: Facilitate safe and connected active transportation on the state highway system

Objective 2: Pursue equitable investment in active transportation infrastructure and safety education and encouragement programming

Objective 3: Expand data collection and analysis infrastructure throughout the state

Objective 4: Continue investment in education and encouragement programming to encourage safe active transportation

Table 58: Active Transportation Modal/Funding Priority Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Percent of urban state roadway miles with active transportation facilities	NDDOT RIMs State Highway Centerline File	50%	38%
State funded multimodal transportation planning	NDDOT	\$1.50/capita in new state funding to support transportation planning in North Dakota	\$0.33
Federal funds dedicated to active transportation through transportation alternatives, safe routes, and recreational trails program	STIP	\$4.0M (50% increase)	\$2.67M

Asset Management & Sustainability

Maintain the state's existing active transportation network and grow these resources to encourage environmental and economic sustainability

Objective 1: Reduce vehicle miles traveled (VMT) through increased active transportation

Objective 2: Regularly monitor plan outcomes through short- and long-term active transportation performance measures

Objective 3: Regularly provide NDDOT staff with training and other resources to stay apprised of best practices for facilitating and promoting active transportation along the state highway system

Table 59: Active Transportation Asset Management & Sustainability Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Combined number of established bicycle/pedestrian count programs	Local Agencies (Cities, Counties, MPOs)	100% of MPOs Areas and 57% (4/7 cities) of urban areas	1 MPO and 0 cities with a pop 5,000 to 49,000
Number of active transportation trainings per year offered for NDDOT employees pertaining to active transportation	NDDOT	4 (one training per quarter)	No formal tracking

Marketing & Communications

Proactively communicate with North Dakota citizens, other public agencies, transportation advocates, and other stakeholders to implement the plan

Objective 1: Provide meaningful ways for the public to engage with the plan's recommendations and implementation

Objective 2: Increase engagement opportunities for underserved populations across the state

Objective 3: Grow the number of communities recognized as Walk Friendly Communities and Bicycle Friendly Communities

Objective 4: Use NDDOT online and in person communication channels to promote advances in active and public transportation infrastructure networks and educational resources

Table 60: Active Transportation Marketing & Communications Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Number of cities, towns, and MPOs that are Bicycle Friendly Communities (BFC)	List of BFCs from League of American Bicyclists website	100% of MPOs (Silver) and 28% (2/7) of urban areas (Bronze)	3 (Each of the state's three MPOs is a Bronze level BFC)
Number of cities, towns, and MPOs that are Walk Friendly Communities (WFC)	List of WFCs from walkfriendly.org	100% of MPOs and 2/7 (28%) of urban areas	0

Modal Integration

Coordinate the growth of active and public transportation networks to enable seamless multimodal travel throughout the state

Objective 1: Invest in facilities that improve first- and last-mile walk and bike connections to public transit stops and stations across North Dakota

Objective 2: Provide mobility options to underserved populations across the state

Objective 3: Ensure that existing and future public transit vehicles are well-equipped to handle bicycles

Table 61: Active Transportation Modal Integration Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Communities with an adopted multimodal transportation plan by 2024 (no less than 5 years old for MPOs and 10 years old for the other urban areas)	NDDOT	100% of MPOs and 100% of urban areas	100% MPOs; 42% of urban areas

Safety

Facilitate a system in which all users feel safe

Objective 1: Reduce the number of active transportation user-involved crashes across the state

Objective 2: Reduce the number of serious and fatal active transportation-involved crashes across the state

Objective 3: Coordinate the implementation of plan recommendations in conjunction with NDDOT Vision Zero initiatives. Create and utilize design guidelines that ensure high-quality, safe, and comfortable routes for active transportation

Table 62: Active Transportation Safety Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Bicycle crash rates (per 10,000 people)	NDDOT Safety Division	3.00	6.63
Bicycle crash severity rate (Fatal and severe injury crashes divided by total bicycle crashes)	NDDOT Safety Division	5%	10.90%
Pedestrian crash rates (per 10,000 people)	NDDOT Safety Division	4.00	8.13
Pedestrian crash severity rate (Fatal and Injury A divided by total pedestrian crashes)	NDDOT Safety Division	11.00%	22.13%
Number of active transportation focused safety campaigns	NDDOT Safety Division	5	0

*Crash rates were calculated using 5 years of crash data (2012-2016) divided by the average North Dakota population from 2012 to 2016.

*Severity rates were calculated using 5 years of crash data (2012-2016).

Technology

Leverage transportation technologies to advance active and public transportation

Objective 1: Share information about new transportation technologies with state and local partners

Objective 2: Consider new technologies for data collection

Objective 3: Increase number of active transportation facilities with automatic data collection and real time information

Objective 4: Use technology to promote active/public transportation through websites, mobile apps, partnerships, and providing data to app developers and mapping applications

Table 63: Active Transportation Technology Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Number of locations with automatic data collection for walking and bicycling	NDDOT/Local Agencies	100% of MPOs and 4/7 urban areas	1/3 MPOs and 0 urban areas
Report on transportation technologies and implementation	To be determined	Annually	No formal process

Community Health

Increase the use of active transportation to improve community health outcomes

Objective 1: Coordinate with the North Dakota Department of Health to support efforts to reduce the instances of heart disease and diabetes

Objective 2: Partner with the North Dakota Department of Health to collect data and advance active and public transportation to seek better health outcomes for North Dakotans

Objective 3: Support initiatives that encourage active transportation

Table 64: Active Transportation Community Health Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Rate of diabetes among adults	North Dakota Department of Health Indicator Dashboard	7%	8.9%
Rate of coronary heart disease death rate among people 0 to 64 (per 100,000)	North Dakota Department of Health Indicator Dashboard	23	43
Percent of adults who engage in no leisure time physical activity	North Dakota Department of Health Healthy People 2020 Indicators	19%	24%
Percent of adults who are obese	North Dakota Department of Health Healthy People 2020 Indicators	22%	30%

Performance Management for Public Transportation (Public Transit)

The goals for the public transit element of ND Moves in relation to the FAST Act National Planning goals are shown in the table below.

Table 65: FAST Act and ND Moves Public Transit Goals

FAST Act National Planning Goals	Mobility & Accessibility	Modal/ Funding Priority	Asset Management	Sustainability	Marketing & Communications	Data Management/ Agency Coordination	Safety
Safety							X
Infrastructure Condition			X			X	X
Congestion Reduction	X	X		X		X	
System Reliability		X				X	
Freight Movement and Economic Vitality		X			X		X
Environmental Sustainability		X		X	X		
Reduced Project Delivery Delays							

Public Transportation Goals & Objectives

Mobility & Accessibility

Improve public transit opportunities within and between communities

Objective 1: Provide convenient, accessible, and affordable public transit opportunities for all populations

Objective 2: Make public transit more time-competitive with automobile travel

Objective 3: Create a passenger-friendly environment at stops, stations, or on-board vehicles

Objective 4: Increase the amount of public transit service provided

Objective 5: Enhance connectivity among local, intercity, and regional public transit services and other modes

Table 66: Public Transportation Mobility & Accessibility Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Annual State public transit commuting mode share	US Census American Community Survey	1.0%	0.50%
Revenue Hours per Capita (Urban Fixed-Route)	National Transit Database	0.5	0.41
Revenue Hours per Capita (Rural)	National Transit Database	0.75	0.67

Table 67: Public Transportation Mobility & Accessibility Performance Measures (Continued)

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Passengers per Revenue Hour (Urban Fixed-Route)	National Transit Database	15.00	12.59
Passengers per Revenue Hour (Rural)	National Transit Database	3.00	2.73
Revenue Miles per Passenger (Urban Fixed-Route)	National Transit Database	1.00	1.41
Revenue Miles per Passenger (Rural)	National Transit Database	10	13.19
Percentage of fixed-routes with a frequency of service at 30 minutes or greater during the peak period and 60 minutes or greater off-peak	Transit provider schedules	75%	37.5%

Modal/Funding Priority

Maintain or increase the amount of transportation funding dedicated to public transit

Objective 1: Demonstrate fiscal responsibility in funding decisions

Objective 2: Study the public transit return on investment in North Dakota

Objective 3: Explore additional public transit funding sources

Table 68: Public Transportation Modal/Funding Priority Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Cost per Revenue Hour (Urban Fixed-Route)	National Transit Database	\$70.00	\$64.05
Cost per Revenue Hour (Rural)	National Transit Database	\$50.00	\$46.58
Investment per Passenger (Urban Fixed-Route)	National Transit Database	\$4.00	\$5.55
Investment per Passenger (Rural)	National Transit Database	\$20.00	\$23.13
Cost per Ride (Urban Fixed-Route)	National Transit Database	\$5.00	\$6.11
Cost per Ride (Rural)	National Transit Database	\$20.00	\$21.19
Farebox recovery ratio (Urban Fixed-Route)	National Transit Database	15.0%	10.1%
Farebox recovery ratio (Rural)	National Transit Database	12.0%	10.1%
Public transit funding per capita	State and local public transit funding; state population	\$12.25	\$11.14 (2017)

Asset Management & Sustainability

Maintain public transit assets in a state of good repair

Objective 1: Maintain and preserve existing infrastructure and protect future infrastructure and right-of-way

Objective 2: Expand public transit services based on a prioritization process

Objective 3: Allocate resources to support both preservation and expansion

Objective 4: Identify grant and other funding opportunities to maintain and renew/expand public transit equipment and services

Objective 5: Support energy-efficient vehicles and facilities

Table 69: Public Transportation Asset Management & Sustainability Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Percent of revenue vehicles that exceed the useful life benchmark (all systems)	NDDOT	Less than 10%	36%
Percent of other public transit assets that exceed the useful life benchmark (all systems)	NDDOT	Less than 10%	66%
Percent of facilities rated less than 3.0 on the TERM Scale (all systems)	NDDOT	0%	0%

Marketing & Communications

Increase communications and promote public transit as a viable and important mode of travel

Objective 1: Support the creation of how-to-ride-videos, photos, and handouts

Objective 2: Support public transit traveling training staff and organizations

Objective 3: Allocate resources to fund promotion of public transit and public transit communications staff

Objective 4: Develop materials that illustrate the benefits of public transit for riders and the community

Table 70: Public Transportation Marketing & Communications Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Information availability (Title VI, Riders Guide, Service Schedules, Trip Reservation Process)	Public transit providers	Update annually	No formal process
Marketing and communications training available for public transit operators	To be developed	Complete annually	No formal process

Data Management/Agency Coordination

Increase communication, collaboration, and coordination within the statewide public transit network

Objective 1: Facilitate and leverage key partnerships

Objective 2: Coordinate services to enhance system efficiency

Objective 3: Streamline and standardize the collection of public transit data

Table 71: Public Transportation Data Management/Agency Coordination Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
All providers use the same software to report data	NDDOT	100%	100%

Safety

Improve public transit safety across the state

Objective 1: Improve safety on North Dakota's public transit systems

Objective 2: Encourage service providers to have safety and security plans meet FTA guidance

Table 72: Public Transportation Safety Performance Measures

PERFORMANCE MEASURE	SOURCE	LONG-TERM PERFORMANCE GOAL	SYSTEM PERFORMANCE
Number of crashes per 100,000 public transit vehicle miles	National Transit Database	0	0
Number of fatalities involving public transit vehicles per 100,000 public transit vehicle miles	National Transit Database	0	0

Future Performance Measures

In addition to the performance measures described, it is recommended that NDDOT explore additional performance measures as baseline data is calculated or becomes available. The future performance measures recommended include:

- Percent of proposed State/US Bicycle Route network meeting design and wayfinding signage recommendations
- Revenue miles of regional, interregional, and intercity public transit service
- Percentage of fixed-route buses with automatic passenger counters (urban)
- Percentage of fixed-route buses with automatic vehicle location (urban)
- Percentage of demand response buses with automated data collection device (all systems)
- Percentage of local public transit agencies that have safety and security plans that meet FTA guidance