NORTH Dakota | Transportation

Be Legendary.

ELECTRIC VEHICLE INFRASTRUCTURE PLAN

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Acronyms

AADT annual average daily traffic

AASHTO American Association of State Highway and Transportation Officials

ADA Americans with Disabilities Act

ADT Average Daily Traffic

AFC Alternative Fuel Corridor

API application programming interface

ATMS advanced traffic management system

BEV Battery Electric Vehicles

BIL Bipartisan Infrastructure Law

BTS Build-to-Suit

CCS combined charging system

CMAR Construction Management at Risk

COG Council of Governments

CSEA Clean Sustainable Energy Authority

CVSS common vulnerability scoring system

DAC Disadvantaged Community

DB Design-Build

DBB Design-Bid-Build

DBE Disadvantaged Business Enterprise

DBF Design-Build-Finance

DBFO Design-Build-Finance-Operate

DBFOM Design-Build-Finance-Operate-Maintain

DBOM Design-Build-Operate-Maintain

DCFC Direct Current Fast Charger

DEQ Department of Environmental Quality

DiD Defense-in-Depth

DMS dynamic message sign

DOT Department of Transportation

EV Electric Vehicle

EVIP Electric Vehicle Infrastructure Plan

EVITP Electric Vehicle Infrastructure Training Program

EVSE Electric Vehicle Supply Equipment

F Fahrenheit

FHWA Federal Highway Administration

FIPS Federal Information Processing Standards

FM Fargo-Moorhead

FY Fiscal Year

GEC general engineering consultant

GMP guaranteed maximum price

I Interstate

ICE Internal Combustion Engine

IDS Intrusion Detection System

IIJA Infrastructure Investment and Jobs Act

IPS Intrusion Protection System

ISCM information security continuous monitoring

ITS Intelligent Transportation Society

K thousand

kW Kilowatt(s)

kWh kilowatt hours

LRTP Long Range Transportation Plan

M million

MPO Metropolitan Planning Organization

m/s meters per second

MUTCD Manual on Uniform Traffic Control Devices

MW Megawatt

mWh megawatt hours

NASEO National Association of State Energy Officials

NDDOT North Dakota Department of Transportation

NDPSC North Dakota Public Service Commission

NEHC National Electric Highway Coalition

NEVI National Electric Vehicle Infrastructure

NIST National Institute for Standards and Technology

NPRM Notice of Proposed Rulemaking

NPV Net Present Value

OCCP open charge-point protocol

OEM Original Equipment Manufacturer

O&M Operations and Maintenance

P3 Public-Private Partnership

PCI payment card industry

PDA Pre-Development Agreement

PHEV plug-in hybrid vehicle

PII personally identifiable information

PSC Public Service Commission

RFP Request for Proposal

ROW right of way

SAE Society of Automotive Engineers

SbD Security by Design

SEP State Energy Program

SIEM security information and event management

SOC Security Operations Center

SP Special Publication

STP State Transportation Planning

STRIDE Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service, Elevation of Privilege

TCD traffic control device

TOA Township Officers Association

U.S. United States

U.S. DOE United States Department of Energy

U.S. DOT United States Department of Transportation

VFM Value-for-Money

WOTC Work Opportunity Tax Credit

ZEV Zero Emission Vehicle

1: INTRODUCTION

1.1 Background

The 2021 Federal Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act (IIJA), provides investments to help support emerging transportation technologies, including electric vehicles (EVs). Currently, EV sales are low but increasing rapidly. The IIJA provides long-lasting infrastructure improvements by developing a national network of EV chargers, to support those who choose to adopt this new technology.

The IIJA created the National Electric Vehicle Infrastructure (NEVI) Formula Program, among other new federal policy and funding initiatives. NEVI provides funding to states to deploy EV charging infrastructure to support travelers who choose to use EVs. The guidance issued for the NEVI Formula Program required that states develop an infrastructure plan outlining how they would utilize the formula funding. This North Dakota EV Infrastructure Plan (EVIP) addresses those federal guidelines with partnerships across agencies and stakeholders.

SECTIONS

1.1 Background

1.2 Plan Development

1.3 Study Area

1.4 Development, Adoption, and Implementation

1.5 Plan Overview

1.2 Plan Development

The North Dakota Department of Transportation (NDDOT), in coordination with other agencies, has prepared this EVIP to be an overall plan for the goals, objectives, and mission on how to strategize for EVs and EV charging locations for the future. The EVIP is one component of how NDDOT plans, builds, and develops transportation improvements to provide safety and infrastructure for all users.

The plan was developed in accordance with the 90-day NEVI Formula Program Guidance issued on February 10, 2022, and the 180-day NEVI guidance issued on June 9, 2022 (NEVI Guidance). NDDOT intends the EVIP to be flexible and to have the capability to evolve as new information becomes available over the 5-year life of the NEVI Formula Program. This EVIP documents the process used to develop the plan, which included three key elements: stakeholder engagement, technical analysis, and policy and plan development.

Stakeholder Engagement – NDDOT reached out to over 50 different agencies, organizations, with representation such as utilities, energy producers, EV groups, government agencies, and education. One online public meeting and one live engagement were held to engage the public. The input and feedback received from these engagement efforts helped inform many aspects of the plan, and the information gathered from these entities was essential to the technical and policy planning tasks.

Technical Analysis – The evaluation and assessment activities addressed the criteria outlined in the NEVI Guidance. This work provided a sound quantitative basis for decision making, including determining the suitability and prioritization of placement for direct current fast charger (DCFC) deployments.

Plan and Policy Development – The planning and policy work outlined the program vision and goals. It also addressed key topics such as funding, equity, contracting, and coordination with other states and their EV infrastructure programs.

The result is a strategic and flexible plan for North Dakota to provide for travelers who use EVs. While NDDOT does not exercise a formal adoption process, the EVIP joins NDDOT's suite of plans, including the Transportation Connection statewide long range transportation plan, among others.

1.3 Study Area

As shown in **Figure 6.5**, the state of North Dakota includes two interstates: I-94, which runs east-west for 352 miles, and the 217-mile-long, north-south I-29. North Dakota has designated these two corridors as alternative fuel corridors (AFCs) within the state. The expansion of EV charging stations along these corridors will benefit EV drivers traveling within and through North Dakota.

Figure 1.1: Study Area

1.4 Development, Adoption, and Implementation

Milestones of the development of the EVIP and anticipated deployment are as follows:

- Spring 2022: Preparation for producing the EVIP.
- May 2022: Launch of EVIP development and initial stakeholder engagement.
- June 2022: Data and site analysis.
- July 2022: Anticipated EVIP completion and adoption.
- August 2022: EVIP submittal to the Federal Highway Administration (FHWA) and the Joint Office.
- September 2022: Anticipated EVIP approval by FHWA and the Joint Office.
- October 2022: Begin EVIP implementation and contracting process.
- Spring 2023: Initial deployment.

1.5 Plan Overview

This document follows the outline provided by the Joint Office released February 13, 2022.

The remainder of this report is divided into these 14 chapters:

- Chapter 2: State Agency Coordination
- Chapter 3: Public Engagement
- Chapter 4: Plan Vision and Goals
- Chapter 5: Contracting
- Chapter 6: Existing and Future Conditions Analysis
- Chapter 7: EV Charging Infrastructure Development
- Chapter 8: Implementation
- Chapter 9: Civil Rights
- Chapter 10: Equity Concerns
- Chapter 11: Labor and Workforce Considerations
- Chapter 12: Cybersecurity
- Chapter 13: Program Evaluation
- Chapter 14: Discretionary Exemptions


Historical
Site

2: STATE AGENCY COORDINATION

2.1 Overview

SECTIONS

2.1 Overview

An executive steering committee composed of several state agencies oversaw the development of the EVIP. NDDOT was the lead agency. Other state agencies on the executive steering committee were the North Dakota Public Service Commission (NDPSC), and the North Dakota Department of Commerce (Commerce). The North Dakota State Energy Program (SEP) also was represented on the executive steering committee.

In addition to the state agencies discussed here, many other agencies and organizations were involved in the EVIP development. These included utility-related, auto-related, energy-related, and government-related groups and organizations. The many agencies and groups involved in the plan development are discussed further in Chapter 3: Public Engagement. NDDOT has also coordinated with other states regarding the NEVI Program, including Idaho, Minnesota, Montana, South Dakota, and Wyoming.

As outlined by the NEVI Guidance and requested for inclusion in this section of the plan, NDDOT supports an approach that maximizes opportunities to use United States (U.S.)-made EV supply equipment (EVSE), in addition to U.S.-made materials and products for site development, electrical equipment, and construction materials. For example, NDDOT is investigating procuring U.S.-made equipment prior to NEVI funding availability, as it may be difficult to procure chargers once funding is available. NDDOT understands that the Buy America requirement is a key feature of this program, intended to spur growth of the EVSE charging industry in the United States. The implementation of the program will follow the requirements as outlined in the April 18, 2022, Presidential Memo M-22-11. A challenge will be the procurement of charging infrastructure that meets the preferred standards of the program, which includes the ability to deliver up to 350 kilowatts (kW) and power-share between dispensers. These are new chargers with advanced technology, and it will be a challenge to obtain chargers that follow compliance. However, Buy America compliance is paramount to the program and will supersede the preference for infrastructure capability, and NDDOT will continue to identify opportunities to meet the requirements while obtaining infrastructure that is suitable for the program.


ADAM'S
POLISHES

3: PUBLIC ENGAGEMENT

SECTIONS

3.1 Overview

3.2 Engagement Goals

3.3 Feedback Overview

3.4 Survey Results

3.5 Community Analysis

3.6 Engagement Meetings and Tools

3.1 Overview

North Dakota DOT implemented a comprehensive public engagement plan to inform stakeholders and the public about the EV Infrastructure Plan and gather meaningful input to inform the development of the plan. An inclusive and transparent engagement process was essential to developing the final plan that addressed a broad base of needs and future opportunities while building consensus among North Dakota's public, key stakeholders, and advisory groups. Below are the agencies and organizations that were involved throughout the development of the plan.

Utilities and Utility Agencies:

- Goldenwest Electric Cooperative, Inc.
- Roughrider Electric Cooperative
- Mor-Gran-Sou Electric Cooperative, Inc.
- Capital Electric Cooperative, Inc.
- Kem Electric Cooperative, Inc.
- Northern Plains Electric Cooperative
- Cass County Electric Cooperative, Inc.
- Dakota Valley Electric Cooperative, Inc.
- Nodak Electric Cooperative, Inc.
- City of Valley City
- Otter Tail Power Company
- Basin Electric Power Cooperative
- North Dakota Transmission Authority
- North Dakota Public Service Commission
- Utility Shareholders of North Dakota
- North Dakota Association of Rural Electric Cooperatives
- Xcel Energy
- Montana-Dakota Utilities Company
- Ottertail Power
- Minnkota Power

Governmental/Tribal:

- Bismarck/Mandan Metropolitan Planning Organization (MPO)
- Fargo-Moorhead (FM) Metro Council of Governments (COG)
- Grand Forks/East Grand Forks MPO
- North Dakota Association of Counties
- North Dakota Highway Patrol
- North Dakota League of Cities
- ND Department of Environmental Quality
- ND Department of Labor and Human Rights
- ND Indian Affairs Commission
- North Dakota Department of Commerce
- ND Township Officers Association (TOA)
- Federal Highway Administration
- Standing Rock Sioux Tribe
- Mandan, Hidatsa, and Arikara Nation
- Spirit Lake Nation
- Turtle Mountain Band of Chippewa
- Sisseton-Wahpeton Oyate of the Lake Traverse Reservation

EV/Energy/Education/Transportation/Other:

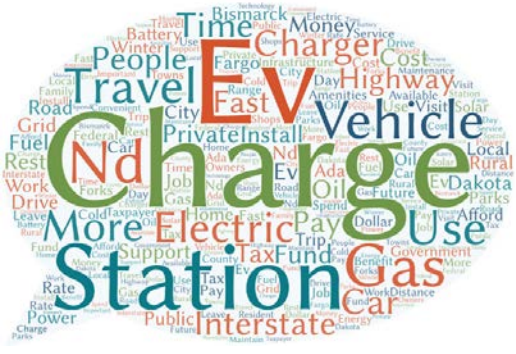
- North Dakota Motor Carriers Association
- Automobile Dealers Association of North Dakota
- North Dakota Clean Cities Coalition
- Drive Electric North Dakota
- North Dakota Petroleum Council
- Lignite Energy Council
- North Dakota Association of Nonprofit Organizations
- North Dakota University System – Upper Great Plains Transportation Institute (UGPTI)
- North Dakota Petroleum Marketers Association
- University of North Dakota Transportation Technology Research Initiative
- North Dakota Active Transportation Alliance
- Greater North Dakota Chamber
- Impact Dakota
- Economic Development Association of North Dakota (EDND)
- American Council of Engineering Companies
- Associated General Contractors of North Dakota
- CLEAN

3.2 Engagement Goals

The public engagement plan and process were developed and implemented with the following primary goals as a focus:

- Facilitating stakeholder and public engagement anticipated throughout the planning process.
- Providing a variety of options for receiving input from stakeholders and the public.
- Engaging stakeholders and the public to collect meaningful feedback that will inform the development of the EVIP.
- Transforming complex technical data into comprehensive communication materials.
- Implementing tools and tactics that are accessible, strategic, and inclusive.

3.3 Feedback Overview



Throughout the engagement process, feedback was collected from a wide variety of stakeholders and participants. Participants were asked to explore barriers to deployment, opportunities for successful implementation, and areas where additional coordination or efforts will need to be made. The feedback received from this effort was used to inform specific elements in the Plan but will also be used as a guide for future program implementation efforts and future EV-related efforts. While the key takeaways listed below do not capture every comment received, they do provide a summary of some of the areas that are critical to make this Plan and program a success in North Dakota.

Benefits of EV Fast Charging Stations

Most of the stakeholders and the public believe there will be several benefits to the results of the EV Infrastructure Plan and installation of DCFCs. They believe that the new infrastructure will provide confidence to travel long distance, will enhance tourism to and from the state, and more access and potential mobility for locals.

Barriers to Infrastructure Deployment

Barriers were discussed when it came to the operations and maintenance of the DCFCs. They voiced concern about high upfront costs and maintaining the stations, especially in cold weather conditions. In addition, stakeholders that represented utility agencies were concerned about the demand on the power grid, especially during peak demand. The state needs to be deliberate and sensible in choosing interchanges and sites, and closely coordinate on sequencing and timing for the deployment.

EV Adoption and Education

A concern that was voiced was that North Dakotans would not care about or use the EV infrastructure. In addition, it was noted that there is a lack of information and education within the community about EVs and charging infrastructure. It was recommended that public education needs to take place about EVs in general and why the DCFCs are needed. It was noted that the state should partner with utilities and other organizations to provide EV benefit education to communities, specifically in rural areas.

Building Partnerships

Stakeholders strongly encouraged the need for comprehensive partnerships with the state, utilities, and other organizations for the EV planning and deployment. It was noted that coordination will be needed for infrastructure siting, including costs and capacity, and potential utility programs to make the federal dollars go farther.

3.4 Survey Results

Out of the 680 participants in the online meeting, a total of 355 responded to the survey. Survey respondents were generally white (76%) predominantly male (57%), and between the ages of 26 and 49 (57%). Most of the survey respondents did not currently own an EV (87%), and 37% of which would not consider owning/leasing an EV in the future. Of respondents who did own an EV, a challenge they experience when charging their vehicle was inconvenient charging locations (41%) and the charging takes too long (21%).

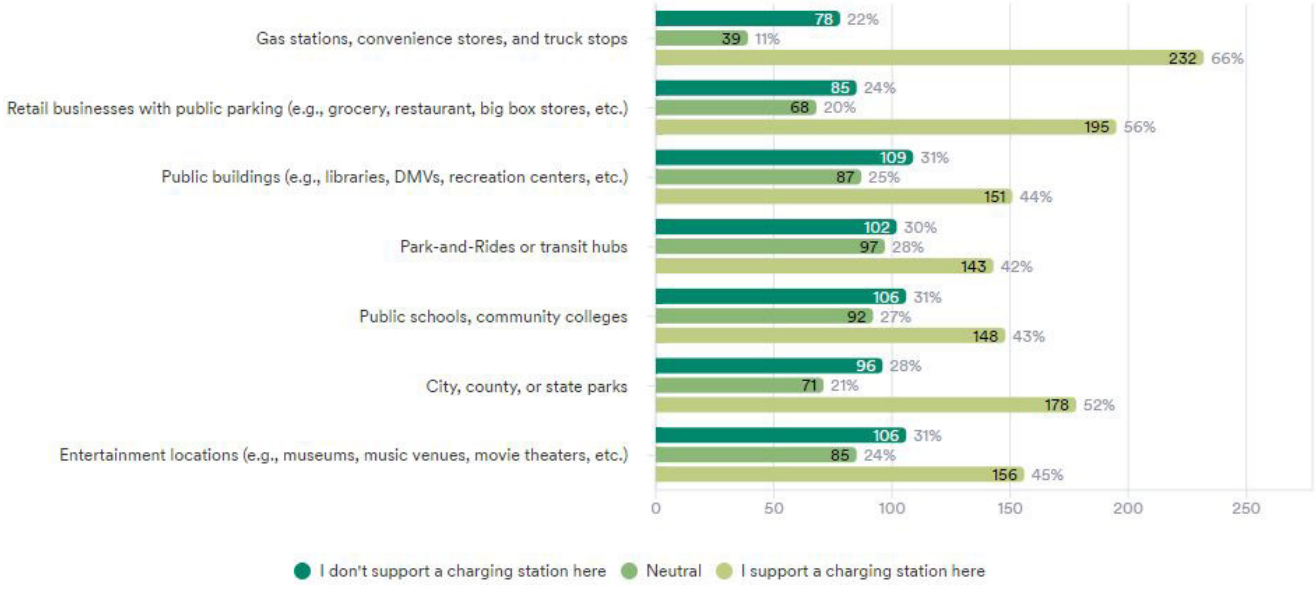
One of the survey questions asked about considerations that NDDOT should be thinking about when determining the locations of the fast-charging stations. Responders were asked to rank the considerations in order of priority. The following are the top priorities, as well as other options to consider.

Top 3	Other
• Addressing gaps in the existing charging network • Rural areas • Small towns and cities	• Parking garages • Chargers at gas stations • Safe areas to charge • Near parks

Survey responders were asked their preference on what NDDOT's focus should be for deploying the EV charging stations between supporting long-distance travel and supporting local travel. 58% of respondents indicated their preference would be to focus on long-distance travel across North Dakota.

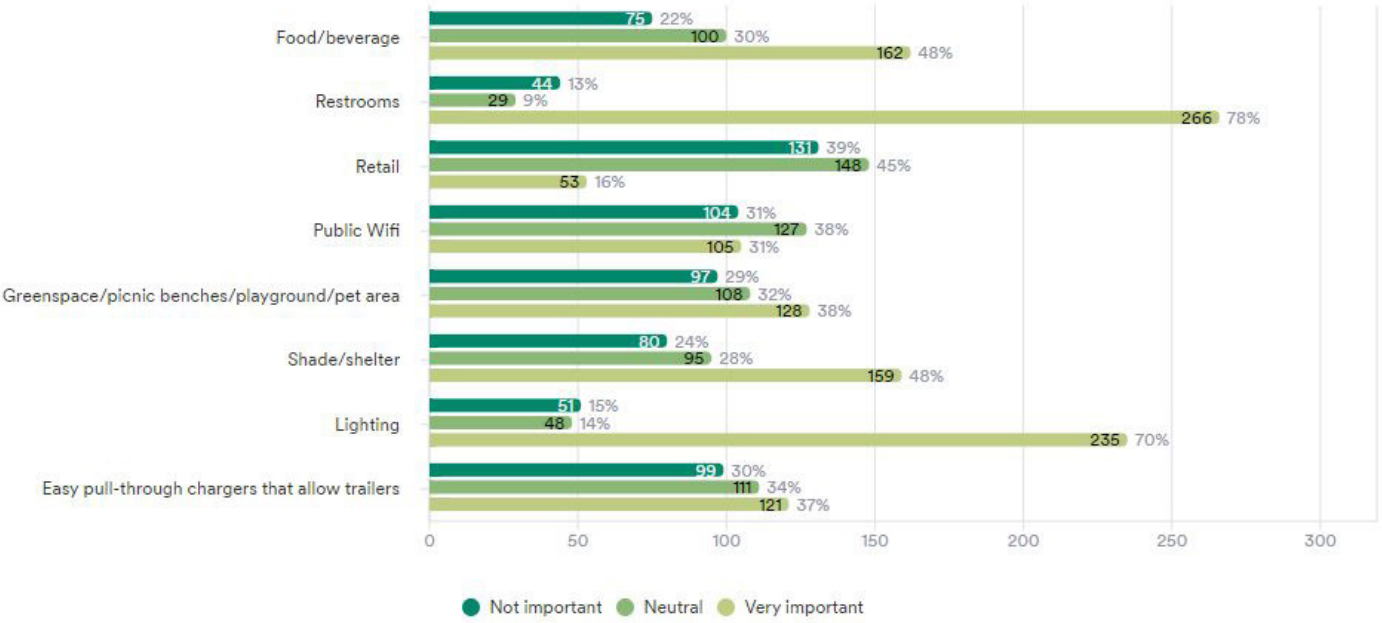
A survey question asked responders to consider their level of support for fast charging stations at specific destinations on a scale of supporting and not supporting. The highest support was shown for gas stations, convenience stores, and truck stops. Below are the results.

Figure 3.1: Responses to location preferences



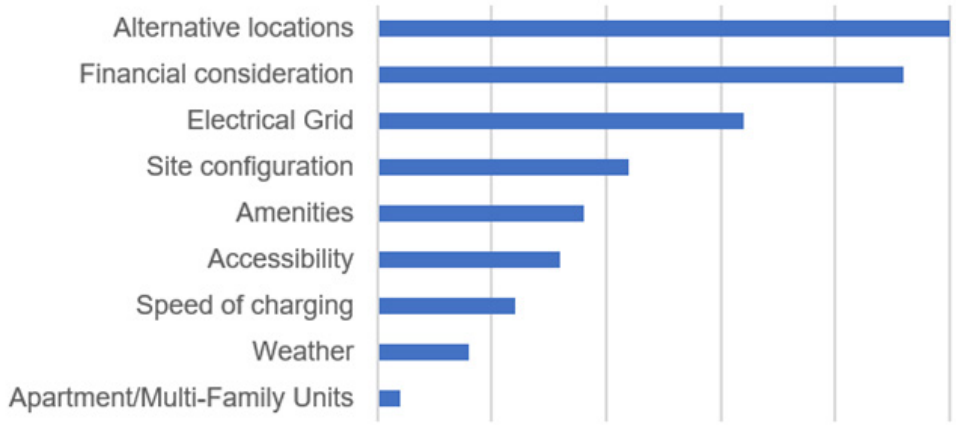
Responders were also asked the importance of specific amenities at EV charging stations on a scale from important to not important. The highest important amenities were restrooms and lighting. Below are the results.

Figure 3.2: Responses to amenity preferences



Responders were asked if there were additional suggestions for how NDDOT should prioritize future charging station locations and amenities. Comments were analyzed and categorized below.

Figure 3.3: Placeholder Title



3.5 Community Analysis

The engagement process started with a community analysis – informed using publicly available market research data – providing an overview of the residents, businesses, and perceptions across the North Dakota Department of Transportation (NDDOT). This information was used to help understand community socio-demographics, perceptions, and beliefs at the district level to inform the EV Infrastructure Plan.

North Dakota's transportation system is divided into eight Districts:

- Bismarck
- Valley City
- Devils Lake
- Minot
- Dickinson
- Grand Forks
- Williston
- Fargo

Key demographic, socioeconomic traits, employment, and perceptions across the eight districts of North Dakota are outlined below. The State of North Dakota was used as a statistical benchmark for comparing reported values across the eight districts. Insights obtained from analyzing demographic and socioeconomics of the community will inform the development of the North Dakota EV Plan and can be used by NDDOT in the future to help customize communication methods when implementing EV infrastructure deployment.

To develop a holistic and inclusive EV Plan, metrics that indicate potentially vulnerable or disadvantaged populations are included in this assessment and analyzed at the district level. The following analysis examines 12 social equity themes under the umbrella of socioeconomic, demographic, and community health categories:

- Income
- Employment
- Education
- Housing
- Transportation
- Internet/computer access
- Civic engagement
- Crime
- Disability
- Seniors
- Race/ethnicity
- Language

3.6 Engagement Meetings and Tools

The following meetings and tools were used to educate the stakeholders and the public about the plan and provide opportunities for input. The outreach approach incorporated digital engagement opportunities while being mindful to those who might not be technologically savvy. To build project awareness and promote the opportunities for public engagement, social media posts, press releases, and eblasts were distributed to NDDOT's followers and contacts.

Due to the rural nature of North Dakota, the ability to hold in-person events that are accessible to all Justice40 communities is difficult. NDDOT conducted digital outreach to all communities within North Dakota, with respondents from J40 communities included. The EV Tailgate event hosted by NDDOT was located approximately 1,000 feet from Bismarck's Justice40 community boundary, which invited community members to come see EV technology and provide insight into the planning process.

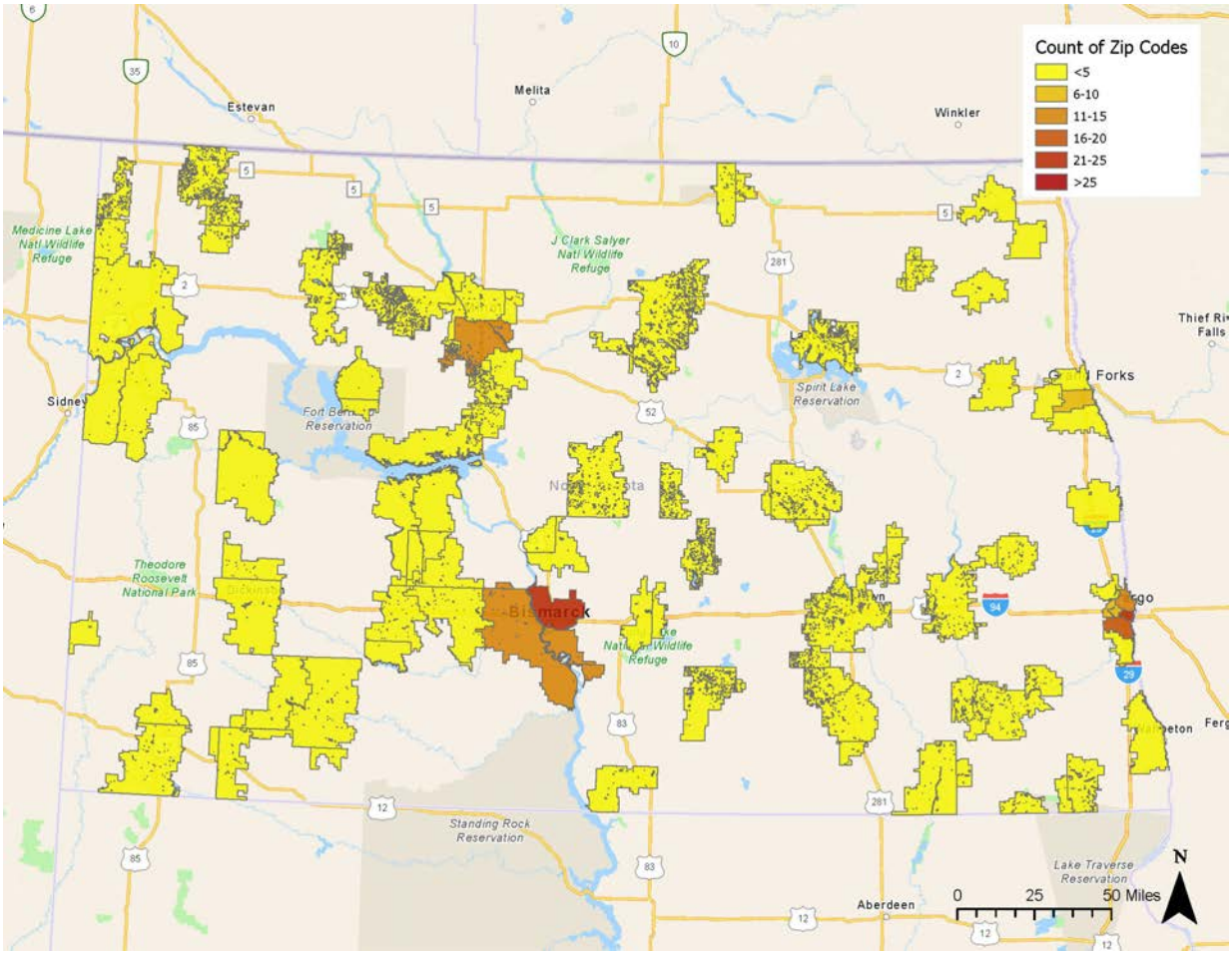
Virtual Public Meetings

NDDOT hosted a self-guided, on-demand virtual public meeting that the public was able to participate anytime between June 27 and July 18. Topics of the meeting included:

- About the EV Infrastructure Plan
- Results of the plan
- Types of EV chargers
- EV Chargers in North Dakota
- Federal Requirements for Funding
- Public survey to inform the potential locations and amenities of EV fast charging stations around the state

The survey respondents were well distributed across the state of North Dakota as seen in Figure 3.4.

Figure 3.4: Distribution of Survey Respondents



EV Tailgate

NDDOT had a booth at the North Dakota EV Tailgate event on June 29, 2022. Materials provided included a fact sheet, printed survey with the same questions as the online meeting, project overview board, and public input board. More than 200 people attended the event and 38 people provided input through the use of a dot map.

Stakeholder Interviews

A series of five stakeholder interviews were held to collect one-on-one input from key stakeholders, including the Association of Counties, Department of Commerce, League of Cities, North Dakota Association of Rural Electric Cooperatives, and Utility Shareholders of North Dakota.

Results

Below are some of the key takeaways from the stakeholder interviews:

- There is an overall lack of knowledge about EVs and EV charging infrastructure.
- Need to focus on marketing what you're trying to accomplish – many people think that the gas prices are high to push the EV agenda
- The EV infrastructure will bring more people, more recognition, more commerce.
- Stakeholders want to stay involved in the planning and implementation.
- Need to identify if the electrical infrastructure is there to support the new DCFCs.
- The new chargers might be a loss for a while given most people are charging at home.

Stakeholder Group Meetings

Three larger group stakeholder meetings were held to educate government/tribal agencies, utilities, and EV/sustainability organizations about the EV Infrastructure Plan and gather input to help inform the plan development. Below are the highlights of each meeting.

Governmental/Tribal Agencies

Key Takeaways

- Low gas prices, longer EV range, shorter charging time, cheaper EV models = increase demand for EVs
- Benefits: low noise pollution, tourism to and from the state, increase in zero-emission vehicles, more access and potential mobility for locals
- Concern from stakeholders: high upfront costs, putting eggs in one basket, most people won't care, ND is slow at adopting technology, enforcing equity will be challenging

Utility Agencies

Key Takeaways

- Concern around demand on the grid, especially peak demand
- Will need to be deliberate/sensible in choosing interchanges and sites
- Coordination needed for infrastructure siting (costs, capacity) and potential utility programs to make the federal dollars go farther
- Work through the specifics of any site with the utilities serving in each area
- Close coordination on sequencing and timing for this roll out
- Partner with utilities to provide EV benefit education for rural communities
- Opportunity for a comprehensive partnership with state and utilities for planning and outreach/education

EV/Sustainability Organizations

Key Takeaways

- EVs are more attractive because: affordable, future technology, zero emissions, fast chargers can provide more range
- Charger benefits: confidence to travel, enhance tourism, better access to chargers
- Barriers: maintenance, acceptance of EVs in ND, lack of info and education, indigenous communities aren't within corridor locations
- Expect a divided response – some people may view as a benefit, some as indifferent, some as a waste of money.

Translating Engagement to Plan Development

Both stakeholder and public comments informed several facets of the plan, including the selection of candidate locations, desirable amenities, and the development of candidate charging station layouts. In addition, the information provided will be valuable in the implementation phase as engagement continues and as the specifics of stations and charging amenities are fully designed and developed.

Engagement Next Steps

NDDOT anticipates that engagement will continue past this initial planning phase and into the implementation phase, as charger locations and amenities become more defined. Engagement will likely be locally-focused to allow each community hosting a charger to better understand the plan, the infrastructure, and electric vehicles as a whole. In addition, engagement will be needed with each agency involved in permitting, as the implementation phase is active.

4: PLAN VISION AND GOALS

4.1 Overview

The North Dakota EVIP vision and goals were developed first by reviewing the Joint Office of Energy and Transportation's NEVI Formula Program objectives and criteria for funding the build-out of a nationwide EV charging network. Second, the team conducted a review of the NDDOT's 2021 Long Range Transportation Plan (LRTP) which delineates the state's transportation goals, objectives, and guiding principles for the future[1] and the agency's Strategic Focus Areas and Goals.[2]

The North Dakota EVIP goals below are drawn from and aligned with both of the documents referenced above to work in tandem with the state's top priorities while addressing the growing national demand for EV charging infrastructure and forthcoming federal support under the NEVI Formula Program and Discretionary Grant Program for Charging and Fueling Infrastructure. **Table 4.1** presents the proposed EVIP goals and how they align with the state's LRTP goals, focus areas, and guiding vision.

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4.1 Overview

4.2 North Dakota's EVIP Vision

4.3 NEVI Formula Funding Sources

4.4 NEVI Formula Funding Uses

4.5 NEVI 5-Year Program Targets

4.6 Plan Updates

4.2 North Dakota's EVIP Vision

A reliable, safe, accessible, and resilient transportation system which interconnects to the nationwide electric vehicle network, and improves the quality of life for ND citizens and the traveling public, while promoting economic development.

Table 4.1: North Dakota EVIP Goals

North Dakota EVIP Goals		LRTP Goals	Strategic Focus Areas
Goal 1:	A complete build-out of existing alternative fuel corridors by 2026.	3, 4	3, 4
Goal 2:	Maximize available federal funds to create an interconnected fast-charging system that supports regional, national, and international travel.	3, 4, 5	2, 3, 4
Goal 3:	A comprehensive system that helps provide the traveling public with safe, convenient access to a variety of transportation and energy options.	1, 4	2, 3, 4
Goal 4:	Establish, to the extent feasible, public-private partnerships (P3s) for the installation and operation of EV charging infrastructure.	2, 5	2, 3, 5

1 https://www.dot.nd.gov/projects/lrtp/
2 https://www.dot.nd.gov/divisions/exec/docs/2020-strategic-focus-areas.pdf

North Dakota LRTP Goals

1. **Keeping you safe:** Safety is reflected in everything we do.
   - We are continually innovating and improving what we do to make sure you are safe and secure whether driving, biking, or walking.
2. **Caring for what we have:** Fixing what we have is our priority.
   - We are maintaining our existing infrastructure in good condition to save money down the road, and we are addressing risks to keep that system working for you.
3. **Connecting North Dakota:** Transportation matters.
   - We are leveraging transportation investments to enhance economic competitiveness and improve the quality of life in communities across the state.
4. **Helping you get there:** Transportation should be easy.
   - We are helping make it more convenient for you to get where you want to go by improving data and information, travel choices and options, and operations and maintenance.
5. **Investing in the future:** We work for you.
   - We are making smart investments in how we deliver services and are looking for responsible ways to fund our transportation system well into the future.

North Dakota LRTP Strategic Focus Areas

1. **Safety:** Provide a safe and secure transportation system and workplace.
2. **Innovation:** Promote a culture of innovation to enhance external and internal services, products, and programs.
3. **Assets:** Preserve and enhance assets managed by NDDOT.
4. **Mobility:** NDDOT works to improve access to our transportation system through multimodal solutions to enhance the movement of people and goods, having a positive impact on the quality of life and economic well-being of North Dakotans.
5. **Leadership:** We strive to position NDDOT as a local, state, and nationally trusted leader. We value service, excellence, and diversity, instilling a culture of leadership, which expands the problem-solving capacity of our organization.

4.3 NEVI Formula Funding Sources

NDDOT will receive approximately $25.95 million (M) in NEVI formula funds over the 5-year period from federal fiscal year (FY) 2022 to FY 2026, as indicated in **Table 4.2**. The minimum 20 percent nonfederal match required to secure that funding is $6.49M, for a minimum total 5-year program amount of $32.44M. If a larger nonfederal match, such as private funding, can be secured, that amount could increase.

Table 4.2: NEVI Formula Funds and Matching Funds (Millions)

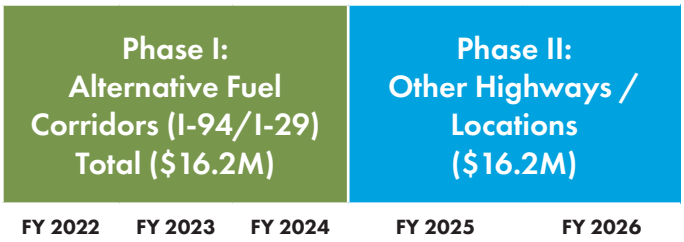
Federal Fiscal Year	Forecasted NEVI Funds	Local Match Funds	Total Funds
FY 2022	$3,841,252	$960,313	$4,801,565
FY 2023	$5,527,808	$1,381,952	$6,909,760
FY 2024	$5,527,808	$1,381,952	$6,909,760
FY 2025	$5,527,808	$1,381,952	$6,909,760
FY 2026	$5,527,808	$1,381,952	$6,909,760
TOTAL	**$ 25,952,484**	**$6,488,121**	**$32,440,605**

4.4 NEVI Formula Funding Uses

An analysis was conducted to determine the cost to fully build out both AFCs (the AFC network is discussed in detail in **Section 6**) to NEVI compliance. The cost estimate was based on the estimated number of NEVI-compliant stations (18 estimated, see **Section 7**) and per-unit cost of $0.9M per station. The station cost is intended for planning purposes and includes the full cost of chargers, utility service, transformer, and labor. Amenitites to be considered would include wifi, lighting, and security cameras. Sites are anticipated to be co-located in areas with existing amenities such as retail, food, and restrooms. Some variation in these costs is anticipated, depending on location, utility upgrades, and sitework. These assumptions will be revisited and updated throughout the planning and implementation process. Ongoing operations and maintenance of each site will be a requirement of the contracting, and will follow the requirements provided by the Joint Office and FHWA for the required period of five years from date of operation.

Based on these values and the required charging density, it is estimated that North Dakota can deploy the NEVI chargers on both Interstates (all AFCs) mid-way through FY 2024 funds (see **Figure 6.5**). NDDOT will pursue certification of full build-out of both AFCs when completed with FY 2024 funds from the Secretary of the U.S. DOT. This will require that the U.S. DOT certify that the AFCs are NEVI-compliant except where a specific documented exemption has been granted.

Figure 4.1: Program Phases by Funding Year



Total ($32.44M)

Federal $25.95M
Nonfederal match $6.49M

When both AFCs are certified as fully built-out to NEVI compliance, the remaining funds from FY 2024 through FY 2026 will be used to deploy charging infrastructure across the state.

4.5 NEVI 5-Year Program Targets

In accordance with the NEVI Guidance, NDDOT has identified quantitative outcome-based targets for the next 5 years.

Phase I 5-Year Program Target: North Dakota will build out the two existing AFCs (I-29 and I-94) to full NEVI compliance by 2026.

Phase II 5-Year Program Target: NDDOT intends to locate a DCFC station within 75 miles of all Justice40 communities and a DCFC station within 100 miles of every resident in North Dakota. NDDOT also inends to place a charger within every Native American Reservation, as long as permission is granted through their Tribal Councils, by the end of Phase II.

4.6 Plan Updates

This plan will guide the use of NEVI Formula funds for FY 2022 and FY 2023. NDDOT will update this plan for FY 2023 if necessary to provide an updated guide for the complete build-out of interstate corridors (Phase I). This plan will be updated in FY 2024 to guide the use of NEVI formula funds in Phase II, which will provide electric vehicle infrastructure in other locations throughout the state.

Future updates will provide an opportunity to adjust the plan based on new information, ongoing stakeholder input, and lessons learned. These updates will also provide a scheduled opportunity for information sharing with other states and the Joint Office.

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5: CONTRACTING

5.1 Overview

The North Dakota DOT intends to partner with one or more experienced third parties to design, to build, and to provide operations and maintenance services for North Dakota's EV infrastructure. NDDOT would prefer to enter into agreements with third party businesses to provide operation and maintenance of charging infrastructure and sites, and ultimately if allowable, to delegate ownership to those same parties. NDDOT will select partners who have the proper expertise and experience, can effectively deploy the resources in a manner that maximizes and leverages the federal funding, and who understand North Dakota's priorities. NDDOT will select a contracting mechanism that will help ensure that the selected partners(s) can realistically deploy charging infrastructure that will enable us to meet the goals and timeframe in our plan.

SECTIONS

5.1 Overview

5.2 Traditional Delivery and Grants

5.3 Alternative Delivery Methods

5.4 Contracting Process

5.2 Traditional Delivery and Grants

North Dakota will use priority EV charging corridors already identified, or pending, to determine primary location corridors. Within that framework, the Department will need to consider some basic components regardless of the contracting method:

- Identify chargers already in the corridor(s) to determine optimum placement for additional chargers
- Identify priority areas, such as low income or rural communities, that do not have adequate charging capacity
- Assess options for contractor(s) needed to deliver the system –for example, one contactor per corridor, or one statewide
- Assess the state's legal and procurement framework in the context of EV charging
- Consider legislative changes if necessary to optimize delivery

Primary Goals

- Maximize leverage of federal dollars while still following all requirements
- Select a contracting partner who understands and is fully committed to NDDOT's goals
- Make sure the contracting method is permissible under North Dakota law and that all requirements can be met
- Have a choice of proposers with proven knowledge and experience in the EV infrastructure space
- Guarantee that operations and maintenance can be handled by an experienced contract partner and will not be the responsibility of NDDOT
- Ultimately, provide for a smooth ownership transition to a private owner(s) and operator(s)
- Provide opportunity for small businesses to be engaged

Traditional Design-Bid-Build Contracting Approach

The North Dakota Department of Transportation typically uses Design-Bid-Build for its infrastructure projects. Using that framework for EV charging might take several different forms.

A traditional Design-Bid-Build approach would likely involve three separate steps. Although DBB is normally a low bid process driven primarily by price, it is possible to set a high bar for experience and qualifications that would guarantee a level of EV charging expertise for a winning proposer.

Depending on NDDOT's procurement limitations, a basic DBB approach would follow steps approximately as follows:

- **Procure design services.** A determination would need to be made regarding scope – statewide, for multiple identified corridors, or individual designers for each corridor.
- **Procure construction/installation services upon design completion.** Similar determinations would need to be made regarding number of contractors and scope for each. If North Dakota law permits, It may be possible for firm(s) that successfully bid on the design phase to also bid on construction/installation.
- **Procure O&M services.** Similar considerations (all chargers or per corridor/region) would need to be made for O&M. The term of the O&M could be through the remainder of the five-year timeframe envisioned in the IIJA, or possibly less. Depending on North Dakota law, it may be possible for the successful bidders on design and/or construction to also bid on the O&M.
- **Long term ownership.** It may be possible that the O&M contract(s) could include an option to take on permanent ownership at the DOT's discretion. The entity could take on permanent ownership upon successful completion of a set period of operations and maintenance with NDDOT's approval. This option would have to be in conformance with North Dakota law.

EV Charging As-A-Service Approach

NDDOT is working to determine if procuring all phases of EV charging services under a single service contract is permissable under both state and federal law. Under the "Charging as a Service" approach, NDDOT would avoid ownership of infrastructure and contract for a third party to provide public charging services that meet the federal and state requirements for the five year period identified in the NEVI Formula Program guidance. The approach is essentially a service contract similar to municipal bikeshare program, where a private third party deploys infrastructure and assets with the end result as the service provided to the consumer.

The State would put out an RFP seeking electric vehicle charging services for one or more corridors, or across the state. The services would include designing, building and operating EV charging services on the state's behalf using parameters described in the RFP.

The state could make the selections qualifications-based, or it could be a combination of qualifications and price.The state could use a bidder's qualifications as a potential owner as part of the procurement evaluation.

The viability of this approach under state and federal law needs to be determined.

Grant Approach

Rather than procure the contractors and manage all of the work themselves, the DOT could instead award one or more grants to other entities to take on that role.

The DOT would establish the goals and objectives for the EV program based on the federal requirements and release a notice of funding opportunity for one or more entities to procure design, construction and O&M for a statewide EV charging network, or one or more corridors or regions within the state. The selected grantee(s) would develop the procurement(s), make the award(s), and oversee the design, installation and O&M.

The specifics of the delivery method would have to be determined. As long as the state's legislative authority allowed it, anything from a DBB to a full DBFOM could potentially be the delivery method. It is an open question whether the grantee might be able to procure using a delivery method, like a Public Private Partnership (P3), even if the state DOT cannot. A legislative change to allow a P3 would be an option if NDDOT chooses to pursue it.

Regardless of the delivery method, the grantee(s) would provide oversight for the design, construction and O&M of the system.

Grantees could be other public entities such as COGs and MPOs, counties, municipalities or public authorities. Nonprofits could also be potential candidates, especially those with a mission to promote EVs or other mobility or infrastructure elements.

The grant opportunity notice would also need to establish the state's parameters for the eventual private ownership of the system. The grantee could then manage the ownership transfer process on behalf of the owner (DOT) as part of their grant agreement.

While the grant option would transfer much of the actual project management to other entities, the DOT would still be responsible for writing the funding opportunity notice, selecting the grantee(s), determining that the grantee(s) approach was in accordance with state and federal requirements, ensuring compliance with the grant throughout the term, ensuring data and information reporting is conducted according to FHWA standards, and ensuring the ultimate asset transfer was in compliance with state and federal law.

There is one additional consideration for the grant approach, and that is whether it could be used to make an award to a private grantee who would do the design, installation and O&M. If it were possible, the language outlining eligibility for the grant would be very similar to the language that would be in a P3 procurement, with expected outcomes for the design, construction, and operations and maintain components, and potentially outlining criteria for the grantee to be the eventual owner. Whether this "private grantee" approach could be used under state law needs to be determined.

5.3 Alternative Delivery Methods

Like most types of infrastructure, EV charging infrastructure can be delivered using a variety of contracting and delivery methods. In fact, it is possible that different portions of the program could be built using different contracting structures, depending on the risks and opportunities associated with a given segment. The key question is whether the North Dakota Legislature will be supportive of allowing alternative delivery for this project.

The public owner and private partner share the risk and control to varying degrees, depending on the contracting methodology. All contracting methods have pros and cons, and all present some challenges to the public owner.

Key goals for a P3 will include the following:

- Maximize leverage of federal dollars while following all federal requirements.
- Select a contracting partner who understands, and is fully committed to, NDDOT's stakeholder outreach, community interaction, equity commitments, and small business development goals.
- Select a contracting method that would attract multiple proposers with proven knowledge and experience in the development and implementation of EVSE and supporting infrastructure.
- Minimize NDDOT staff time during design and construction while still having robust oversight to guarantee performance.
- Arrange for operations and maintenance (O&M) and charge/energy management services to be handled by experienced contract partners and to not be the responsibility of NDDOT.
- Arrange for contract partners to own the EVSE, supporting infrastructure, station sites, and site improvements.
- Deliver the project per the requirements of NEVI Guidance and the state of North Dakota.
- Facilitate the continual upgrade of technology (both hardware and software) to leverage the latest technologies and improvements in charging speed and efficiency.
- Provide for smooth ownership transition at the appropriate time to private owner and operator.
- Engage with local communities where charging infrastructure will be built.
- Engage with small businesses and disadvantaged businesses to build out the infrastructure.

EV infrastructure projects involve advanced technology (hardware and software) and technology integration, as well as comprehensive service requirements to maintain EVSE availability, manage energy costs, and automate charging and fare collection, etc. Therefore, while different methods for EVSE design, construction, procurement, and installation may be considered, NDDOT is currently planning to rely on a qualified third-party vendor to provide ongoing O&M services of the EVSE, procure the software necessary to operate EVSE and monitor system performance, and utilize charge management software to help manage charging costs and revenues. Any contracts for these services should include robust performance requirements that incentivize best practices to ensure long-term system reliability and performance.

The delivery methods recommended for further consideration are listed below (note that this list is not exhaustive, as other options not listed, or variations of those listed, may also be considered):

Design-Build-Operate-Maintain (DBOM)

With this method, the owner, NDDOT, would contract with a single provider to fully design and construct the project. The provider would then assume operations and maintenance of the system after commissioning for a contracted term. The single provider can steer design and construction in a way that maximizes the efficiency of the project life-cycle, but NDDOT would have limited input into the design process. The medium-term operations and maintenance would be built into the contract, which would relieve that burden from NDDOT. However, NDDOT would need to continue to manage the contract with the provider (although many owners hire an owner's representative or general engineering consultant [GEC] to manage the contract). Ultimate ownership would transfer under the terms of the contract.

NDDOT may want to consider the separation of design-build (DB) and O&M/charge management contracts. Separate contracts may be required to attract the highest quality bidders for each discipline if enough contractors/consortiums are not deemed to be available in the market that are both willing to provide these combined services and/or able to demonstrate a successful record of accomplishment providing these combined services.

Traditional Design-Build-Finance-Operate-Maintain (DBFOM)

This method is synonymous with a P3. NDDOT, the owner, would award a single contract with a provider who would complete the full range of design-build services, as well as O&M and charge management, for a defined period. In addition, in this method, the provider is also responsible for identifying and, at least in part, providing the private capital or financing to design and construct the project. One of the challenges of this method is that contract negotiations can be complex and NDDOT would need to manage this complicated, multi-faceted contract throughout the life of the project (although many owners hire an owner's rep or GEC to manage the contract). At the conclusion, ownership would transfer under the terms of the contract.

EV DBFOM (developed for this project)

The unique aspects of EV charging also provide the opportunity for an alternative delivery model tailored more specifically to the reality of establishing an EV system. There are at least two potential ways to approach this effort.

1. **Master Developer:** Under a DBFOM umbrella, it would be possible for the DBFOM developer to segment the project by corridor or geographic area and serve as a "master developer," managing multiple smaller design-build projects. Each small contractor could be responsible for operations and maintenance, or O&M could revert to the master developer. The DBFOM developer would retain responsibility for the overall financial approach. NDDOT would contract with the developer, and the developer would own the system at the conclusion of the contract. Issues such as long-term management would rest with the master developer, who could decide to manage, lease, or sell various segments of the overall project at their discretion. NDDOT could potentially set certain requirements as part of the ownership transfer that the developer would need to pass along to the smaller owners.

2. **Franchise Operator:** This approach would result in the developer serving as more of a franchise operator, securing final plans and bids from contractors to design, install, operate, maintain, and own stations within corridors or geographic areas. Because the contractors would be managing smaller areas, they could focus on the cost and revenue options as they differed in various locations and would bid accordingly. Rural charging corridors, for example, might need to provide subsidies, while urban charging corridors or locations in truck stops might generate revenues. Priority and more generous terms could be given to those who bid on rural franchises or franchises in underserved communities. The system could be similar to how McDonald's or other large franchises work, with a manager that controls the agreement and sets certain standards for operations, but where the individual franchise owners can operate their franchise and earn and keep the revenue if they meet the conditions of their franchise agreement. The DBFOM developer, serving as the franchise operator, would be responsible for managing the overall system and developing the agreements, including financial agreements, with the smaller franchisees. Once the franchise operator took on the ownership of the larger franchise, NDDOT would no longer have responsibility for the charging system and would have no relationship with the franchisees.

Progressive P3

A variation of the DBOM or DBFOM models is the Progressive P3, which combines the efficiency of design-build with a process that allows owners greater input into a project's design and offers greater price certainty. Following the selection of a design-builder through a qualifications-based selection, the design-builder advances the project's design in a collaborative process with the owner, typically via a Pre-Development Agreement (PDA). Thereafter, the construction price, or guaranteed maximum price (GMP) is negotiated based on the design-builder's progressive design, providing certainty to many of the variables that result in changes and increased costs on a conventional design-build project.

Construction Management at Risk (CMAR) with a Separate O&M/ Charge Management Services Contract

Similar to a Progressive P3 model, this method allows a contractor to become involved earlier in the design/development process to collaborate with NDDOT on the project design and early works projects, such as obtaining necessary permits and right-of-way. However, the design is conducted via a separate contract rather than under a design-build arrangement as is the case with Progressive P3. This method would give NDDOT and the contractor the ability to optimize the construction schedule to fully account for the risks and constraints determined early in the process. The parties would then engage in open-book negotiations that would permit NDDOT to review the cost buildup of the GMP.

This method would allow NDDOT to have more direct oversight of the design and to work through issues that would otherwise increase costs.

Build-to-Suit (BTS)

This model is a type of real estate transaction whereby a developer would construct a building (or in this case EV infrastructure) to the state's specifications and lease the infrastructure back to the state for a 10- to 20-year period. The infrastructure can be constructed on private or public land. This type of arrangement, which is more typical for commercial real-estate transactions, may allow for an expedited development process by statute compared to a P3. In addition, the state would not have to make lease payments until the infrastructure is built and available for service. North Dakota statutes would need to be amended to permit this type of contracting mechanism.

5.4 Contracting Process

Building an EV-charging network in North Dakota will be a challenging undertaking. To minimize the risk and maximize the value of lessons learned from around the country, the state plans to engage in a careful process to finalize a delivery method and procure the right private partner(s). The anticipated implementation of the program (discussed in Chapter 8) will be informed by this process. In addition, many of the NEVI guidance requirements, such as operations, maintenance, data sharing, and reporting, will be incorporated into the requirements of the contracting mechanism identified in this process.

1. **Finalize the project concept design and cost estimates:** NDDOT will complete its analysis of the potential future EV infrastructure needs in North Dakota to identify the DCFC station characteristics (desired capacity, efficiency, speeds, etc.), general locations, costs (capital and operating), and phasing before conducting a detailed delivery option/contracting analysis. Once a plan is in place to develop the EV infrastructure over time, the exercises listed below to determine the appropriate delivery method(s) can commence.

2. **Talk to industry:** It is common in alternative delivery and P3 to engage potential bidders in a structured manner before procurement is even underway, exploring industry interest and gaining insight into what might work (or not work) for potential private partners. Public agencies need to understand what their industry partners are interested in, and why, as well as what partners may be reluctant to agree to. The state's procurement rules will be strictly adhered to.

   It is anticipated that NDDOT could host a round-robin workshop with interested providers. During the workshop, NDDOT would describe the project and receive feedback on the level of interest and potential roadblocks. This process would inform the development of a Request for Proposal (RFP) to maximize the potential that NDDOT would receive enough competitive responses from qualified teams to meet the goals of the project and the contract mechanism.

3. **Finalize the right contracting option:**
   - **Risk workshops:** Through one or more structured workshops, NDDOT would refine their key priorities, identify potential risks, and walk though how effectively the selected method(s) could help meet their goals while minimizing risk. These workshops could help the agency understand how to modify their development and procurement approach if needed.

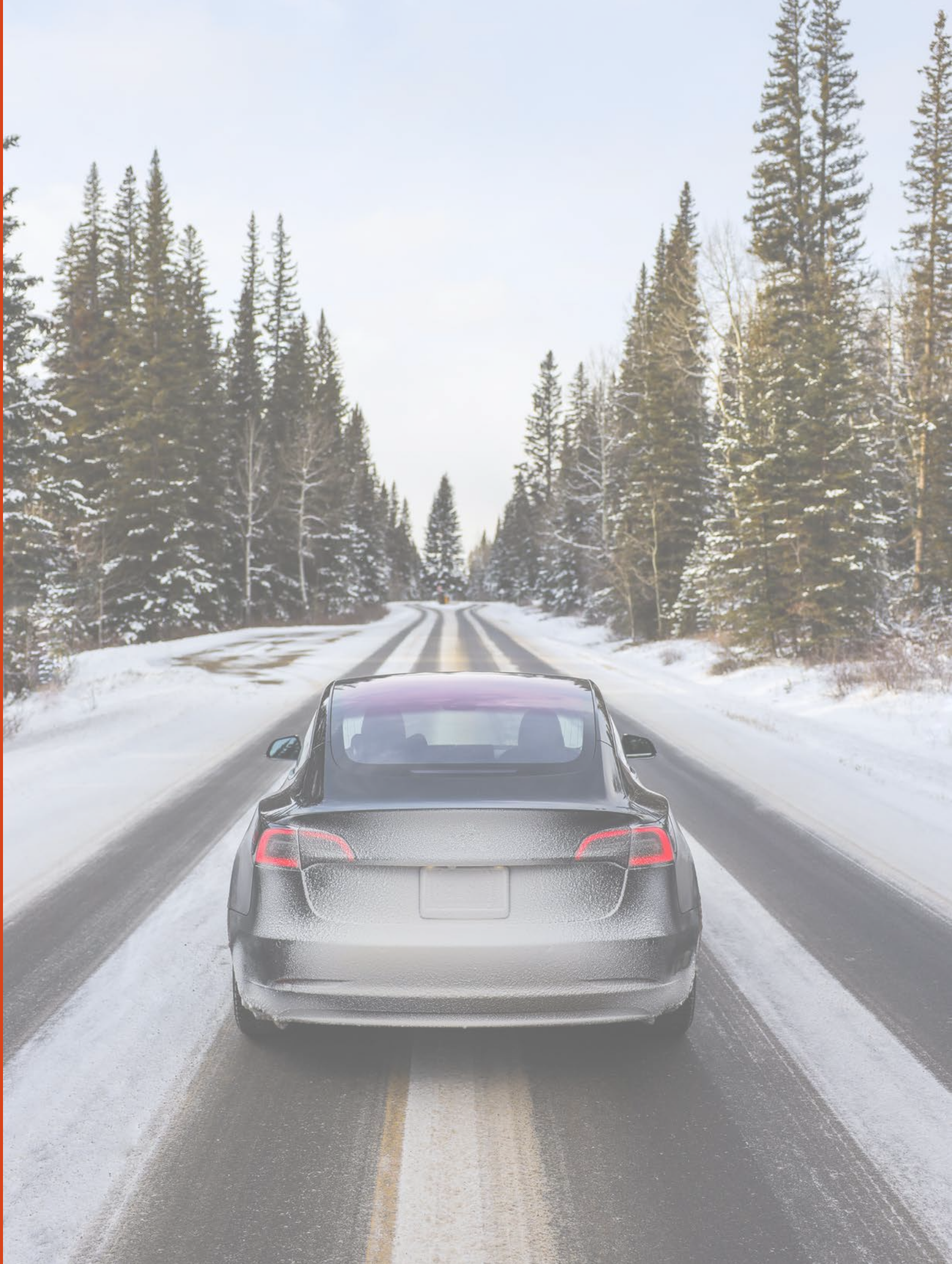
- **Funding/financing analysis:** An analysis is required to determine the funding available for the project (including grant funding) and the potential need for financing. This assessment would determine the extent to which the delivery options should include a financing component.
- **Look at other projects:** Alternative delivery options such as DBOM and P3 now have a robust history in North America. Looking at what has, and has not, worked elsewhere will help NDDOT make the best decision.
- **Develop a schedule:** This process should include the development of a working schedule for assessment and finalization of the contracting approach, development of the procurement documents, award, and negotiations.
- **Identify up to three preferred contracting options for further analysis:** Based on the tasks listed above, narrow down the viable contracting options (three maximum) to be subjected to further, more detailed analysis.

4. **Verify legal authority:** NDDOT cannot engage in P3s at this time and will need to gain legislative approval to do so for this project.
5. **Conduct value-for-money (VFM) analysis:** After the previous steps have been completed, it is recommended that NDDOT perform a final analysis that evaluates, on a qualitative and quantitative basis, the options considered in step #2 listed above. This report will justify the preferred option based on the ability of the delivery option to meet NDDOT project delivery objectives, the alignment of the option's risk allocation with NDDOT's risk profile, and the net present value (NPV) of the option versus other alternatives.
6. **Develop procurement documents:** A complex procurement, especially if it contemplates a hand off to another owner at the end of a term, will need to be carefully constructed for NDDOT to approve and move forward. Procurement documents for RFPs such as this are lengthy and complex, and they often seek specific requirements from proposers. In this instance, taking the necessary steps to obtain a pool of bidders with the appropriate level of qualifications and experience is critical. Professional advisors, potentially including outside legal, technical, and financial advisors, will be utilized to guide NDDOT through the process.
7. **Evaluate proposals:** Proposals are likely to be long and technically complex. The agency will need support to establish procedures to impartially evaluate multiple proposals. The integrity of the process needs to be a priority. Specialists in various technical disciplines, and in finance and funding, may be needed to provide input to the evaluation team. Final negotiations may need to be part of the process of finalizing a selection.
8. **Use professional advisors:** Few public agencies have all the resources necessary for large and complex procurements, which will be particularly true in this case—a type of project that NDDOT has not done before. NDDOT anticipates technical, legal, and financial assistance will be needed throughout the process.

Next Steps

NDDOT is in the process of reviewing state laws to determine which contracting mechanisms are currently permissible and which will need legilsation passed to be considered. NDDOT would rather avoid owning the infrastructure, and is exploring the following mechanisms for program implementation:

- Charging as a Service
- Grant Program
- EV DBFOM
- Build to Suit



6: EXISTING AND FUTURE CONDITIONS ANALYSIS

6.1 Overview

This section addresses existing conditions, including characteristics such as climate and terrain, the transportation network and function, and EV infrastructure and adoption rates.

6.2 State Geography, Terrain, Climate, and Land Use Patterns

North Dakota's Geography Profile

North Dakota is a landlocked state connecting to a broader national network of Interstate, U.S., and State Highways, as shown in **Figure 6.1**. North Dakota borders Minnesota to the east, South Dakota to the south, Montana to the west, and the Canadian provinces of Saskatchewan and Manitoba to the north. North Dakota's total area is 70,704 square miles which ranks 19th among U.S. states.[1]

SECTIONS

6.1 Overview

6.2 State Geography, Terrain, Climate, and Land Use Patterns

6.3 State Travel Patterns, Public Transportation Needs, and Freight and Supply Chain Needs

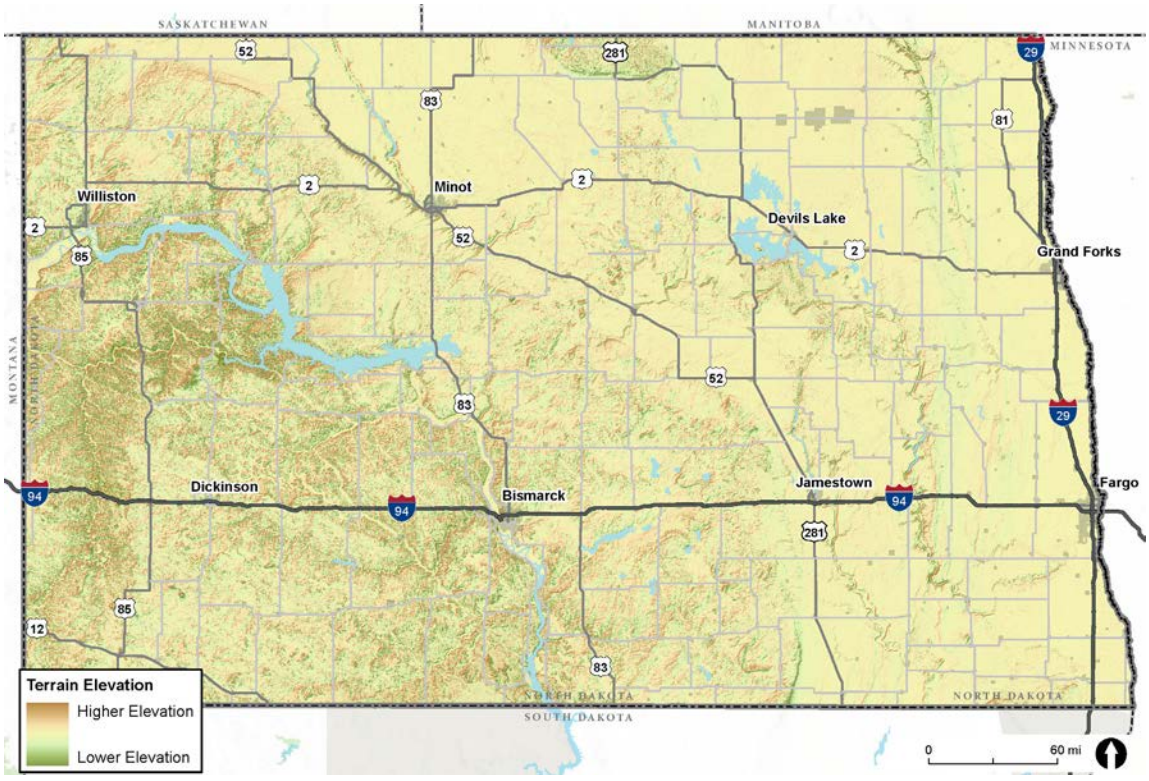
6.4 Current State of EV Industry and Markets

6.5 Alternative Fuel Corridors

6.6 Existing Locations of Charging Infrastructure Along AFCs

6.7 Known Risks and Challenges

Figure 6.1: Geography and Terrain of North Dakota



1 North Dakota State Almanac - General information about North Dakota from NETSTATE.COM

North Dakota's Terrain Profile

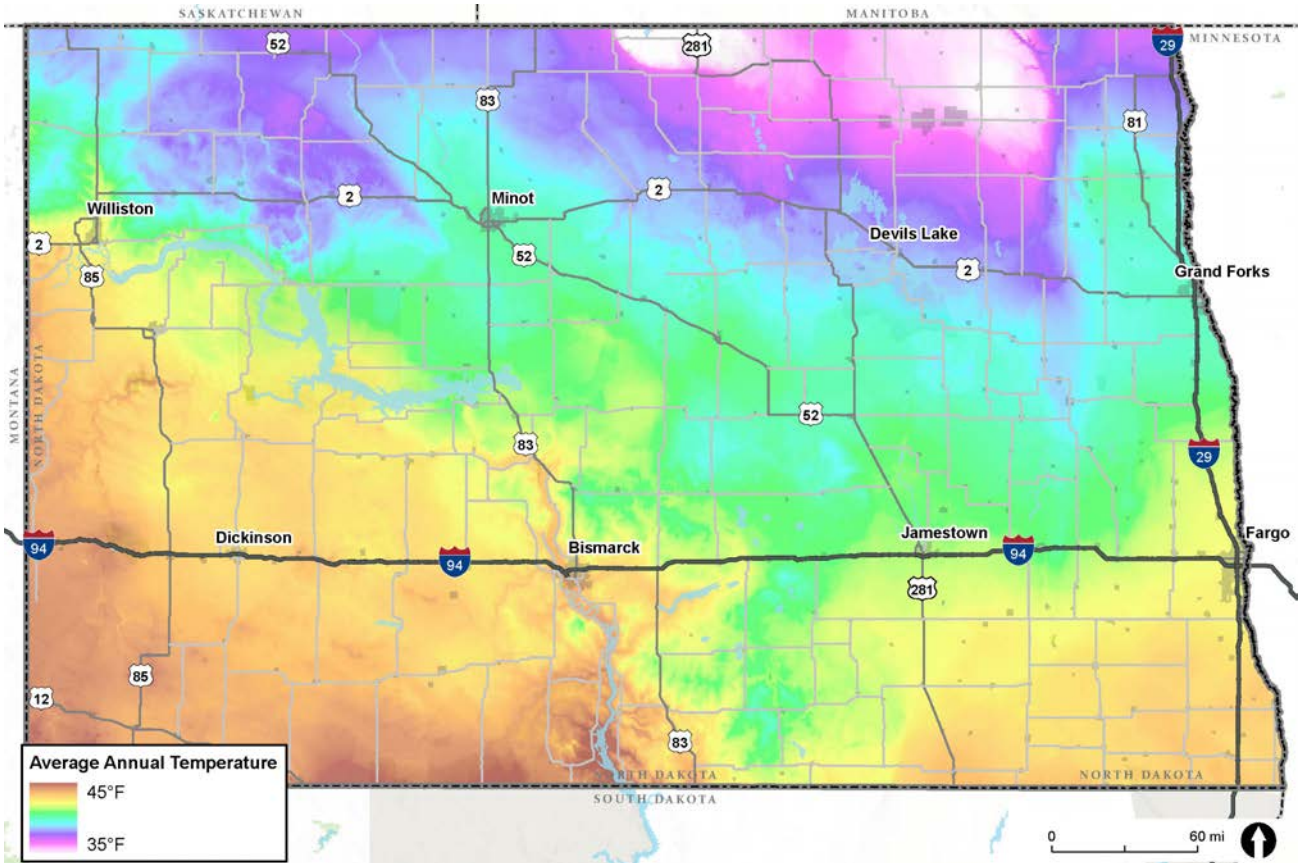
North Dakota comprises three major natural regions: the Red River Valley in the east, the Missouri Plateau and Drift Prairie, and the Great Plains. The Red River Valley narrowly stretches north-south along the eastern edge of the state and is generally flat, ranging between 800 and 1,000 feet above sea level. The Drift Prairie is a rolling plain through the north-central and eastern parts of the state, ranging between 1,300 and 1,600 feet above sea level. Western North Dakota is part of the Great Plains and ranges between 1,800 to 2,500 feet above sea level. The Great Plains are home to the Badlands, characterized by cliffs, buttes, and valleys, with the highest point at White Butte, 3,506 feet above sea level.[2]

With the elevation changing from east to west across the state, EV batteries will be challenged since diving uphill requires more power than driving on a flat surface. However, regenerative braking systems may partially recharge the battery when traveling downhill.[3] This may result in a need for more frequent charging intervals when travelling a net uphill (east to west) than when traveling a net downhill (west to east) across the state.

North Dakota's Climate Patterns

As shown in **Figure 6.2,** North Dakota's four seasons provide an average temperature range from about 14 degrees Fahrenheit (°F) in winter to the lower 80's °F in summer, with occasional extreme temperatures of over 120°F in summer and 60 degrees below zero in winter.

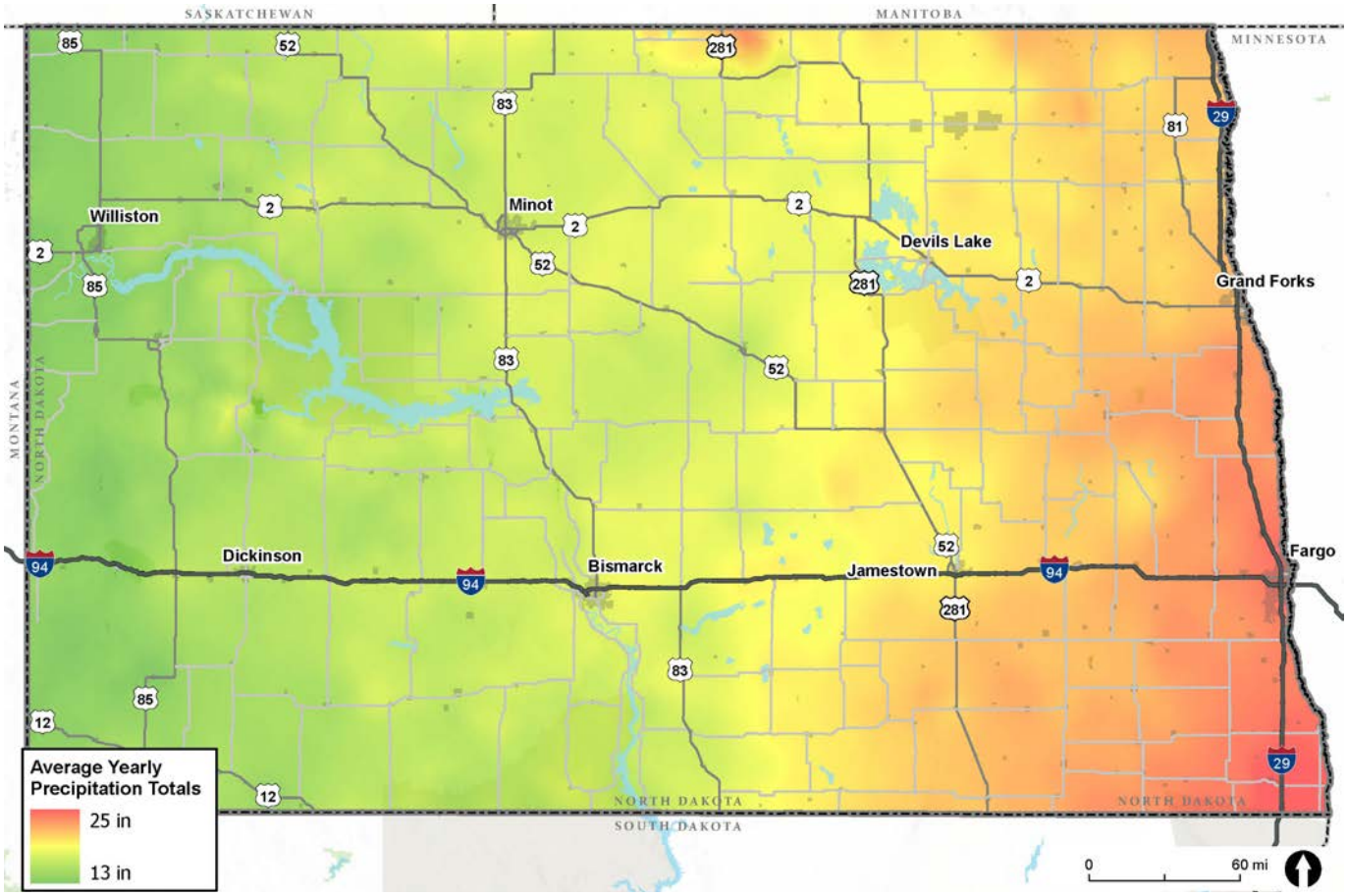
Figure 6.2: Annual Average Temperatures in North Dakota



2 Kelly, Bernard. "North Dakota." Britannica. North Dakota - People | Britannica (Accessed June 7, 2022)
3 Perry, Tristan. "Can Tesla & Other EVs Charge Themselves When Going Downhill?" Green Car Future. November 15, 2021. Can Tesla & Other EVs Charge Themselves When Going Downhill? - Green Car Future (Accessed June 7, 2022)

Precipitation, in the forms of both rain and snow, averages 13 to 20 inches, increasing from the west to the east,[4] as shown in **Figure 6.3.** The state is vulnerable to natural disasters such as drought, floods, tornadoes, and blizzards.

Figure 6.3: Annual Average Precipitation in North Dakota



North Dakota's hot and cold temperatures can impact the range of EVs such that they will require more frequent charging. If drivers are using the vehicle's air conditioning or heating, that usage will pull from the battery and reduce the range of travel. Using the heat during a winter day of 20°F can reduce range by as much as 41 percent. On a summer day, an EV using air-conditioning can lose range by about 17 percent. Future improvements in battery technology will not require liquids and will reduce sensitivity to the cold.[5] EVs are also typically heavier than gas-powered cars and have a lower center of gravity. These characteristics can help drivers retain control of the vehicles when driving on snow-covered roads.[6]

It is best to charge the EV's battery when it is already warmed up, either by parking in a garage or driving the vehicle.[7] The preference for a garage will impact the adoption of EVs in favor of those who can provide garage parking. The need for warmth when charging also reduces flexibility when planning trips such that owners will have to warm up the vehicle before charging.

4 North Dakota Game and Fish Department. "Climate." Climate | North Dakota Game and Fish (Accessed June 8, 2022)
5 Green Cars. "How Cold Weather Affects Electric Cars." August 11, 2021. How Cold Weather Affects Electric Cars | GreenCars (Accessed May 20, 2022)
6 EV Connect. "What to Expect from your Electric Car and Charging Station Performance in Cold Weather." January 20. Electric Cars in Cold Weather | EV Connect — EV Connect (Accessed May 20, 2022)
7 EV Connect.

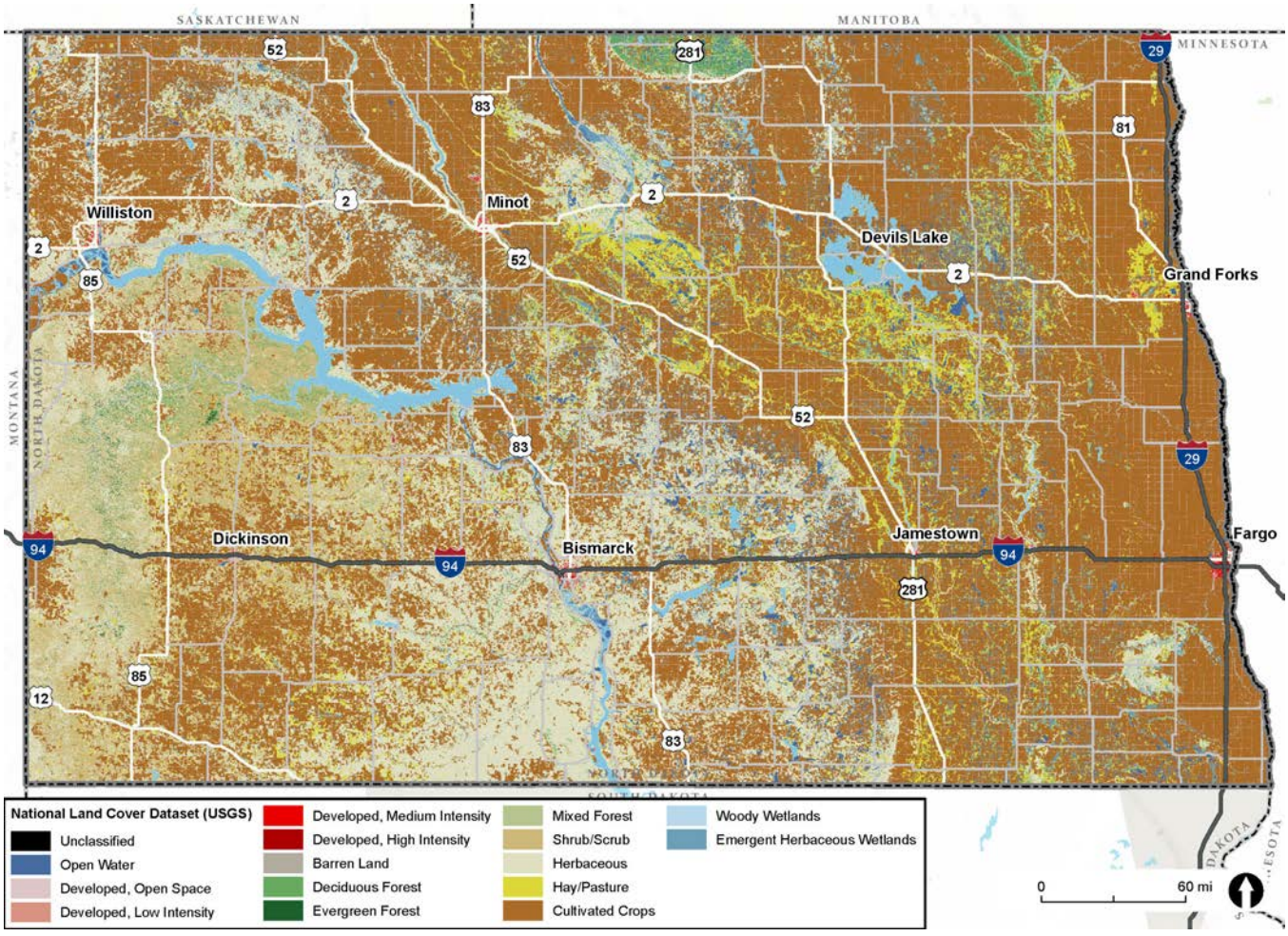
North Dakota's annual average wind speed across the state varies from about 5 meters per second (m/s) in the north central part of the state to about 7.5 m/s in various areas throughout the state.[8] The state has been able to benefit from wind, with the development of wind energy, but wind can also impact travel when it creates headwinds that may shorten the EV's range due to the additional effort of driving against the wind.

North Dakota's Land Use Patterns

Only 0.3 percent of North Dakota's land is urban,[9] as shown in **Figure 6.4.** It is one of the least densely populated states, with 11 people per square mile as of the 2020 Census.[10] Four of the largest five cities, Fargo, West Fargo, Bismarck, and Grand Forks, are located along interstates. However, the fourth largest city, Minot, is not located along an interstate. Residents who live farther from charging infrastructure may be less likely to adopt EVs.

The remaining areas of the state are a mixture of cropland, range and pasture, and forestry land. Water in the state is limited, covering only 1,710 square miles or approximately 2.4 percent of the state.

Figure 6.4: North Dakota Land Cover



8 National Renewable Energy Laboratory, U.S. Department of Energy. "North Dakota 30-meter Residential Scale Wind Resource Map." WINDExchange: North Dakota 30-Meter Residential-Scale Wind Resource Map (energy.gov) (Accessed June 8, 2022)

9 Cox, Wendell. "America's Most Urban States." newgeography. America's Most Urban States | Newgeography.com (Accessed June 8, 2022)

10 U.S. Census Bureau. North Dakota State Profile. NORTH DAKOTA: 2020 Census (Accessed June 8, 2022)

6.3 State Travel Patterns, Public Transportation Needs, and Freight and Supply Chain Needs

Roadway Network and Travel Patterns

North Dakota's transportation system includes interstates, national highways, state highways, county roads, local streets, sidewalks, bike paths, bus routes, railroads, and air routes. North Dakota's State Highway System, which includes interstates, national highways, and state routes, carries over 60 percent of all daily traffic despite accounting for less than 10 percent of roadway miles within the state.[11] The state's Long-Range Transportation Plan, Transportation Connection, provides some insight into existing transportation conditions:

- 88,050 miles of public roads, 93.4% good or fair road condition
    - 570 interstate miles
    - 7,400 state highway miles
    - 15,600 county road miles
- 4,355 bridges[12]
    - 58.4% in good condition
    - 36.5% in fair condition
    - 5.1% in poor condition
- 9.8 billion miles driven by vehicles annually
- North Dakota drivers rank third in the nation for annual vehicle miles traveled. The average North Dakota driver covers more than 17,000 miles per year.[13] **Figure 6.5** shows the state's travel patterns by annual average daily traffic (AADT).

Transportation Connection's goals focus on safety, maintenance, network connections, convenience and reliability, and investing for the future. Many of these goals include strategies that support future transportation technologies, including development of infrastructure assets such as charging stations.

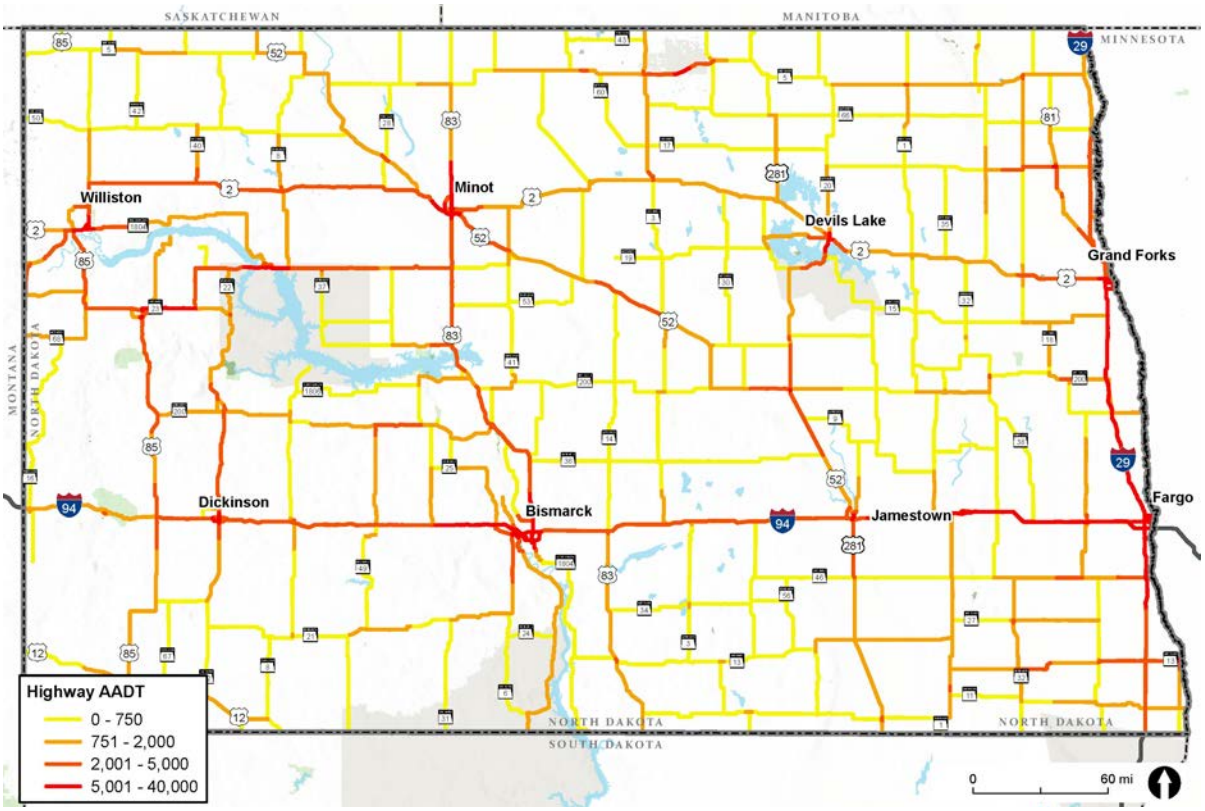
Public Transportation Needs

ND Moves is the state's active and public transportation plan. The goals of the plan address environmental and economic sustainability, safety, and leveraging transportation technologies.[14] The plan notes a future of shared mobility and automated vehicles.[15]

North Dakota has 32 urban and rural transit providers. There are approximately 2.2 million transit trips in the state annually, and approximately 80 percent of all transit trips occur in urban areas. Jefferson Lines and Greyhound provide east-west bus service along I-94, serving five cities. They both also serve Grand Forks. In addition, two rural agencies provide regional transit services from Minot to Bismarck and from Bismarck into South Dakota.[16]

11 NDDOT Long Term Transportation Plan (2021)
12 North_Dakota.pdf (dot.gov) (2020)
13 Appendix_TrendsScenarios.pdf
14 North Dakota Department of Transportation. "ND Moves – Active and Public Transportation Plan." 2019. NDMovesExecutive Summary.pdf (Accessed June 10, 2022)
15 "ND Moves." Page 12.
16 North Dakota Department of Transportation. "Transportation Connections – Trends & Scenarios." 2021 Page 48. NDDOT Long Range Transportation Plan (Accessed June 8, 2022)

Figure 6.5: Annual Average Daily Traffic in North Dakota



ND Moves notes the need to improve public transit across the state through intercity and regional bus systems.[17] Transit services that make trips that are longer than a single charge can support would need reliable charging infrastructure to support a conversion to EVs. Rural transit providers may use a public charging station when needed on longer trips.

Freight and Supply Chain Needs

Transportation Connection noted there are 484.4 million tons of freight transported annually in the state[18] by both rail and truck, including export of various agricultural products, biodiesel, and ethanol. Over the last several years, the state's freight volume has increased. The weight and frequency of freight trucks increase the wear and tear on the state's transportation network.[19] There is some uncertainty regarding the future of freight, as the anticipated trend could either continue towards smaller, faster, more frequent movements or shift towards longer, larger, and heavier trucks and trains.[20]

The cost and efficiency of transporting freight are key factors for North Dakota to remain economically competitive. More products moving to global markets may mean more agricultural freight moving by rail and by truck. Road networks, shown in **Figure 6.6,** will need to be maintained more regularly as more frequent and larger trucks roll through, and rail networks will need to be maintained and expanded to accommodate future movements.[21]

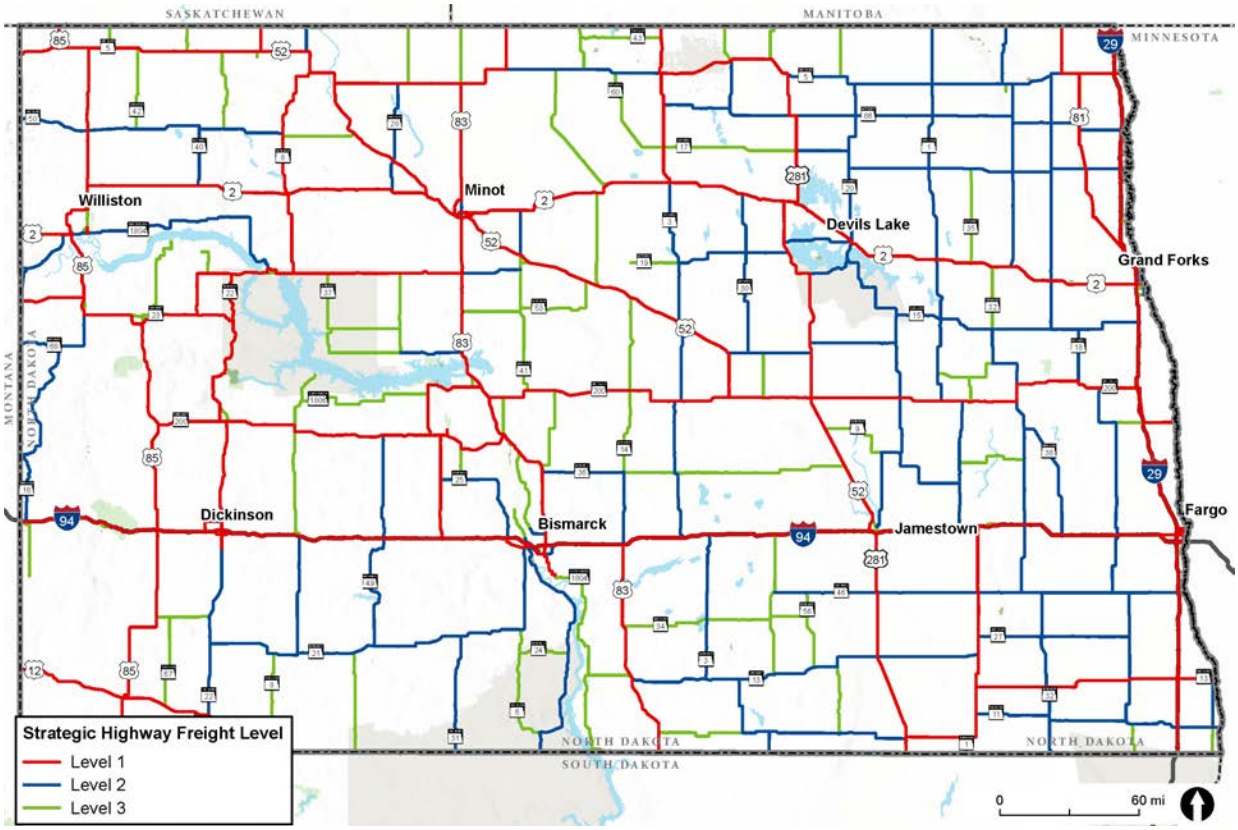
17 "ND Moves." page 17.
18 North Dakota Department of Transportation. "Transportation Connection - North Dakota's Long-Range Transportation Plan." June 2021. NDDOT Long Term Transportation Plan Draft (Accessed June 8, 2022)
19 Ibid, page 39.
20 Ibid, page 8.
21 Ibid, page 31.

The North Dakota Freight Plan does not specifically address the future of electric powered trucks for freight movement, but it does make a commitment to use innovative technologies and intelligent transportation systems to advance safe, secure, and efficient movement of freight and to continue to identify technological priorities into the future.[22]

If freight trucks shift to electric power, they will need to recharge quickly to maintain their shipping schedules, reliability, and, ultimately, their position in the global market. Charging stations for medium- and heavy-duty trucks will require higher power levels than those for passenger vehicles and should be accessible all hours and days to support the commodities markets. Since freight trucks often park overnight as they travel along the interstate system, coupling these parking areas with charging stations may provide some infrastructure and time-related efficiencies. The charging stations themselves would need to be designed for trucks and trailers to pull through rather than go in reverse. Further, freight trucks will need to travel beyond the interstates, so charging networks will also need to expand across the state to support freight EVs. To remain efficient and competitive, freight haulers need to travel as directly as possible to their destinations. This may create a demand for charging infrastructure along all Level 1 routes, even if it results in charging stations be close to one another, to avoid circuitous travel patterns.

For interstate freight, multi-state and multi-utility coordination will be necessary to develop the continuation of EV charging facilities appropriate to heavy- and medium-duty freight haulers and delivery trucks across state lines.

Figure 6.6: State Strategic Freight System – Highways



Source: North Dakota Department of Transportation. "State Strategic Freight System - Highways." 2019. NDStateStrategicFreightPlanMap.pdf (Accessed June 10, 2022)

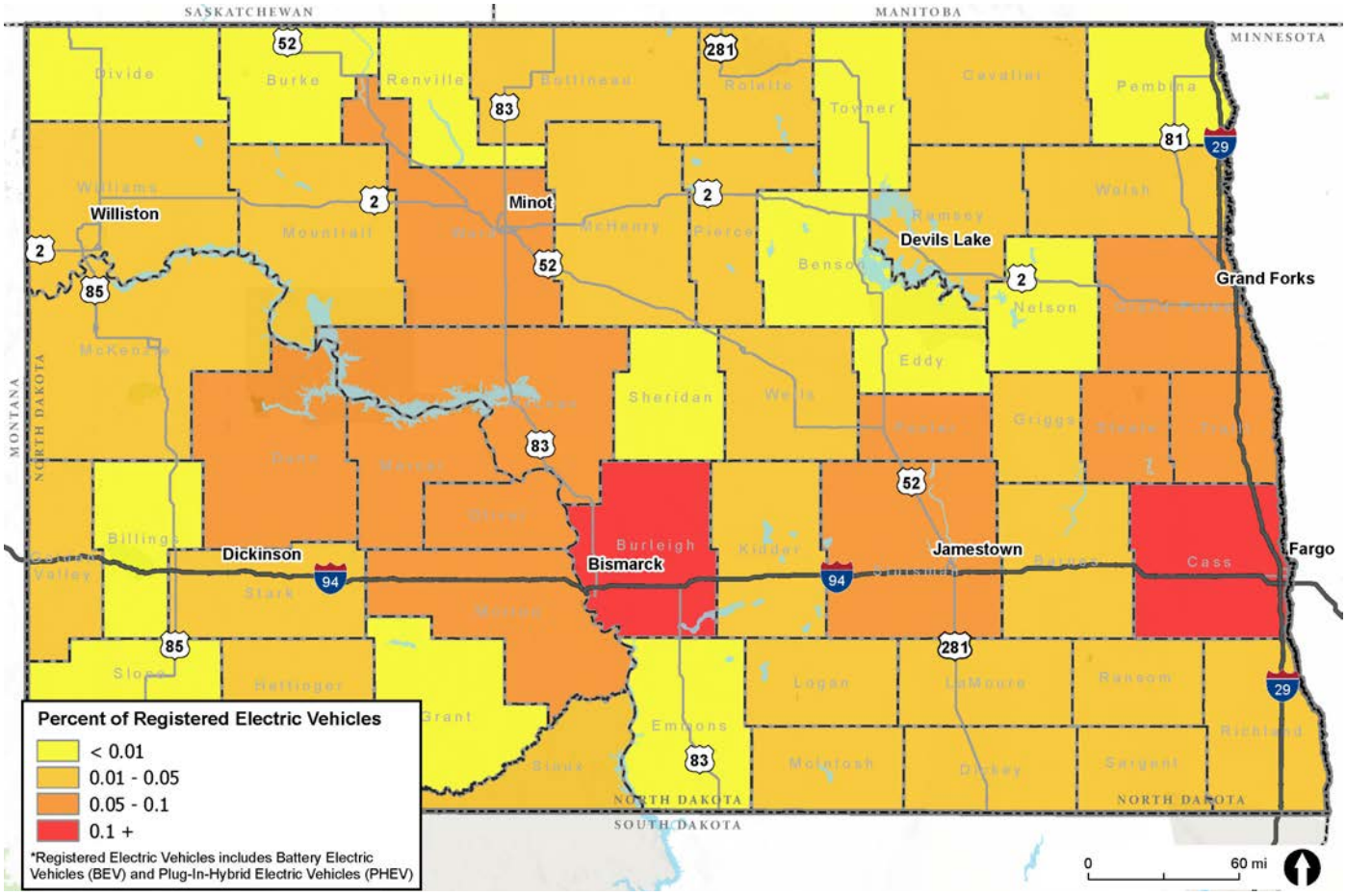
22 North Dakota Department of Transportation. "North Dakota State Freight Plan." April 2015. Page 25-26. Microsoft Word - Freight Plan Executive Summary Apr 2015.docx (nd.gov) (Accessed June 10, 2022)

6.4 Current State of EV Industry and Markets

Electric Vehicle Registrations – Battery Electric Vehicles (BEVs) and Plug-In Hybrid Electric Vehicles (PHEVs)

North Dakota currently has approximately 390 BEVs registered in the state. This is 0.042 percent of the 0.94 million registered light-duty vehicles, which is markedly lower than the national average of 0.49 percent of registered vehicles. Similarly, there are approximately 368 registered PHEVs in North Dakota. This is 0.039 percent of the 0.94 million registered light-duty vehicles in the state. The majority of the BEVs and PHEVs registered in North Dakota today are found in major urban areas or nearby counties, with few vehicles present in the more rural areas. **Figure 6.7** shows the number of registered electric vehicles (BEV and PHEV) by county.

Figure 6.7: Percentage of Registered Electric Vehicles by County



Battery Electric Vehicle and Plug-In Hybrid Vehicle Sales

In 2021, approximately 0.44 percent of all light-duty vehicle sales in North Dakota were BEVs. This compares to approximately 3.4 percent nationally. However, as shown in **Figure 6.8**, both state and national trends have been increasing over the last several years. Similarly, approximately 0.33 percent of all light-duty vehicle sales in North Dakota were PHEVs. This compares to approximately 1.2 percent nationally. **Figure 6.9** show state and national trends for PHEV sales.

Figure 6.8: BEV Sales in the United States and North Dakota

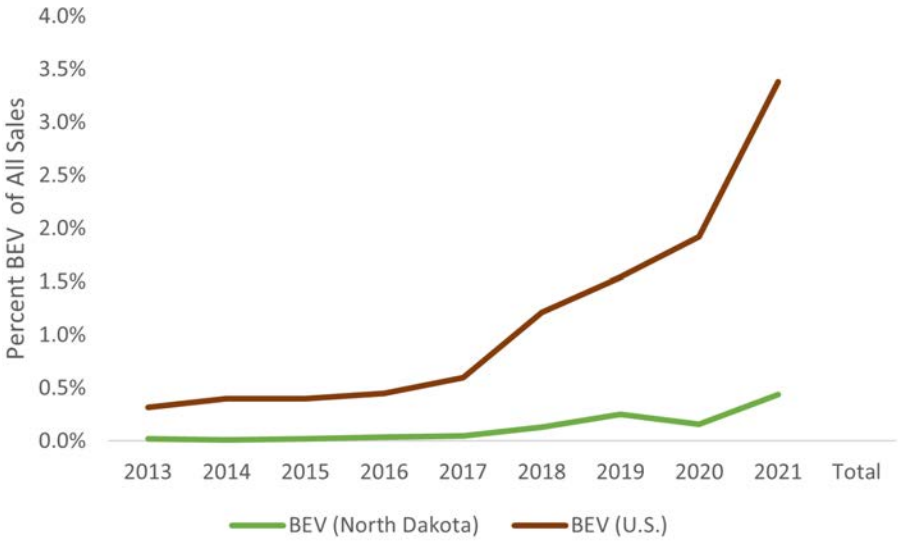
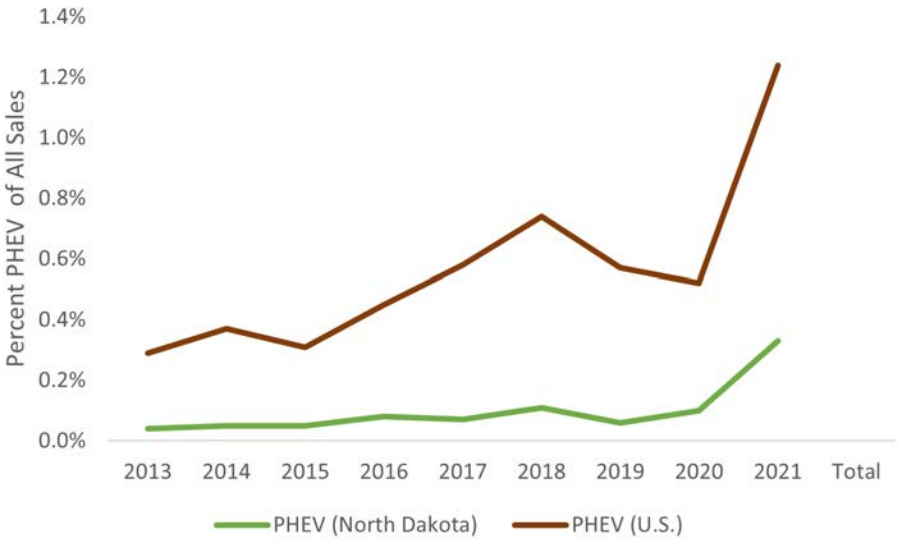


Figure 6.9: PHEV Sales in the United States and North Dakota



Data source for EV sales information is Alliance for Automotive Innovation.
Data source for EV registration data is North Dakota Department of Transportation – Motor Vehicle Division.

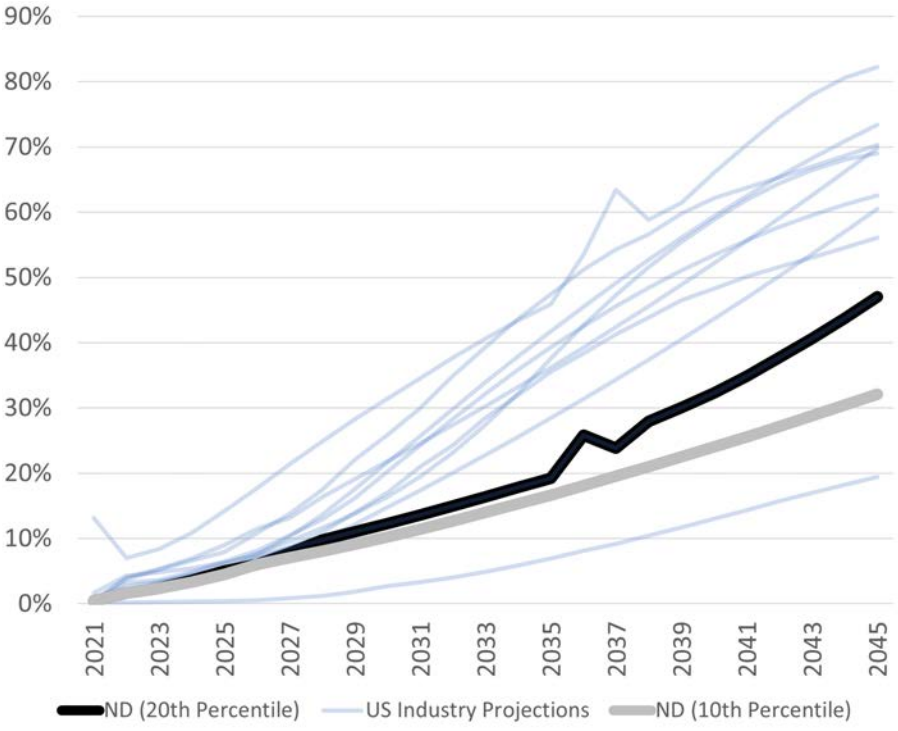
EV Sales and Ownership Projections

An EV adoption forecast for light-duty BEVs in the state of North Dakota was developed based on EV adoption forecasts from various sources including university research, national laboratories, and private forecasting models. **Figure 6.10** shows 11 different forecasts for EV market sales between now and 2045. These industry sales projections range from a low of 19 percent to a high of 82 percent in 2045. The models make different assumptions about battery costs, technological advancements, government incentives, and other factors. Some of the conservative models were developed before manufacturers made major EV announcements and before the IIJA was approved. Some of the more aggressive models have historically over-predicted adoption rates.

The figure also shows the 10th and 20th percentiles which were used for planning EV adoption in North Dakota. While North Dakota has lagged behind other areas of the county in EV adoption, with the expansion of available EV models and the substantial private and governmental investment in EVs and EV infrastructure, it is expected that adoption in North Dakota will increase.

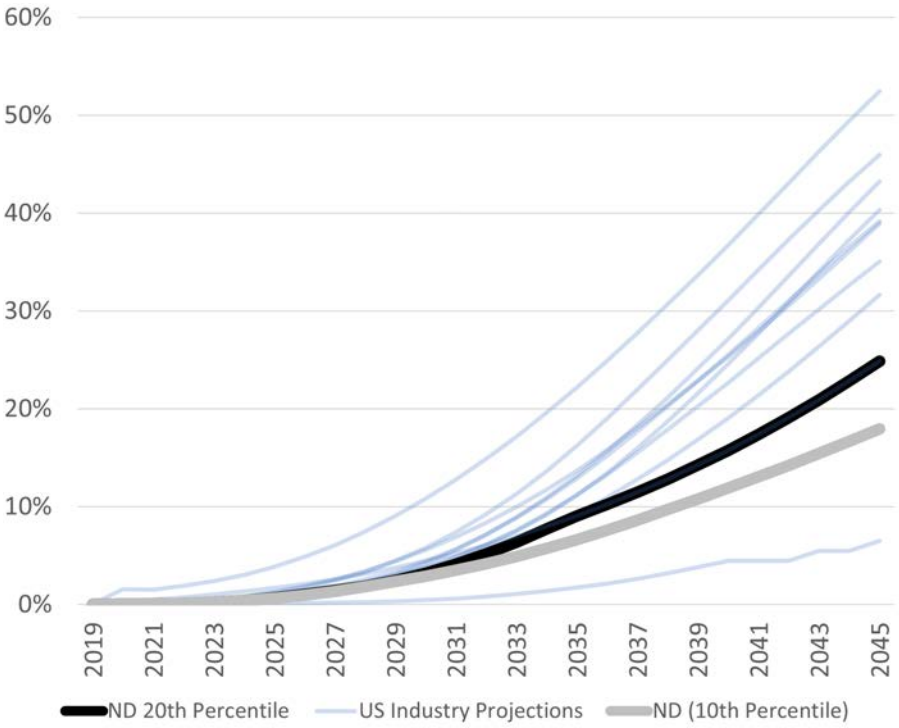
As indicated, the 10th to 20th percentile projections show BEV market sales in North Dakota reaching 10 to 12 percent in 2030. By this time, BEVs are expected to have reached price parity with internal combustion engine (ICE) vehicles. BEV sales are expected to reach 17 to 19 percent in 2035 and just under 32 to 47 percent in 2045.

Figure 6.10: BEV Market Sales Forecast



Over time, BEV sales will begin to transform the registered light-duty vehicle fleet in North Dakota. However, given that vehicles typically stay in use for 15 to 20 or more years, it will take a considerable amount of time for the percentage of registered BEVs to reach high levels. **Figure 6.11** shows the predicted BEV share of registered light-duty vehicles in North Dakota over time. In 2025, BEVs are forecasted to reach 0.5-0.65% of all registered vehicles. That will increase to approximately 3% in 2030, 7%-9% in 2035, 12%-16% in 2040, and 18%-25% in 2045.

Figure 6.11: Percent BEV of Total Fleet



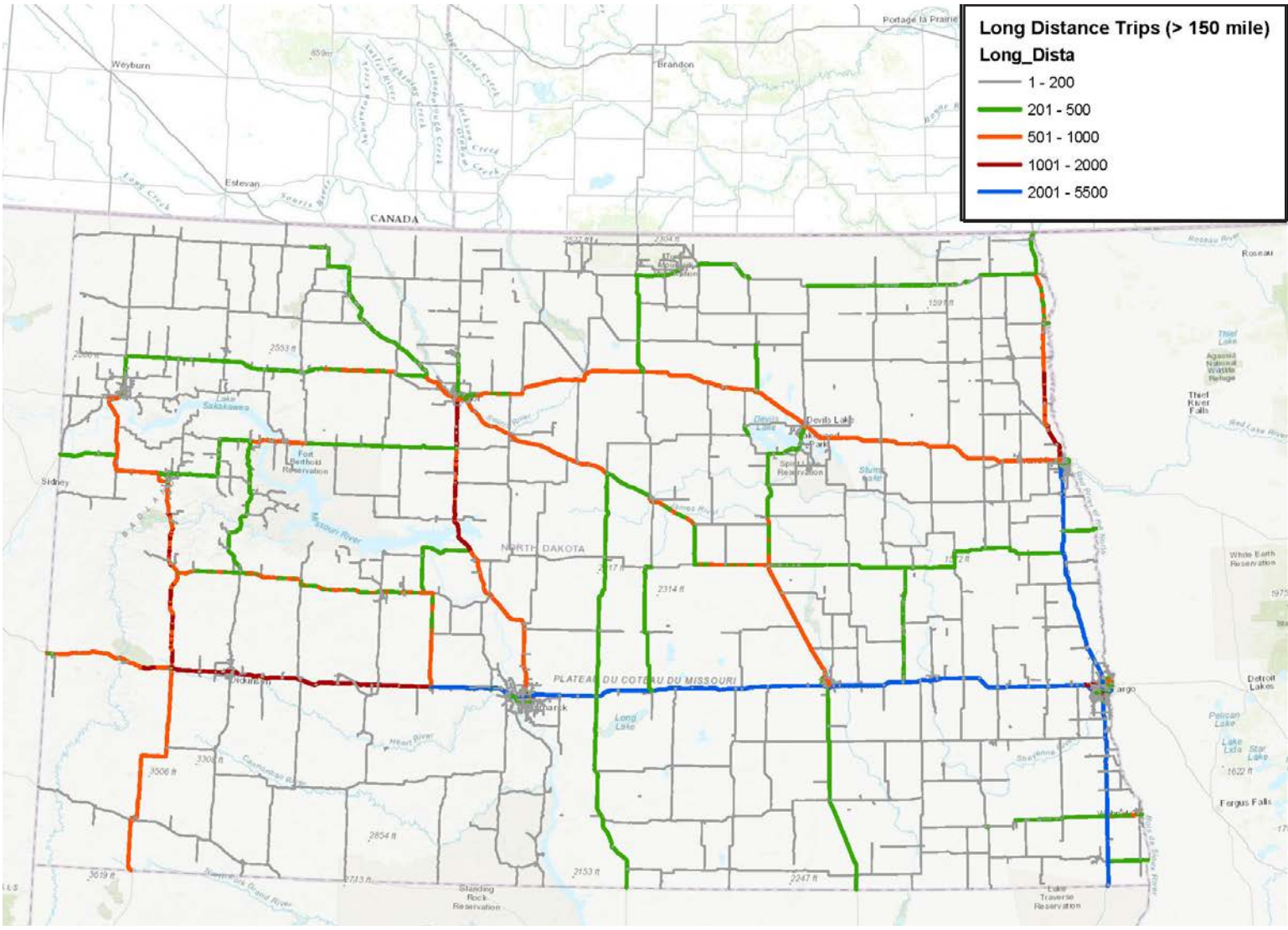
Daily Long-Distance Trips

The majority of EV charging currently takes place at home, where low electricity costs make it much more economical to recharge a battery than at a DCFC station and where the speed of charging is not as concerning. DCFC stations along the highway should only be expected to be used by travelers when other charging methods are not an option.

The probability that an EV will need to stop and use a charging station is dependent on several factors. One of these factors is the EV's traveling range. For example, an EV with a 150-mile range is more likely to stop and charge than an EV with a 300-mile range. Another factor that will influence whether EVs will stop to charge is how far they have already travelled. Even a long-range EV will be required to stop if the length of the trip goes beyond the range of the vehicle.

Replica data was used to determine the number of trips per day of various lengths on each roadway segment, as shown in **Figure 6.12**. For this analysis, long-distance trips were classified as those over 150 miles.

Figure 6.12: Long Distance Trips



North Dakota BEV projections were used to predict DCFC station infrastructure needs on the existing and proposed AFCs over time. However, these needs were not tied to where the EVs would be registered, but rather to the estimated percentage of long-distance travelers that were predicted to use BEVs.

Utilization

EV adoption projections combined with the projected traffic growth in North Dakota were used to estimate charger utilization percentages. The formula below illustrates the estimated utilization rate for a NEVI-compliant charging site for 2026. The statewide EV adoption rate was based on the projections discussed earlier. The estimated utilization rate map (**Figure 6.13**) shows how heavily utilized a four-port charging site would be.

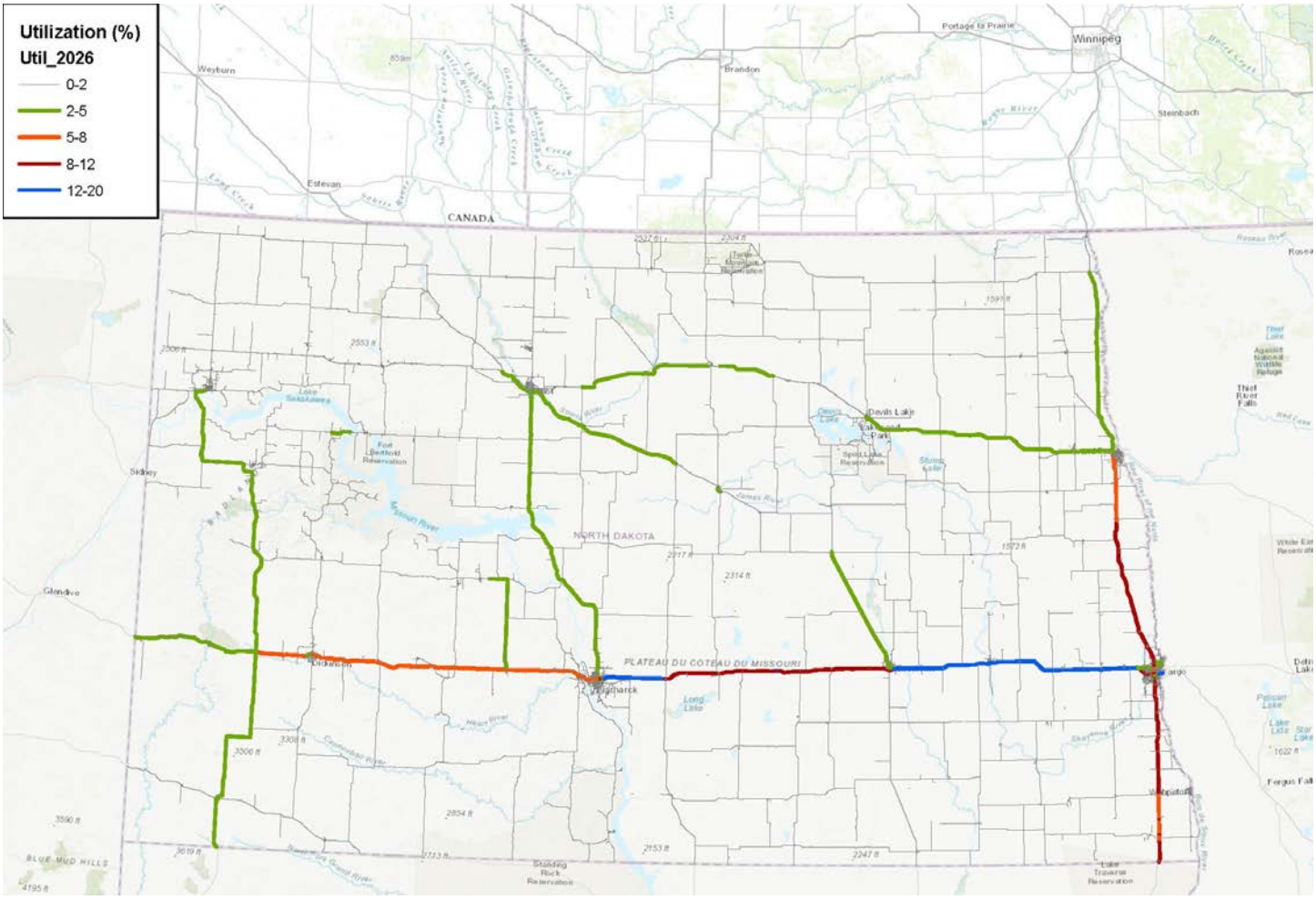
Utilization% = (EV% × LongDistTrips)/24×1/EVRange × ChargeTime/(60 minutes) × 1/density

- The first term computes the number of EVs on the road segment that will need to charge per hour on average, units of vehicles/hour. EV% is the 20th percentile adoption rate for 2026.

LongDistTrips are the data inputs from the earlier section. Replica data was used to compute the long-distance trips for 2019. A 40 percent traffic growth was assumed for long distance trips from 2019 to 2026. The assumption was derived considering traffic growth from 2010 to 2020 on major traffic count stations.

- The second term is the percentage of these EVs that will actually stop at any given station. After applying this, the unit is still vehicles/hour. This is the number of vehicles a single station needs to support in a single hour, on average. EVRange is 150 miles.
- The third term is how many chargers will be 100% utilized by a single vehicle per hour. Units for this term are ([chargers×minutes]/vehicle)/hour, which can simplify to chargers/vehicle. ChargeTime is 25 minutes. After multiplying this term, the units are now chargers/hour.
- Density is assumed to be four chargers per 50 miles.

Figure 6.13: Corridor Charger Utilization



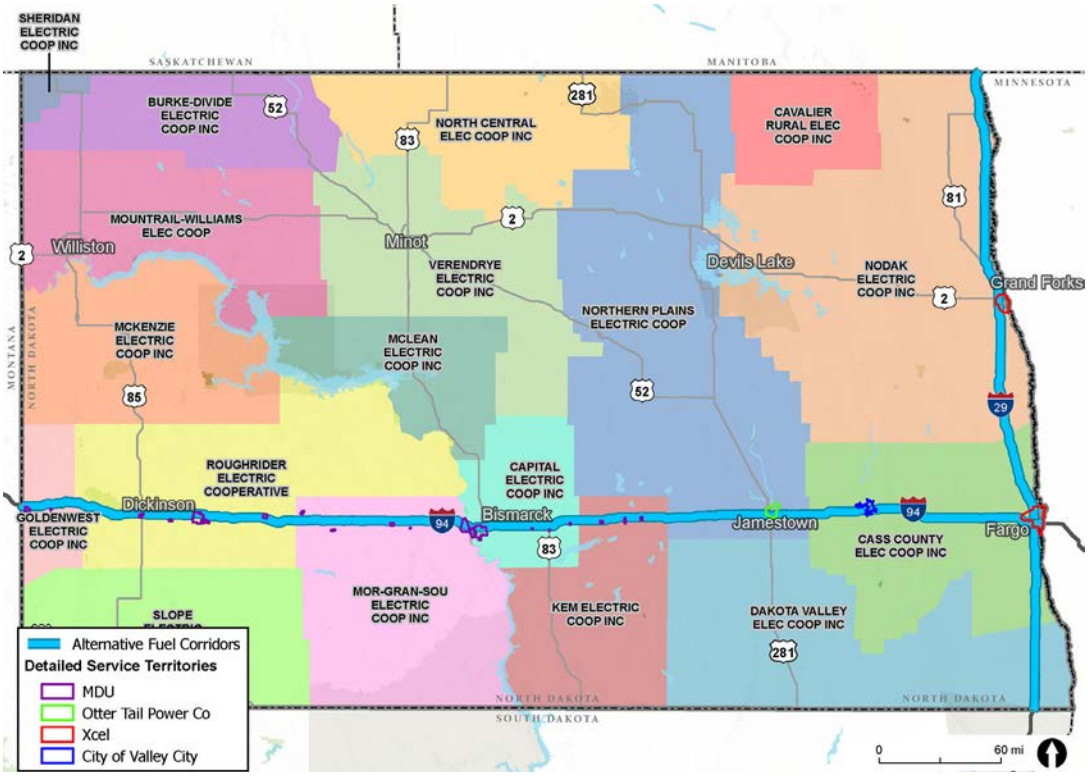
Electric Utility Service Areas

Creating an electrical utility network to support EV charging stations will require the cooperation and coordination of several utility providers. As shown in **Table 6.1** and **Figure 6.14,** there are 18 utility providers that provide service in North Dakota. Ten of these providers have at least one AFC in their territory.

Table 6.1: Electric Utilities Servicing AFCs in North Dakota

Utility Service Provider	AFCs in this Service Area
Nodak Electric Cooperative	I-29
Dakota Valley Electric Cooperative	I-29
Cass County Electric Cooperative	I-29, I-94
Northern Plains Electric Cooperative	I-94
KEM Electric Cooperative	I-94
Capital Electric Cooperative	I-94
Mor-Gran-Sou Electric Cooperative	I-94
Roughrider Electric Cooperative	I-94
Goldenwest Electric Cooperative	I-94
MDU	I-94
Otter Tail Power Co	I-94
Xcel	I-29, I-94
City of Valley City	I-94

Figure 6.14: Electric Utility Service Areas in North Dakota



Grid capacity needs are based on a 40-mile average separation between stations. Each charger needs 600 kW.

EV Laws and Regulations in North Dakota[23]

EV Charging Signage and Parking Space Regulation[24] – A parking space designated for EVs must be indicated by signage approved by NDDOT that indicates that it is only for EV charging. The signage must be consistent with the U.S. DOT FHWA's Manual on Uniform Traffic Control Devices. An individual is not allowed to stop, stand, or park a motor vehicle within any parking space specifically designated for parking and charging EVs unless the motor vehicle is connected to the charger. A fee of $50 applies for non-EVs that park in spaces designated for EVs.

EV Registration Fee[25] – EV owners must pay an annual fee in addition to other registration fees. The fee is $120 for all-electric vehicles, $50 for plug-in hybrid electric vehicles, and $20 for electric motorcycles. Fees contribute to the Highway Tax Distribution Fund.

Experimental Vehicle Definition and Requirements[26] – A vehicle weighing 6,000 pounds or less that is primarily powered by a source other than a combustion engine may be considered an experimental vehicle. A driver may not operate an experimental vehicle unless it is registered as such with the NDDOT. An experimental vehicle must be equipped with certain safety features and may not operate on a state highway unless it is accompanied by a chase vehicle following at a safe driving distance. Experimental vehicle owners must pay an annual registration fee of $50 unless owned by a government entity or political subdivision. Additional requirements and restrictions apply.

Utility/Private Incentives in North Dakota

EV Infrastructure Support – North Dakota utilities joined the National Electric Highway Coalition (NEHC), committing to create a network of DCFC stations connecting major highway systems across the United States from the Atlantic Coast to the Pacific. NEHC utility members agree to ensure efficient and effective fast charging deployment plans that enable long distance EV travel, avoid duplication among coalition utilities, and complement existing corridor DCFC sites. For more information, including a list of participating utilities and states, see the NEHC website.

6.5 Alternative Fuel Corridors

The FHWA begin identifying AFCs in 2016. The AFC program covers various fuel types, including electric power, compressed natural gas, liquefied natural gas, hydrogen, and propane. FHWA's NEVI Formula Program built upon this concept by focusing on electric-powered vehicles and NEVI-compliant infrastructure to establish a national network of charging infrastructure along the national highway system. Corridor Ready routes have enough charging stations in place for an EV to make a reliable trip, while Corridor Pending routes are targeted for additional stations.

In the development of NEVI, EV corridors that are fully built out will provide a minimum distance between stations of 50 miles, with stations located 1 mile or less from the corridor. The stations must provide DCFC capabilities and include at least four EVSE ports with combined charging system (CCS) connectors, and each must be capable of at least 150 kW of power output.

23 Alternative Fuels Data Center: Electricity Laws and Incentives in North Dakota (energy.gov)
24 North Dakota Century Code 39-13-06 and 39-10-50.1 North Dakota Century Code 39-13-06 and 39-10-50.1
25 North Dakota Century Code 39-04
26 North Dakota Century Code 39-10.3

NDDOT has designated AFCs that encompass the full mileage of all interstate routes within the state and does not include any additional routes from the U.S. highway system or North Dakota's state highway system. Specifically, the AFC in North Dakota includes the full lengths of I-29 and I-94, as shown in **Figure 6.15**. As of the most recent AFC designation period, NDDOT has not designated any new AFC routes or mileage. Beyond the AFCs, locations of charging stations are likely to be farther than 50 miles apart due to the sparse population in those areas of the state.

Figure 6.15: North Dakota's Designated AFCs

Corridor-Pending Corridors

- I-29 – South Dakota/North Dakota border to North Dakota/Canadian border
- I-94 – Minnesota/North Dakota border to North Dakota/Montana border

Corridor-Ready Corridors

North Dakota does not currently have any Corridor-Ready AFCs.

6.6 Existing Locations of Charging Infrastructure Along AFCs

Most public EV charging stations are concentrated in the state's urban areas, as shown in **Table 6.2** and **Figure 6.16**. In addition to these charging stations, there are additional stations that support the state's EV infrastructure network, but do not meet NEVI standards. The total of public and private charging outlets in the state is 155, of which 10 stations have DCFC capabilities.[27]

Role of DCFC Stations – DCFC stations are important to the AFC because they provide the fastest charging option, of about 15 to 45 minutes, which is substantially faster than the Level 2 charging time of 4 to 10 hours. Fast charging provides the closest equivalent to the time required to refuel an ICE vehicle for people using EVs on long-distance trips. Fast charging stations must be in place for freight systems to adopt EVs into their fleet because travel time is an important metric for reliability and profitability. Slower charging stations are acceptable in locations where people are expected to spend more time, such as home, school, and work.

Table 6.2: Existing Public Non-Proprietary DCFC EV Charging Infrastructure Along AFCs

State EV Charging Location Unique ID	AFC	Location	EV DCFC Count	EV Network
165815	I-94	2050 Sheyenne St West Fargo, ND 58078	1	ChargePoint
166823	I-29	3902 13th Ave S Fargo, ND 58103	1	ChargePoint
166898	I-29	3760 32nd Ave S Grand Forks, ND 58201	1	ChargePoint
181143	I-94	2001 44th St S Fargo, ND 58103	1	ChargePoint
183271	I-94	285 14th St W Dickinson, ND 58601	2	Non-Networked
185675	I-29	4770 Gateway Dr Grand Forks, ND 58203	2	ZEFNET
193285	I-94	1600 Burnt Boat Rd Bismarck, ND 58503	1	ChargePoint
213189	I-29	22 6th St NW Hillsboro, ND 58045	1	ChargePoint

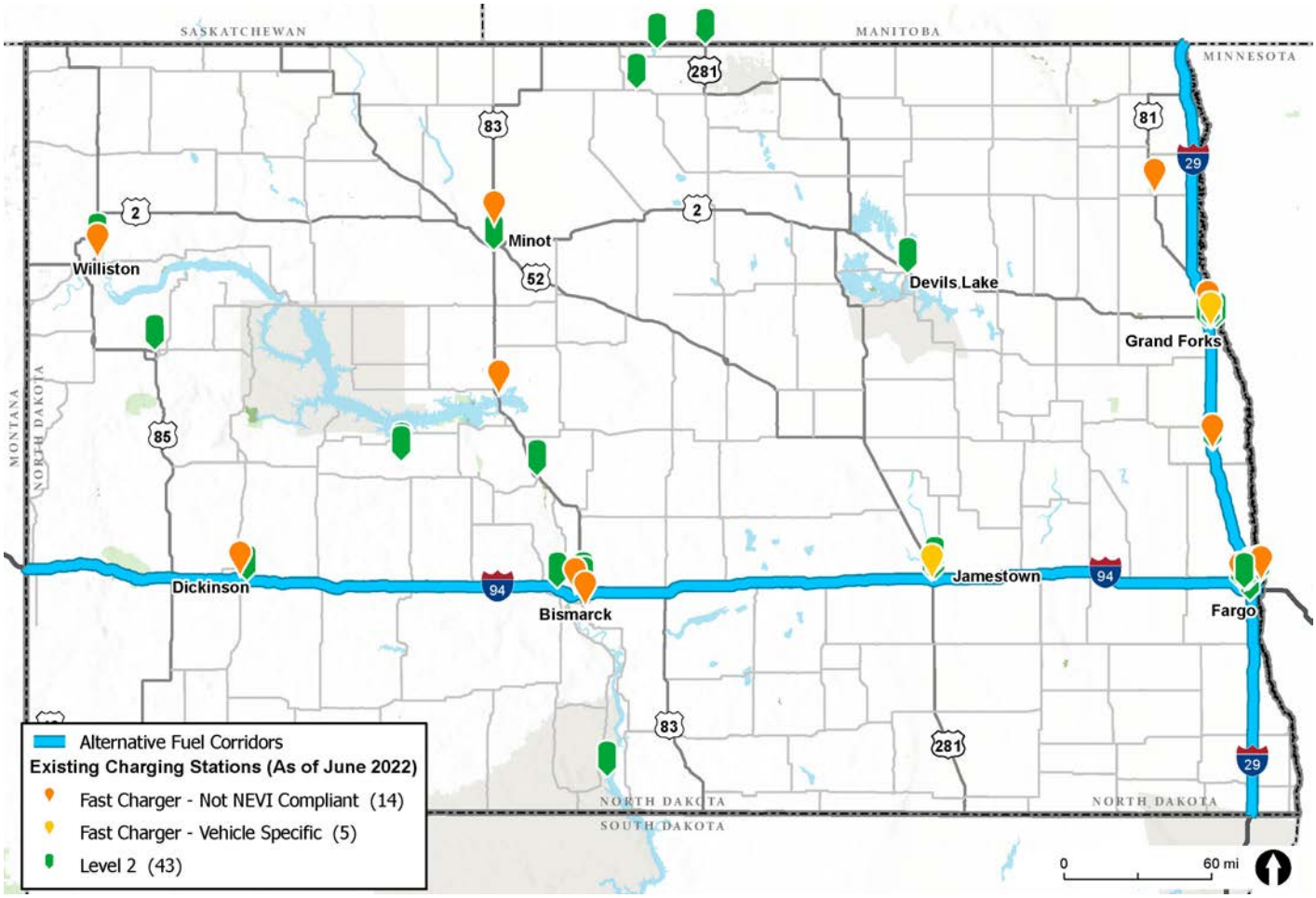
Note: No existing chargers in ND meet the minimum 150kw per charger or the minimum four dispensers per station.

27 U.S. Department of Energy. "Alternative Fueling Stations." North Dakota Clean Cities Clean Cities Coalition Network: North Dakota Clean Cities (energy.gov) (Accessed June 9, 2022)

Information Dissemination about EV Charging Stations – For EV usage to be widely adopted, EV charging stations need to be predictable and reliable. Until they are as ubiquitous and predictable as gas stations, EV charging stations should be posted on the Internet as part of users' trip planning efforts. A national site, such as www.DriveElectric.gov, would be useful since it would facilitate planning for interstate travel. Many online mapping and navigation tools include locations of charging stations, but they do not automatically integrate those locations with recommended driving directions. Bing Maps allows users to search for charging stations along the route.

Information about the types of charging stations and how to get one installed at your business, housing complex, or neighborhood would help with getting stations located in places of high demand.

Figure 6.16: North Dakota's Existing Public Charger Locations (as of June 2022)



6.7 Known Risks and Challenges

Implementation of a full EV network will face various challenges. Some anticipated risks and challenges are:

- **Costs**
  With an estimated station cost between $750,000 - $1,000,000, the cost to construct and maintain the infrastructure will be substantial (even with the 80 percent federal match).
- **Limited Utility Infrastructure**
  In discussions with utilities, there is concern about providing the minimum amount of power needed for each site. In urban areas such as Bismarck and Fargo, there is less concern. However, in many of the rural areas, the utilties have expressed concern about their ability to reliably supply that quantity of power.
- **Utility Demand Charges**
  While charger utilization is forecasted to be low, the potential for four vehicles charging simultaneously could drive up demand charges, providing a challenge for the site host or operator.
- **Low Adoption**
  As of 2022, North Dakota has 400 registered BEVs. While the number is certain to increase, the actual demand for DC Fast Chargers will be low due to the low adoption rate. The challenge is building four-port NEVI-compliant stations without the flexibility for phased build-out by station. NDDOT intends to bring both AFCs to compliance, then focus on spreading chargers geographically throughout the state. However, if a full build-out of four chargers per-site is required prior, then the infrastructure will remain significantly under-utilized. NDDOT would prefer the ability to build two-charger stations where utilization is anticipated to be low, but to develop the stations to make future build-out to a full four-port station easy.
- **Climate**
  North Dakota is the coldest state in the contiguous U.S., with large portions of rural highway. This combined with the near-constant wind can significantly reduce an EVs range. The 50-mile interval required by NEVI will benefit drivers in these conditions, and NDDOT is anticipating improvements in battery technology and range that will further benefit EV drivers.
- **NEPA**
  The NEPA process may require substantial planning and coordination, depdent upon requirements. Further study will be performed to understand the limits of the program related to NEPA, and what scale will trigger further planning and analysis.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7: EV CHARGING INFRASTRUCTURE DEPLOYMENT

7.1 Overview

North Dakota's overarching strategy will be to prioritize the build-out of Interstates 29 and 94 (currently pending AFC designation) as a single phase, in accordance with NEVI standards, and with as few exemptions as possible. As a rural state with relatively low EV adoption compared to national trends, North Dakota anticipates that build-out of remaining National Highway System and State Highway System corridors will occur over a longer time horizon and may not require the same charger density, both in terms of the number of charging ports per site and the frequency of stations, as NEVI guidelines require. This section therefore focuses on the methodology and strategy for completing a charging network on North Dakota's Interstate system.

SECTIONS

7.1 Overview

7.2 Site Suitability, Prioritization, and Selection

7.3 2022 Infrastructure Deployments/Upgrades

7.4 FY23-FY26 Infrastructure Deployments

7.5 Funding Sources

7.6 State, Regional, and Local Policy

7.2 Site Suitability, Prioritization, and Selection

Scoring Methodology

North Dakota used a combination of factors in assessing the suitability and priority for each exit along I-29 and I-94. Suitability is defined as the strength of a business case for installing chargers at a particular location based on cost (availability of power infrastructure and existing amenities) and the anticipated demand based on traffic conditions. Priority is defined as those locations which should be prioritized to receive funding based on the equity considerations specified in NEVI program guidance (Justice40 communities).

Each interchange was scored using criteria defined in Table 7.1. Each criteria was assigned a scale and weight which were applied to every interchange. The top 40 interchanges were mapped for further analysis. With some interchanges receiving tied scores, a total of 46 interchanges (shown in Figure 7.1) have been identified for further consideration, 15 to 20 of which are anticipated to be required to meet NEVI program requirements. Scores are subject to change as better data is made available, including input from North Dakota electric utilities detailing their available power infrastructure at each possible site. Some areas may have only one interchange suitable for build-out, while others may have a cluster of sites suitable for build-out. These clusters may provide flexibility for project partners to find optimal locations that best fit their business models and their ability to serve drivers.

Table 7.1: Site Assessment Criteria

3-Ph Power Availability	
Availability	**Score**
Yes	10
No	0

Justice 40	
Within Proximity	**Score**
Within 1-Mile	10
Between 1-2 Miles	5
Outside 2 Miles	0

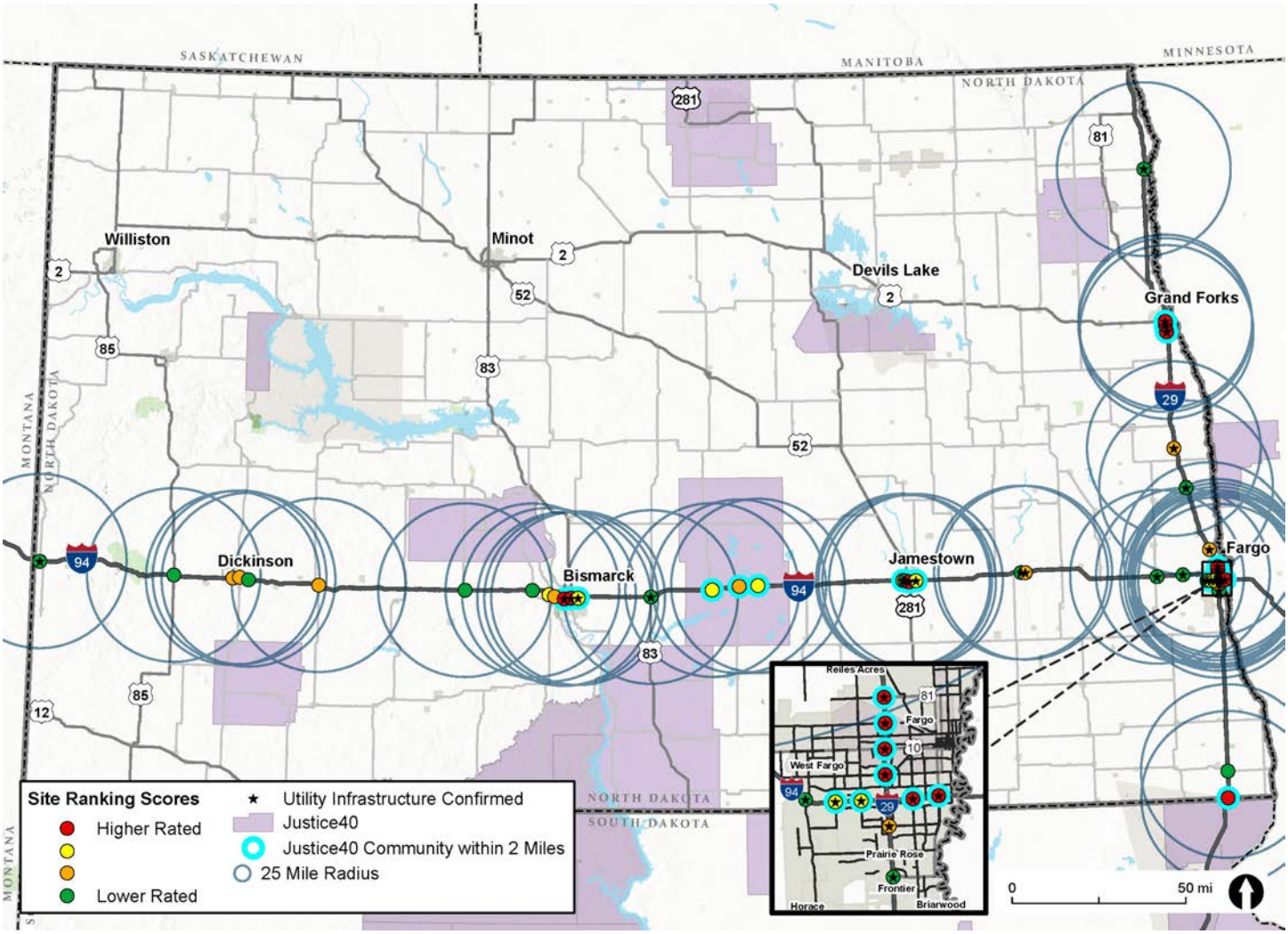
Number of Nearby Substations	
Count	**Score**
0	0
1	2.5
2	4.75
3+	5

Cross-Street Traffic	
Count	**Score**
700	0
1200	1
4000	2.5
7000	3.5
10000	4.5
>10000	5

Scoring

Each interchange was scored using criteria within two categories: suitability and priority (see **Table 7.1)**. Each criteria was assigned a scoring scale and weight which were used to score every interchange. Interchanges with scores in the top 40% were mapped for further analysis. A total of 37 interchanges (shown in **Figure 7.1**) were identified for further consideration, 15 to 20 of which are anticipated to be required to meet NEVI program requirements. Scores are subject to change as better data is made available, including input from North Dakota electric utilities detailing their available power infrastructure at each possible site. Some areas may have only one interchange suitable for build-out, while others may have a cluster of sites suitable for build-out. These clusters may provide flexibility for project partners to find optimal locations that best fit their business models and their ability to serve drivers.

Figure 7.1: Potential EVSE Sites Chosen for Further Analysis



7.3 2022 Infrastructure Deployments/Upgrades

Due to the anticipated timing requirements of a design-bid-build procurement and global supply chain constraints, no infrastructure installation is anticipated in FY 2022. During this time, North Dakota will continue planning and designing its EVSE network, with procurement anticipated in the beginning of FY 2023.

Infrastructure installed with NEVI dollars will follow the July 22, 2022 NPRM draft requirements as released by FHWA.

Corridor-Pending Designations Upgraded to Corridor-Ready Designations

The AFC program has two levels of designation for corridors:

- **Corridor-Ready:** The route has enough facilities to warrant signage indicating locations of alternative fueling stations.
- **Corridor-Pending:** The route does not yet have enough facilities to warrant signage. The FHWA coordinates with state and local entities to bring corridor-pending routes up to corridor-ready.

North Dakota has designated I-29 and I-94 as AFCs, and both are considered "Corridor-Pending" currently. Existing charging on each corridor does not meet NEVI compliance due to distance, insufficient power, or port availability to meet NEVI requirements.

Electric Vehicle Freight Considerations

While the North Dakota Freight Plan does not specifically address charging for electric medium- and heavy-duty trucks, the state plays an important role in both east-west goods movement and north-south movement to and from Canada. While the EVSE network proposed in this document may be utilized by all compatible vehicle types, it will not serve as the primary charging network for medium- and heavy-duty trucks due to the power levels they require. Other considerations for a freight charging network, similar to refueling of ICE vehicles, include 24/7 access, proximity to interstates, and design of pull-through lanes with clearance to accommodate large vehicles with a trailer. For interstate freight, multi-state and multi-utility coordination will be necessary to establish continuity of EV charging facilities appropriate for medium- and heavy-duty freight haulers and delivery trucks across state lines.

Public Transportation Considerations

As noted in Existing Conditions, North Dakota has 32 urban and rural transit providers. There are approximately 2.2 million transit trips in the state annually and approximately 80 percent of all transit trips occur in urban areas, with remaining service comprising primary on-demand/dial-a-ride service in rural areas. While vehicles providing urban, fixed route service can often be replaced with EVs, finding suitable vehicles will be a challenge in rural areas due climate conditions, travel distances, and the availability of shuttle-sized vehicles that meet Americans with Disabilities Act (ADA) standards. North Dakota will further assess transit EV opportunities as part of the next phase of this project.

7.4 FY 2023 – 2026 Infrastructure Deployments

Due to the small number of stations required to meet current and projected demand, North Dakota anticipates procuring and installing infrastructure along I-29 and I-94 as a single project phase over FY 2023-2024. North Dakota will work with utilities, individual communities, and the selected charger network owner/operator to site individual charging locations from the exits identified above in Figure 7.1. FY 2025-2026 will focus on the remaining National Highway System and State Highway System corridors, which will likely not require the same charger density as NEVI guidelines specify.

7.5 Funding Sources

North Dakota will utilize a tiered approach to funding EVSE aimed at securing matching funding from private sector charging network companies and/or site owners to the extent feasible. By building out a full network of chargers along key Interstate routes as a single phase, sites expected to be less profitable to owners/operators will be bid in combination with highly desirable sites. North Dakota will make state funding available only when necessary to close key gaps in the network.

7.6 State, Regional, and Local Policy

Relevant state legislation and policy is discussed above in Existing Conditions. As charging stations are sited in individual communities, North Dakota will assess whether each individual locality has a building code that sets forth standards for EVSE design and installation. Given the low EV adoption rate in the state, this is not anticipated to be common. As part of procurement, North Dakota will establish EVSE design and installation standards for contractors where such standards do not exist in local ordinance.

North Dakota will continue to collaborate with adjacent states (Minnesota, South Dakota, and Montana) on the placement of infrastructure and the need to create a consistent spacing throughout the AFCs.

7.7 Utility Planning

NDDOT has engaged with every utility along both AFCs to better understand the current infrastructure and available power at the interchanges under consideration. This process was conducted through large group stakeholder meetings, small group stakeholder meetings, and one-on-one conversations with the technical staff at each utility.

This engagement will continue throughout the next phase of the process to keep utilities actively engaged and aware of the program.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8: IMPLEMENTATION

8.1 Overview

Strategies for guiding the implementation of the program will rely heavily upon the contracting process as described in Chapter 5: Contracting. NDDOT anticipates that the EVSE providers will be heavily involved in developing deployment strategies that address the sections in this chapter.

This contracting process is intended to give each respondent an opportunity to enhance the effectiveness of every federal dollar spent to develop the network while meeting minimum federal and state requirements. This is done by providing flexible options (where possible) for charger locations, while still meeting the NEVI requirements and program goals for Justice40 and service to rural communities. NDDOT will define the desired outcomes as part of the contracting process and will score the respondents on their abilities to meet those requirements. In essence, the specific strategies will be developed by the private respondents, which correspond to the desired outcomes that NDDOT will define.

NDDOT will incorporate guidance and requirements from the Joint Office into components of the contracting requirements. Proposed rules outlined in the June 22, 2022 FHWA NPRM will be included in the implementation and contracting requirements for infrastructure providers. The six categories covered in the NPRM are shown below:

- Installation, operation, and maintenance by qualified technicians of EV infrastructure.
- Interoperability of EV charging infrastructure.
- Traffic control devices and on-premise signs acquired, installed, or operated.
- Data requested related to a project funded under the NEVI Formula Program, including the format and schedule for the submission of such data (data collection and sharing).
- Network connectivity of EV charging infrastructure.
- Information on publicly available EV charging infrastructure locations, pricing, real-time availability, and accessibility though mapping applications.

SECTIONS

8.1 Overview

8.2 Strategies for EV Infrastructure Operations and Maintenance

8.3 Strategies for Service-Provider and Station-Owner Identification

8.4 Strategies for EVSE Data Collection and Sharing

8.5 Strategies to Address Resilience, Emergency Evacuation, and Snow Removal/Seasonal Needs

8.6 Strategies to Promote Strong Labor, Safety, Training, and Installation Standards

8.7 Draft Charger Types

8.2 Strategies for EV Infrastructure Operations and Maintenance

NDDOT anticipates that the O&M of all EVSE will be performed by the station's third-party provider, whether it is part of a P3, grant, or ongoing service contract. As part of the contracting process, minimum requirements will be defined for charger uptime (97 percent as defined by the NEVI Program requirements), repair lead time, repair responsiveness, failure/fault reporting, regular maintenance, cleaning, and station upkeep. The requirements will also meet the 180-day NEVI Formula Program Notice of Proposed Rulemaking (NPRM) issued on June 22, 2022. It is anticipated that different responders would have different business models, but each would need to demonstrate that the site host is engaged to monitor, routinely inspect, and perform basic site cleaning functions. In addition, operations and maintenance of the infrastructure will be required to be performed by qualified technicians that meet the June 22, 2022 NPRM guidance.

NPRM GUIDANCE

Section 680.106(j) requires states ensure that the installation and maintenance of EVSE is performed safely by a skilled workforce that has appropriate licenses, certifications, and training. The proposed regulation would further encourage states to utilize a diverse workforce of electricians and other laborers. The proposed regulation also requires that, with the exception of apprentices, all electricians installing, maintaining, and operating EVSE be certified through the Electric Vehicle Infrastructure Training Program (EVITP). The EVITP refers to a comprehensive training program for the installation of EV supply equipment.

8.3 Strategies for Identifying EV Charger Service Providers and Station Owners

The process identified in Chapter 5: Contracting will be used to identify both charger service providers and station owners (site hosts). It is anticipated that selection of appropriate site hosts would be a requirement of the contract, and that one of the first steps in developing the proposal would be to highlight preliminary partnerships, interchange selections, and potential engagement with small businesses and site hosts to partner for infrastructure build-out. A key challenge will be identifying respondents who can maintain charging infrastructure and respond to issues quickly in rural stretches along the AFCs.

NDDOT will require that contractors follow the requirements as stated in the June 22, 2022 NPRM, ensuring their ability to meet the minimum standards that are outlined in the proposed rules. As additional guidance and rules are provided from the Joint Office or FHWA, NDDOT will work with project partners to meet the minimum standards, rules, and guidance provided.

NDDOT is in the process of determining the best approach for guiding infrastructure deployment in a manner that aligns with the interchange analysis in Chapter 7: EV Charging Infrastructure Deployment. NDDOT is exploring ways to cost effectively build out the system while setting up the network of DCFC stations and private contractors for long-term success.

Progressive Funding: This provides a sliding scale of funding percentage based on the estimated use of the charger. It could also include viewing a project more favorably if it is located near, or includes build-out of, desirable amenities or if it exceeds the NEVI guidance minimums in ways that benefit the traveling public.

Bundled Funding: Charger locations are grouped into projects that balance higher and lower utilization charging sites, allowing system operators to develop a workable long-term financial and O&M plan for all sites within the bundle, not just the charging locations that experience the most use.

At this stage, NDDOT is exploring the potential for different contracting models which may change over the course of the project. For example, one or a small number of contracts may be preferable in the initial stages of the program to build out I-94 and I-29 to promote consistency and lower program risk. But as the program matures, there may be benefits to expanding the contracting types and/or number of respondents later in the program for building charging infrastructure throughout North Dakota. NDDOT may also explore a regional approach that allows respondents to draw from workforce and expertise available in the region.

8.4 Strategies for EVSE Data Collection and Sharing

NDDOT anticipates that EVSE data collection and sharing would be the primary responsibility of the third-party contractor and would be outlined as a requirement in the contract.

During the selection process, each respondent is anticipated to provide their approach to data collection and sharing, which could include the level of detail they are willing to provide; their approach to assembling and anonymizing data; their data handling, usage, and security practices; and their approach to leveraging data to inform program decisions such as future charger build-out or monitoring of charger health.

NDDOT anticipates the contractor will generate and provide data describing charging usage, cost, and reliability that can be shared with the Joint Office to support program evaluation and improvement efforts. As outlined in the June 22, 2022 NPRM, NDDOT will utilize the template provided to submit data to the Joint Office. NDDOT will consider requiring data describing charging station location, type of equipment available, price, and status that can be shared via an application programming interface (API) through the open charge-point protocol (OCPP) with public-facing directories, including the Alternative Fuel Data Center's Station Locator. Data sharing will also conform to the requirements now being developed by the Joint Office.

8.5 Strategies to Address Resilience, Emergency Evacuation, and Snow Removal/Seasonal Needs

NDDOT has identified several types of resilience that the charging network would need to address. While these are likely not the only areas related to resilience, they represent the areas that are commonly identified as points of failure.

- **Technology resilience.** Charging and battery technology is constantly evolving, and the charging provider should have the ability to upgrade chargers to meet new standards and evolving battery technology. Delivering suitable power to the site is a key focus of this effort, along with modular infrastructure that can be easily upgraded. NDDOT has engaged with charging providers that offer modular upgrades to chargers, which would allow dispensers to be upgraded from 150 to 350 kW and to offer capabilities like power sharing between dispensers.
- **Energy/grid resilience.** NDDOT, along with utility partners and charging providers, will continually explore options for energy resilience. One challenge to implementing the charging system is the numerous utility providers located along I-94 and I-29, and NDDOT has been engaging with municipal, rural co-op, and investor-owned utilities in the state to determine available load and grid reliability within the service areas. In general, utilities had some concern regarding the additional load that electric vehicles may add to the system, not necessarily just through NEVI charging, but through home and destination charging as well.
- **Natural disaster resilience.** Flooding, tornadoes, and temperature extremes are the natural disasters that may be experienced in North Dakota. These present major challenges for EV infrastructure resilience. Because NDDOT has limited experience with EV infrastructure, it is expected that resilience in these areas would be addressed primarily by the private charging provider, with requirements to address resiliency possibly included as a component of the contracting process.
- **Snow, wind, and cold resilience.** North Dakota is the coldest state in the contiguous United States, with average winter temperatures ranging from 2°F in the north to 17°F in the south during the coldest month (January). North Dakota is also among the top-five windiest states and receives an average of 37 inches of snow per year. To address the issue of cold temperatures, NDDOT has engaged with EVSE providers to understand their operating limits in cold weather (down to -40°F in one instance) and will include addressing extreme temperature ranges as a requirement in the contracting process.

Snow becomes an issue when paired with North Dakota's wind, as snow would drift even if an overhead structure were present. In response, North Dakota has developed preferred station layouts that allow a plow to easily clear the parking area without blocking access to the charging dispensers (see **Figure 8.1, 8.2, and 8.3**). A minimum clearance of 14 feet between chargers is recommended to allow snow removal using standard size snow plows. It is anticipated that seasonal needs and snow removal will be a requirement of the contracting process, and the specific responsibilities of these services will be determined between the site host and the charging network provider. NDDOT will explore minimum standards related to snow removal, including best practices to ensure snow removal does not block access to charging infrastructure.

North Dakota has no defined statewide evacuation routes. The North Dakota Department of Emergency Services has divided the state into four areas, with I-29 and I-94 serving three of these areas. It is anticipated that both I-29 and I-94 would be critical routes for any evacuation needed, and the placement of NEVI chargers along this route will address evacuation travel if the need arises.

8.6 Strategies to Promote Strong Labor, Safety, Training, and Installation Standards

As a rural state with widely dispersed population centers, training and workforce development will be a major challenge for North Dakota. Adoption of the EVITP program will require widespread partnerships with colleges and vocational schools throughout the state to establish a workforce qualified in the installation and maintenance of EVSE. NDDOT will continue to promote the use of small businesses in the construction and maintenance of North Dakota's transportation infrastructure. For this program, NDDOT and its partners may be able to identify workforce training opportunities. For example, equipment could possibly be made available for training purposes. The purchase of a charger can be a substantial investment for a vocational school, but there may be opportunities to use chargers and equipment for educational purposes prior to (or during) equipment installation. This could apply to the actual installation process of the equipment, where the contractor may be asked to provide educational assistance to further develop a skilled North Dakota workforce related to charging infrastructure. This is also an opportunity to engage with Justice40 communities to develop workforce training opportunities related to infrastructure installation, operation, and maintenance. Contractors should also recognize that the ongoing O&M of the infrastructure and the sites should be an opportunity to develop regional skills and workforce opportunities, and that the training of this workforce should be a key component of the program.

Regarding safety, training should be made available to first responders and site hosts that provides guidance and safety procedures to manage infrastructure in the case of malfunction, equipment destruction, or an emergency event.

This plan includes some initial draft standards related to charging sites, chargers, and desired amenities. However, NDDOT will follow FHWA/Joint Office guidance and standards and work with contractors prior to beginning construction in Year 1 to develop a set of installation and design standards for the program and apply those as the basis for standards to the rest of the program. It is anticipated that these standards should allow flexibility for different technologies and chargers to be deployed at a future date. Contractors may develop modified standards that respond to regional characteristics or site-specific requirements.

8.7 Draft Charger Types

NDDOT intends to build both AFCs to full NEVI compliance and prioritize charger locations that can be constructed quickly and easily. NDDOT recognizes that not all charging locations will have a full suite of amenities, and these locations will be supporting travelers having a 10- to 30-minute layover for long distance trips. As site selection begins by the contractor, NDDOT has identified a preliminary list of amenities that could be part of the considerations for site suitability. Amenities may be located off site from the charger, but within walking distance, such as a charging site adjacent to a restaurant or coffee shop. Amenities are categorized into tiers, each corresponding to the level of preference or need.

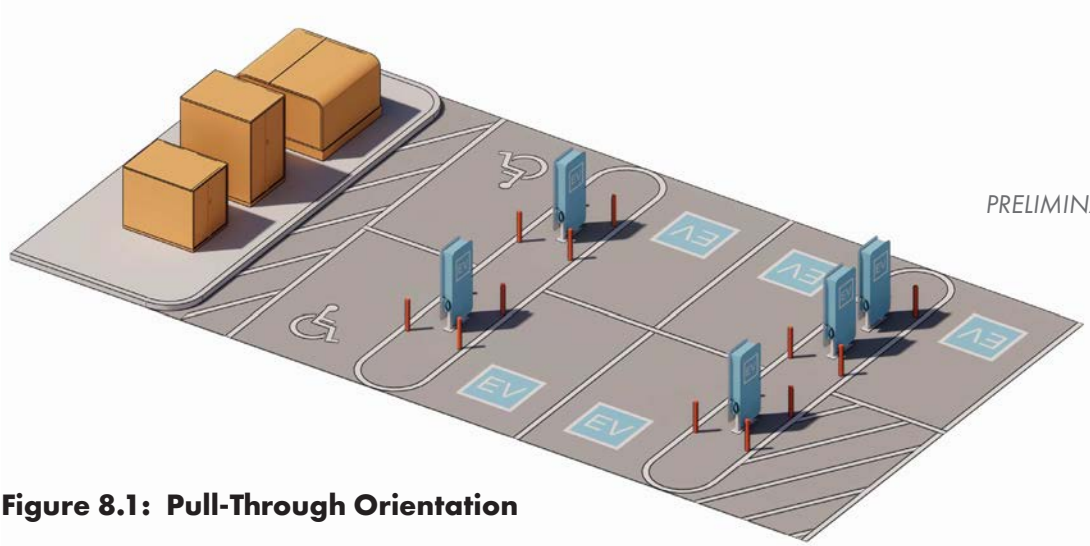
8.8 Potential Site Standards and Layouts

Table 8.1: Potential NEVI and Low-Demand Standards

	NEVI Standard
Applicability	° Applies to both AFC interstates (I-29 and I-94) ° Conforms with NEVI standards required to be certified fully built-out
Charger Types	° **Minimum Standard** 150 kW x 4 = 600 kW total ° **Preferred Standard A** 175 kW x 4 = 700 kW total, with power sharing (350 kW per port) ° **Preferred Standard B** 350 kW x 2 and 150 kW x 2 = 1 megawatt (MW)
Siting Interval	° Located a maximum of 50 miles from another NEVI-compliant charging station ° Located no more than 1 mile from the corridor
Conceptual Site Orientations *(Development Ongoing)*	° **Preferred Orientations** Side-charger site orientation (see **Figure 8.1 and Figure 8.2**) ° **Optional Orientation** Front-charger charging site orientation (see Figure 8.3)
Accessibility	° Compliant with all applicable ADA standards
Minimum Amenities and Features	° Restroom, vending machine, benches, trash can, lighting, security camera
Preferred Amenities and Features	° Restaurant, convenience store, shelter/canopy, vehicle trailer pull-through
Ideal Amenities and Features	° Outdoor space/park/playground, pet relief area, multiple restaurants, backup power connection

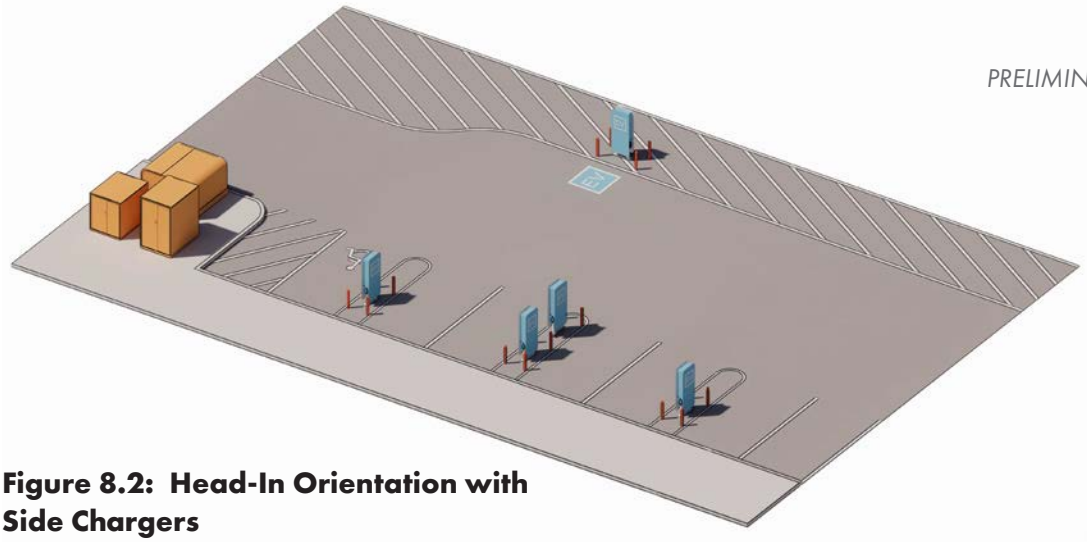
The initial conceptual layouts shown in **Figures 8.1, 8.2,** and **8.3** illustrate possible options for NEVI-compliant stations. The following considerations were identified to address specific characteristics of North Dakota:

- Side chargers are preferred, to enable easier snow removal. Plows can push snow past chargers and eliminate snow mounding at the front of the charger.
- Accommodation for vehicles pulling trailers should be provided. This can be an optional charger placed to the rear of a head-in charger site, or as a striped section in a pull-through orientation. In either case, the orientation should allow a vehicle with trailer to pull through the charger space and not require the vehicle to reverse.
- All chargers should be ADA accessible. Chargers should be placed behind bollards instead of curbs, and all charger interfaces and equipment should address ADA accessibility standards. As an option, every charger site could meet ADA parking standards and include the required access space for every parking space.
- Access to ports should be simple and intuitive. It is expected that these conceptual layouts will change as North Dakota further develops its approach to deployment. Site layouts must also be very flexible, as each site will have its own unique opportunities and constraints. Electrical equipment will need to be easily accessible for installation and maintenance.



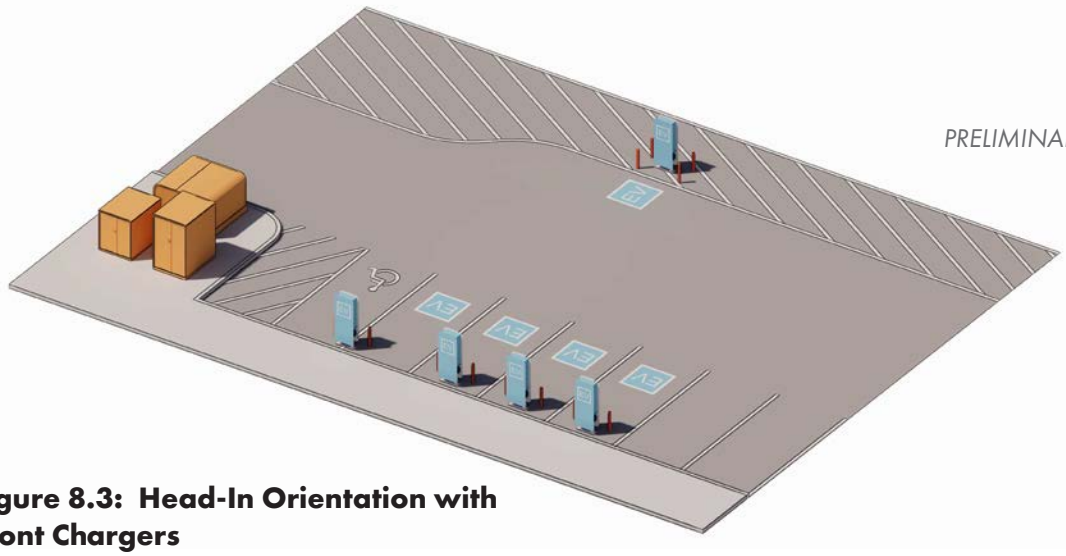
PRELIMINARY DRAFT

Figure 8.1: Pull-Through Orientation



PRELIMINARY DRAFT

Figure 8.2: Head-In Orientation with Side Chargers



PRELIMINARY DRAFT

Figure 8.3: Head-In Orientation with Front Chargers


NORTH DAKOTA
CAPITOL

9: CIVIL RIGHTS

9.1 Overview

NDDOT is a proven administrator of federal-aid funds and, as such, assures compliance with state and federal civil rights laws as a regular business practice. The NEVI program will be implemented utilizing the adopted practices that have ensured civil rights compliance and that have been successfully implemented in other federal funding programs for decades. Utilizing this proven practice ensures Title VI of the Civil Rights Act, ADA, Section 504 of the Rehabilitation Act, and all accompanying U.S. DOT regulations and ancillary programs will provide a foundational base for the NEVI program from the onset.

SECTIONS

9.1 Overview

9.2 Title VI and ADA

9.3 Small/Disadvantaged Business Utilization

The NDDOT Civil Rights Program ensures no person shall be excluded from participation in, or denied the benefits of, or subjected to discrimination under, any program or activity receiving federal financial assistance from NDDOT on the basis of race, color, national origin, religion, sex, age, disability, limited English proficiency, genetics, political opinion or affiliation, or status with regard to marriage or public assistance. In addition, NDDOT ensures that all beneficiaries, and potential beneficiaries, of these programs are offered an equal participation opportunity.

It is the policy of NDDOT to comply with numerous non-discrimination laws and regulations, including:

- Title VI of the Civil Rights Act of 1964: Prohibits discrimination on the basis of race, color, or national origin.
- Uniform Relocation Assistance and Real Property Act of 1970: Prohibits unfair treatment of persons displaced or whose property has been acquired because of federal or federal-aid programs and projects.
- 1973 Federal Aid Highway Act: Prohibits discrimination on the basis of sex.
- Section 504 of the Rehabilitation Act of 1973: Prohibits employment discrimination based on disability for any program or project which receives federal financial assistance.
- The Age Discrimination Act of 1975: Prohibits discrimination on the basis of age.
- Airport and Airway Improvement Act of 1982: Prohibits discrimination based on race, creed, color, national origin, or sex.
- Civil Rights Restoration Act of 1987: Broadens applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973 by expanding the definition of the terms "programs or activities" to include ALL of the programs or activities of the federal-aid recipients, subrecipients, and contractors regardless of if the project or program is federally funded.

- Americans with Disabilities Act of 1990: Improves accessibility for disabled individuals through design considerations of infrastructure and facilities.
- The Federal Aviation Administration's nondiscrimination statute: Prohibits discrimination on the basis of race, color, national origin, and sex.
- Executive Order 12898: Addresses environmental justice considerations to ensure burdens are not disproportionately high and adverse for minority and low-income populations.
- Executive Order 13166: Improves access to services for persons with limited English proficiency by taking steps to provide materials, programs, and services in alternate languages.
- Title IX of the Education Act: Prohibits discrimination because of sex in education programs or activities.

9.2 Title VI and ADA

NDDOT is committed to ensuring that projects, programs, and services are performed without discrimination under Title VI and ADA. To accomplish this, NDDOT established a Civil Rights Division that is charged with the development and administration of Civil Rights, ADA, and disadvantaged business enterprise (DBE) programs. The FHWA requires NDDOT to develop a plan that clarifies roles, responsibilities, and procedures for Title VI, ADA, and applicable ancillary programs. It is the expectation of NDDOT that the directors and employees of all functional units be responsible for ensuring nondiscrimination within their activities and programs. Each organizational NDDOT Bureau is committed to specific actions to implement these nondiscrimination requirements into appropriate business practices, projects, manuals, directives, and regulations.

9.3 Small/Disadvantaged Business Utilization

The NEVI program will be a vehicle to enhance the U.S. DOT's initiative for wealth creation for small, disadvantaged businesses and expanding access to increase social and economic opportunities for disadvantaged and underserved communities. This is accomplished by exploring opportunities to:

- Establish participation goals and determine the opportunities for the participation and utilization of DBE firms on contracts associated with the NEVI program.
- Develop proactive programs to support an increase of small DBE firms in the innovative scopes associated with EV infrastructure construction and maintenance in the NEVI program.
- Work to maximize opportunities for DBE firms within NDDOT's existing DBE program through targeted outreach to DBEs on EV-infrastructure-oriented workforce development.

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10: EQUITY CONSIDERATIONS

10.1 Overview

NDDOT is committed to emphasizing equity considerations when planning investments in EV charging infrastructure. NDDOT recognizes that while the use of EVs is gradually increasing in the state, EV ownership is not currently an option for all North Dakotans due to availability and affordability issues, and it may not be the right fit for some of the wide-ranging mobility needs across the state. As demand and the charging network grow over time, it is expected that passenger vehicle model options will increase and prices for EVs will decrease. Transit services in metropolitan areas, and on-demand service in rural areas, are also expected to transition to zero emission alternatives in part because they too are federally funded and can take advantage of recent funding increases for EV technologies. Thinking ahead to ensure that these investments in infrastructure today benefit populations across North Dakota equitably is a priority.

SECTIONS

10.1 Overview

10.2 Identification of, and Outreach to, DACs within the State

5.3 Identifying, Quantifying, and Measuring Benefits to DACs

5.4 Benefits to DACs

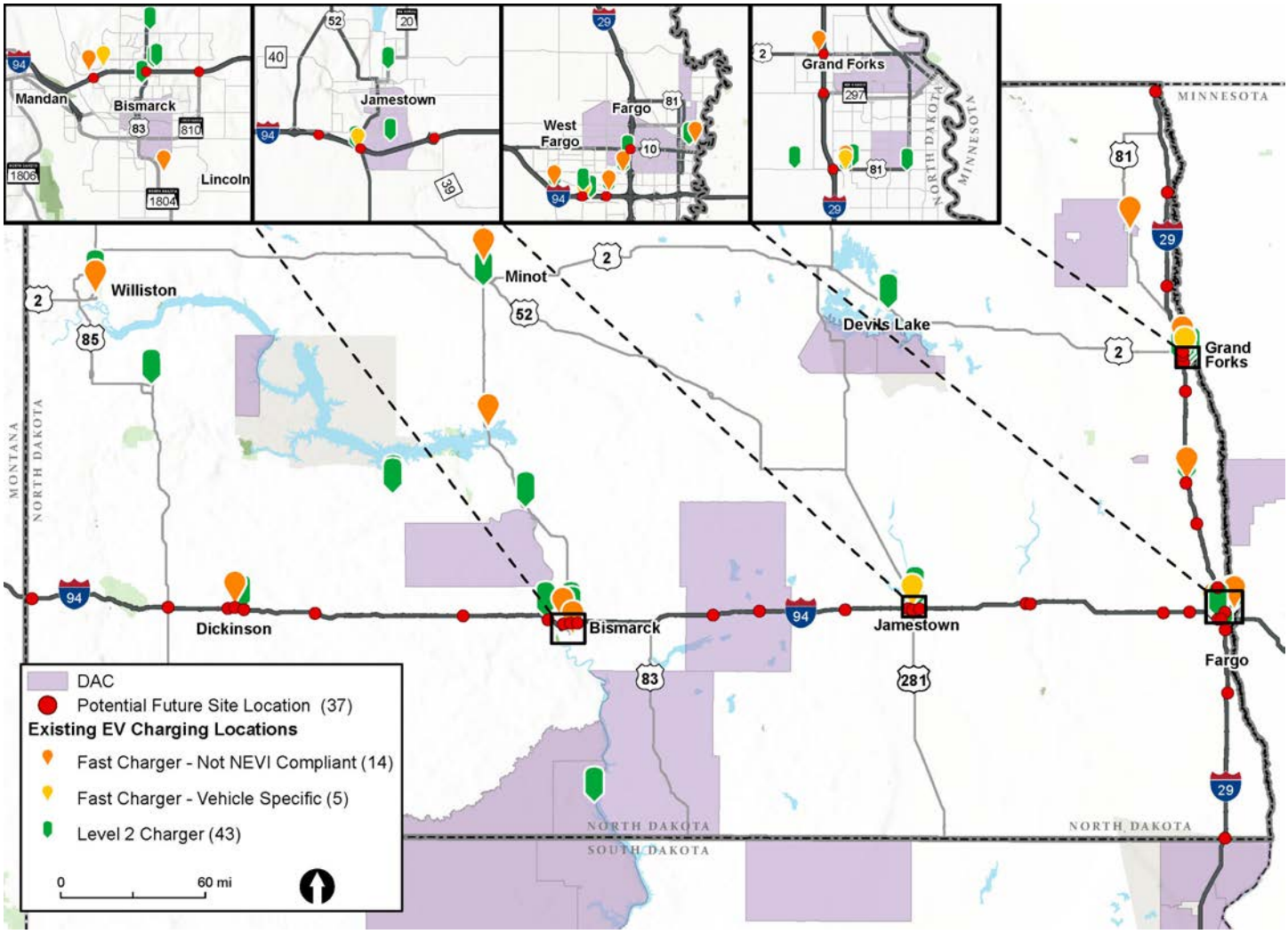
The Justice40 Initiative, established in January 2021 by Presidential Executive Order 14008 on Tackling the Climate Crisis at Home and Abroad, states a goal that at least 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities (DACs). The Interim Implementation Guidance for the Justice40 Initiative (released July 2021) and the National Electric Vehicle Infrastructure Formula Program Guidance (released February 2022) identify clean transportation, to include the NEVI program, as Justice40-covered programs. This is especially relevant to clean energy and transportation decision-making because, historically in the United States, burdens of these systems have been disproportionately borne by DACs.

10.2 Identification of, and Outreach to, DACs within the State

As part of a U.S. DOT and U.S. Department of Energy (DOE) partnership in implementing the Justice40 Initiative, an interim definition for DACs was developed to assist states in identifying them, as shown in **Figure 10.1**. "Communities" are defined as a group of individuals living in close geographic proximity to one another. "Disadvantaged" is defined through data investigation of these communities by a combination of variables including low income (and/or high persistent poverty), racial minority composition, linguistic isolation, high transportation cost burden, high energy cost burden, and disproportionate environmental stressors.

NDDOT has utilized the Electric Vehicle Charging Justice40 Map tool to analyze the existing and future EV network in North Dakota and incorporated the location of these communities as a key criterion for the selection of corridors and the priority scoring of interchanges when identifying potential future infrastructure sites.

Figure 10.1: DACs with Existing and Potential EV



NDDOT has developed and implemented procedures to encourage and monitor participation of all citizens in the planning process. This public participation process was developed to offer North Dakotans the opportunity to shape their transportation network through the identification of issues, needs, and priorities which then inform policy creation and project selection and implementation (see **Chapter 3**). This includes, but is not limited to, meaningful engagement in projects and programs with low-income and minority individuals, those with limited English proficiency, and other underserved groups.

It is anticipated that engagement with Justice40, tribal, and rural communities will be an ongoing process throughout the project development and construction process. Engagement will be deployed to understand concerns, opportunities, and any aspects that could improve accessibility or service of the infrastructure to these communities.

10.3 Identifying, Quantifying, and Measuring Benefits to DACs

NDDOT sees value in performance-based planning and is experienced in measuring performance and reporting in accordance with U.S. DOT requirements. NDDOT recognizes the emerging nature of the NEVI program and looks forward to working with U.S. DOT to measure the benefits of this program as it evolves. Currently, benefits beyond geographic location can only be discussed qualitatively, as tools do not yet exist to measure expected benefits. NDDOT expects that this program will evolve and mature to have a national standard for benefit metrics and measurement set by U.S. DOT. Until that time comes, NDDOT is evaluating existing programs and data tools to internally enhance, target, and measure the benefits of the NEVI program to DACs. Initially, NDDOT will track the location of EV chargers and the percentage of those located in U.S. DOT designated DACs using the Electric Vehicle Charging Justice40 Map tool. NDDOT will also explore opportunities to enhance and measure DBE utilization on NEVI projects. This is discussed in additional depth within the workforce and labor element of this plan.

10.4 Benefits to DACs

NDDOT anticipates challenges in identifying the totality of direct, indirect, and cumulative benefits of this plan to DACs. While it is possible to account for charging infrastructure location in relationship to DACs, NDDOT expects that the benefits of this investment will go beyond the geographic location of the chargers. EV charger presence in DACs when the community has low, or no, EV ownership provides little benefit beyond enhancing business economy in these areas while EV owners are charging. Through existing programs and outreach, job creation for EV utilization and infrastructure can be enhanced through the use and training of DBEs. DACs have historically been negatively impacted by transportation, with air quality being on key area of concern. As fleets transition to zero emission vehicles, improvements in air quality should be expected. NDDOT will explore how improvement in air quality for DACs can be estimated, likely through assumptions based on VMT and EV penetration rates.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11: LABOR AND WORKFORCE CONSIDERATIONS

11.1 Overview

The NEVI program will generate substantial opportunities for equitable and accessible job creation in the electrical and construction trades, as a network of electric vehicle chargers is planned, designed, installed, and commissioned in North Dakota. The NEVI program will also increase opportunities for power generation and power distribution utilities to strengthen their workforce to provide electric vehicle transportation that is convenient, reliable, affordable, and equitable. Project planning, stakeholder engagement, construction and its support services, and long-term maintenance will all provide robust opportunities. NDDOT is prepared to meet this opportunity through its strong utility stakeholders and robust workforce practices.

SECTIONS

11.1 Overview

11.2 Construction by Area

11.3 Electrical Trade

6.4 Labor and Workforce Strategies

Within the construction industry, the development of the NEVI network will rely on labor throughout the state and will need to leverage specialty contractor services, particularly electricians. The state of North Dakota had a construction workforce of 26,500 in April 2022, approximately 6.2 percent of the state's non-farm workforce. The latest Bureau of Labor and Statistics research on the construction workforce notes an average annual wage of $57,600.

11.2 Construction by Area

Data regarding certified electrical contractors from the EVITP indicates that the concentration of construction jobs falls within the four largest cities in the state: Fargo, Bismarck, Grand Forks, and Minot. The state's dispersed footprint of small, urbanized areas and expansive rural areas will generate some construction activity distant from the primary centers of construction workers. Justice40 mapping indicates that proactive encouragement of local construction laborers will be needed in Native American reservations including Standing Rock Reservation, Fort Berthold Reservation, Spirit Lake Reservation, and Turtle Mountain Reservation, as well as in transportation-disadvantaged census tracts including northwest of Bismarck and northwest and southwest of Grand Forks.

11.3 Electrical Trade

The use of well-trained electrical staff will be critical to the success of building out the NEVI network in North Dakota. Of the full construction workforce, approximately 10 percent, or 2,780, are electricians. The state is also well prepared with 21 North Dakota-based electrical contractors that have become certified in the EVITP.

11.4 Labor and Workforce Strategies

The state of North Dakota has strong existing strategies that will enable NEVI investment to create jobs and benefits that are inclusive and local and that will create a diverse and sustainable electric vehicle workforce. Further, all workforce strategies will be coordinated with the North Dakota Department of Commerce Workforce Development Division with goals to expand the sources of training, experience level, and diversity of the workforce that will install and maintain EV charging infrastructure. Stakeholder input is also being solicited from major stakeholders, including utilities.

In deploying the NEVI program, North Dakota will be able to leverage the following strengths in developing the EV workforce. These include:

- **Leverage Statewide Workforce Initiatives:** North Dakota can leverage statewide workforce initiatives already in place to accelerate the development of a workforce focused on the EV network. The North Dakota Department of Commerce has several workforce programs, including the Technical Skills Training grant, the Regional Workforce Impact Program, and an apprenticeship program.
- **Bolster Equity and Accessibility to the Workforce:** The state of North Dakota rewards employers for hiring individuals who have had difficulty finding work using the federal Work Opportunity Tax Credit (WOTC), a state-administered federal program awarded to companies that hire people facing significant barriers to employment.
- **Educational Collaboration:** The state of North Dakota will work with agency partners to confirm the availability of technical training and higher education in sufficient quantity and diversity to support the NEVI impact on the local workforce. The NEVI program will incorporate outreach strategies with local schools, colleges, and vocational programs to develop a pipeline of employees with skillsets needed for the deployment of infrastructure.
- **Inclusive Input and Outreach:** The development workforce training and outreach plans will include input from diverse communities, advocacy groups, and industry organizations, as well as diverse DBE firms. The state of North Dakota will apply their tested practices to establish appropriate trainee and apprentice goals for NEVI deployment projects. Educational collaboration, as mentioned earlier, aims to include outreach and recruitment at historically Native American colleges and universities and will access diverse minority and women students to foster a broad diverse pool to address the need for a diverse local workforce.
- **Leveraging the Energy Industry:** North Dakota's Clean Sustainable Energy Authority (CSEA) was established by the Legislature in 2021 under the control of the North Dakota Industrial Commission to support research, development, and technological advancements through partnerships and financial support for the large-scale development and commercialization of projects, processes, activities, and technologies that reduce environmental impacts and increase sustainability of energy production and delivery. For the 2021-2023 biennium, the program received an appropriation of $25M for grants and the authority to request a line of credit from the Bank of North Dakota for up to $250M. The NEVI program will become a pillar of this initiative, and CSEA will leverage its resources to create a robust workforce to support NEVI development in partnership with communities across the state.

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12: CYBERSECURITY

12.1 Overview

The state of North Dakota and NDDOT are committed to public service, including cybersecurity, cyber-resiliency, and privacy protections for all services and systems in the communities in which they serve.

As the U.S. IIJA has allocated funds for deployment of EVSE within state transportation right of way (ROW), and as NDDOT intends to deploy these systems to support the goal of advancing widespread EV adoption, this cybersecurity policy document provides guidelines and best practices for NDDOT and EVSE deployers.

SECTIONS

12.1 Overview

12.2 Current State of the Industry

12.3 Best Practices - Minimum Guidelines

12.4 Issues Under Consideration

The potential sources and types of cybersecurity threats for EVSEs are evolving, and regularly scheduled risk assessments are prudent and necessary to provide Defense-in-Depth (DiD) protection. Successful exploitation of even a single DCFC can cause relay chatter, other various power quality issues, and phase instability that can have cascading effects upstream into the larger network.

The primary goals of the EVSE cybersecurity guidance are to ensure the following:

- All EVSE infrastructure deployed within the NDDOT system is secure. "Secure" is defined as:
    - Protected against physical or electronic intrusion by unauthorized persons or entities.
    - Hardened against damage or loss of service due to weather, environment, transient surge voltages, traffic incidents, etc.
    - Protected against insider threats, whether malicious or inadvertent.
    - Segmented, or separated, to protect against unintended damage, unauthorized access, loss of data, service availability, or privacy breach from unprotected connections among stakeholder partner and user systems.
- All revenue and financial systems are compliant with payment card industry (PCI) requirements.
- All security operations are compliant with, and certification is maintained for, Security Operations Center – Level 2 (SOC2) audit requirements.
- The functionality required for a fully functional EV charging system is available to support commercial vehicle operations, state fleet operations, and service to private motorists, while assuring maintenance of the above secure environment.
- Physical and electronic resiliency is built in.
- Security by Design is implemented for each project.

12.2 Current State of the Industry

Industry Studies/Reports

According to a September 2021 joint report by Sandia National Labs and the U.S. DOE by Johnson and Slezak (2021) "…. there is no comprehensive EVSE cybersecurity approach, and limited best practices have been adopted by the EV/EVSE industry."

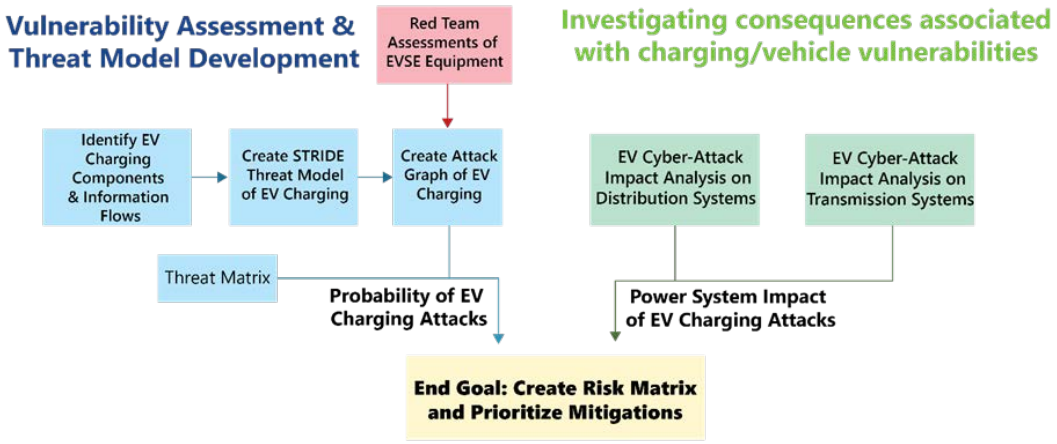
The report *(IBID)* went on to state, "There is an incomplete industry understanding of the attack surface, interconnected assets, and unsecured interfaces." The report stresses the importance of basing cybersecurity recommendations on sound research and provides a technical basis to help guide organizations such as NDDOT when developing cybersecurity policies.

Need to Conduct Project-Specific Risk Assessments

Since the industry does not yet have a clear picture of the attack surfaces, each project (or group of related projects) shall require a full-scope risk assessment to identify the comprehensive threat surface presented by and against the elements of all stakeholder partners/users (grid operators, vehicles, original equipment manufacturer (OEM) vendors, charging network operators, etc.).

Sandia National Labs followed these process/task flows in conducting their research on potential risk models for EVSE. The recommended approach is shown in **Figure 12.1**.

Figure 12.1: Sandia National Labs Risk/Consequence Process Flows



The STRIDE Model for capturing threat surfaces was created by Microsoft and is a good tool for documenting threat surfaces based on analysis of Processes, Data Flows, Endpoints, Trust Boundaries, and Electrical Equipment. These key elements for analysis are identified from the architecture and assessed for risk against the threats represented by STRIDE, as shown in **Figure 12.2**.

Figure 12.2: Sandia National Labs STRIDE Model Elements

Threat	Desired Property
Spoofing	Authenticity
Tampering	Integrity
Repudiation	Non-repudiability
Information Disclosure	Confidentiality
Denial of Service	Availability
Elevation of Privilege	Authorization

12.3 Best Practices – Minimum Guidelines

General

A common set of recommended best practices for the EV deployers is summarized below. Details of these are available from: https://doi.org/10.2172/1706221

Risk Management

- Establish full life-cycle risk reviews and prioritize improvements based on risk to EVSE operations.
- Maintain updated architecture diagrams to identify critical assets, Internet connections, open ports, and supported protocols.
- Establish a process for active security patch management.

Configuration and Change Management

- Create a formal process for uploading code.
- Properly secure keys, credentials, and other secret items.

Identity and Access Management

- Require individual credentials for system login and do not reuse credentials.
- Limit the use of system/maintenance accounts.

Threat and Vulnerability Management

- Use a common vulnerability scoring system (CVSS) to evaluate potential vulnerabilities and prioritized responses.
- Establish and regularly update a comprehensive threat profile.

Communications

- Encrypt all information both internal and external to the EVSE.
- Apply network segmentation and security systems, including intrusion detection systems (IDS's), intrusion prevention systems (IPS's), and firewalls.

Event and Incident Response, Continuity of Operations

- Implement information security continuous monitoring (ISCM) per National Institute of Standards and Technology Special Publication (NIST SP) 800-137.
- Establish protocols and procedures for immediate response to logs or alerts from ISCM, security information and event management (SIEM), and IDS/IPS systems.
- Create a Security Operations Center (SOC) and maintain SOC2 certification.
- Establish business continuity, incident response, and disaster recovery plans. Conduct regularly scheduled tabletop exercises, drills, and reviews to test procedures, train staff, and update per technology changes.

Supply Chain Management

- Use secure shipping channels that include verification of the state of EVSE when it departs a facility.
- Use tamper-resistant seals, alarms, and other protective measures to prevent and report attempts of unauthorized access to equipment or enclosures.

Workforce Management

- Ensure critical roles have redundancy in personnel and cross function capabilities.
- Evaluate competence of staff with periodic social engineering (phishing), audits, etc.

Cybersecurity Program Management

- Mature a cybersecurity program strategy with clear priorities and governance model.
- Include a "safe" environment for anonymous or protected means to report violations or vulnerability concerns.

Foundational Principles

Achieving the best feasible protective posture is facilitated by employing two foundational principles: Security by Design (SbD) and Defense-in-Depth (DiD).

- Security by Design is the controlled use of established processes to build security functions, safeguards and procedures into software and systems design from project initiation, ensuring security is considered and tested throughout the entire design/engineering phase.
- Defense in Depth is the practice of constructing cybersecurity defense via layers of protection that overlap and enhance adjacent layers. Where one layer is defeated, another is automatically implemented to step into the gap and continue defensive efforts.

Following Existing Standards

NDDOT requires compliance with all applicable national, state of North Dakota, and industry standards.

12.4 Issues Under Consideration

On June 22, 2022, the U.S. DOE and U.S. DOT issued a joint NPRM outlining proposed minimum requirements for EVSE deployments built using NEVI grant funds. Final rules will be released by DOE/DOT no later than 180 days from release of the NPRM. **Table 12.1** highlights potential impacts to cybersecurity requirements of NDDOT's NEVI program along with recommended actions for early planning and compliance with the expected forthcoming rules.

Table 12.1: Cyber-Related Requirements

EVSE Requirement from DOE/DOT NPRM of June 22, 2022	Requirement Category	Cybersecurity Impact	Recommended Action
Minimum skill, training, and certification standards for technicians installing, operating, and maintaining EVSE.	Installation, operation, and maintenance by qualified technicians of EV infrastructure.	Likely to require minimal cyber-hygiene training for all techs and cyber certs for certain integrators.	Early development of workforce requirements and training, and follow NPRM progress for final requirements.
Charging equipment certifications, including security.	Installation, operation, and maintenance by qualified technicians of EV infrastructure.	Many aspects of certification may be attainable through state testing and inclusion on an approved products list, but some cybersecurity requirements will likely entail compliance with Federal Information Processing Standard (FIPS) 140-3, PCI standards, and rules for customer data privacy.	Early planning for state DOT labs to certify devices for inclusion on an approved products list and investigating potential outsourcing of testing for cybersecurity requirements if outside of normal state testing operations.
The FHWA proposes a seamless national network of EV charging infrastructure that can communicate and operate on the same software platforms from one state to another.	Interoperability of EV charging infrastructure.	Requirement to communicate on a national scale exponentially expands the potential threat surface.	Follow NPRM for final requirements, begin early national discourse on cyber threats incurred via interconnection. Suggest initiating discussion via American Association of State Highway and Transportation Officials (AASHTO).
Traffic control devices and signage to comply with the Manual on Uniform Traffic Control Devices (MUTCD), et al.	Traffic control devices and on-premise signs acquired, installed, or operated.	Introduction of traffic signals, dynamic message signs (DMS's), etc. expands the threat surface not just for EVSE but to the advanced traffic management system (ATMS) networks to which they may connect for remote operation.	Early consideration of under what conditions an EVSE vendor local agency may outsource remote control of signals, DMS's, and other traffic control devices (TCDs), e.g., connected to local or regional traffic management center (TMC) and managed by ATMS.

Table 12.1: Cyber-Related Requirements (Continued)

EVSE Requirement from DOE/DOT NPRM of June 22, 2022	Requirement Category	Cybersecurity Impact	Recommended Action
The FHWA proposes to outline network connectivity requirements for charger-to-charger network communication, charging network-to-charging network communication, and charging network-to-grid communication. These proposed requirements address standards meant to allow for secure remote monitoring, diagnostics, control, and updates. The FHWA believes these proposed requirements would help address cybersecurity concerns while mitigating against stranded assets (whereby any provider abandons operations at any particular charging station).	Network connectivity of EV charging infrastructure.	These requirements are intended to improve cybersecurity in general, especially in the case of abandoned operations by an EVSE vendor. However, the potential for customer personally identifiable information (PII) and payment data to be exposed during transfer between two disparate platforms must be addressed prior to any transfer.	Follow the NPRM progress and ensure this topic is highlighted during public comment periods. Advance the topic via interaction with standards development bodies, AASHTO, Intelligent Transportation Society (ITS) America, Society of Automotive Engineers (SAE), etc.

Source: Joint U.S. DOE/DOT Notice of Proposed Rulemaking, Electric Vehicle Charging Infrastructure (June 9, 2022).

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13: PROGRAM EVALUATION

13.1 Overview

SECTIONS

13.1 Overview

North Dakota has developed a program evaluation plan that tracks various performance metrics in accordance with all FHWA standards and requirements. This evaluation plan will allow NDDOT and the Joint Office to evaluate the relative success of the EVIP program and adhering to federal standards and requirements for the EV charging network during the 5-year implementation period.

At minimum, data will be collected to comply with federal standards, allowing for the documentation and measurement of the proposed performance metrics. These metrics generally rely on data that will already be collected to meet federal requirements, and thus performance tracking should not be overly burdensome.

The framework, outlined below, aligns with many of the program vision and goals, as well as the overall performance of the infrastructure and program. During the program implementation process, North Dakota will identify benchmarks and performance targets for each draft metric. In general, the information gathered will be compared to the targeted benchmarks on an annual basis. The data collection and evaluation plan will also allow for the identification of opportunities to revise implementation activities and reprioritize activities and funding to better support the deployment, environment, Justice40 Initiative, and long-term operations and maintenance of the EV charging network, while also maximizing the use of federal funding.

NDDOT has developed the following draft performance measures to measure program success, benefits, monitor infrastructure, and to inform future phases of the program.

Table 13.1: Draft Program Evaluation Measures

Indicator	KPI	Metric
Systemwide Performance	EV Adoption	° Registered light-duty vehicles that are BEVs (# and %)
	Environment	° Air quality (modeled pollutants) ° GHG emission reduction (calculated from kWh consumption)
	Job Creation and Workforce Promotion	° Number of new jobs created by investment ° Number of workers engaged in the NEVI Program
EVSE Availability	Minimum Viable Network Completion	° Statewide system miles covered by EV charging stations ° Number of stations meeting NEVI guidance minimum standards
	Access	° Percent of population within 50 miles of a station ° Population within 15 miles of a station ° Utilization of chargers
EVSE Performance	Utilization	° Percent of time with a vehicle connected aggregated by time of day, payment type, land use, and location ° Number of charging events ° Energy consumed per charge event and in aggregate ° Number of unique users per charging station
	Reliability	° Charger availability/uptime ° Number of calls/complaints per location
	Payments	° Average charging cost per kWh ° Number of payments by type
Equity	Justice40 Benefits	° Number of Justice40 communities within two miles of a charger ° Number of Justice40 households within 10 miles of a charger
Customer Satisfaction	Customer Satisfaction with Network	° Net user review score
	Public Perception	° Number of views for public-facing EV charger online map
Implementation Efficiency	Federal Funding Efficiency	° Number of chargers installed per federal dollar provided
	Program Efficiency	° NEVI program progress

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14: DISCRETIONARY EXCEPTIONS

No discretionary exceptions are expected.

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