North Dakota Transmission Authority

North Dakota Industrial Commission

BIL 40101(d) Application

Project Title: Converting Overhead Crossings to Underground Across Federal and State Highways

Applicant: Capital Electric Cooperative

Date of Application: 11/17/2023

Date of Application Revision: 12/18/2023

Amount of Grant Request:
Phase 1: $104,020
Phase 2: $217,910
Total Request: $321,930

Total Amount of Proposed Project:
Phase 1: $155,254
Phase 2: $325,238
Total Project: $480,492

Duration of Project:
Phase 1: 2024, 6 months
Phase 2: 2025, 8 months

Point of Contact (POC): Greg Owen

POC Telephone: 701-712-7908

POC Email: grego@capitalelec.com

POC Address: 7401 Yukon Drive, Bismarck, ND 58503

TABLE OF CONTENTS

Please use this table to fill in the correct corresponding page number.

Applicant Description
Provide a description of the applicant (i.e., type of entity, corporate structure, MWh sold annually, etc.).

Project Description
Provide a description of the project with enough detail to allow the reviewers to adequately evaluate the project.

Standards of Success
Provide a description of how the proposed project will fulfill any or all of the program objectives.

Project Timeline
Provide a project timeline including anticipated start date, significant project milestones, and anticipated project completion date or project duration.

Project Budget
Provide a total project budget, clearly describing the amount of funding requested from NDTA.

Applicant Description

Capital Electric Cooperative (Capital), a rural electric distribution cooperative located in Bismarck, North Dakota, has been serving electricity to its member consumers in Burleigh and southern Sheridan counties since 1948. Capital serves more than 18,714 member consumers, providing nearly 400,000 MWh of electrical service annually to 22,155 locations. Capital owns more than 2,806 miles of distribution line, of which approximately 46% of those lines are underground cable. Capital is a member of and takes transmission service from Central Power Electric Cooperative, Inc, an electric transmission cooperative headquartered in Minot, ND.

Capital has 38 full-time and 2 part-time staff, governed by a board of directors comprised of nine member consumers. The board meets on the fourth Friday of each month, and an annual meeting for the membership is held in June each year. Capital's headquarters is located at 7401 Yukon Drive, Bismarck, ND 58503.

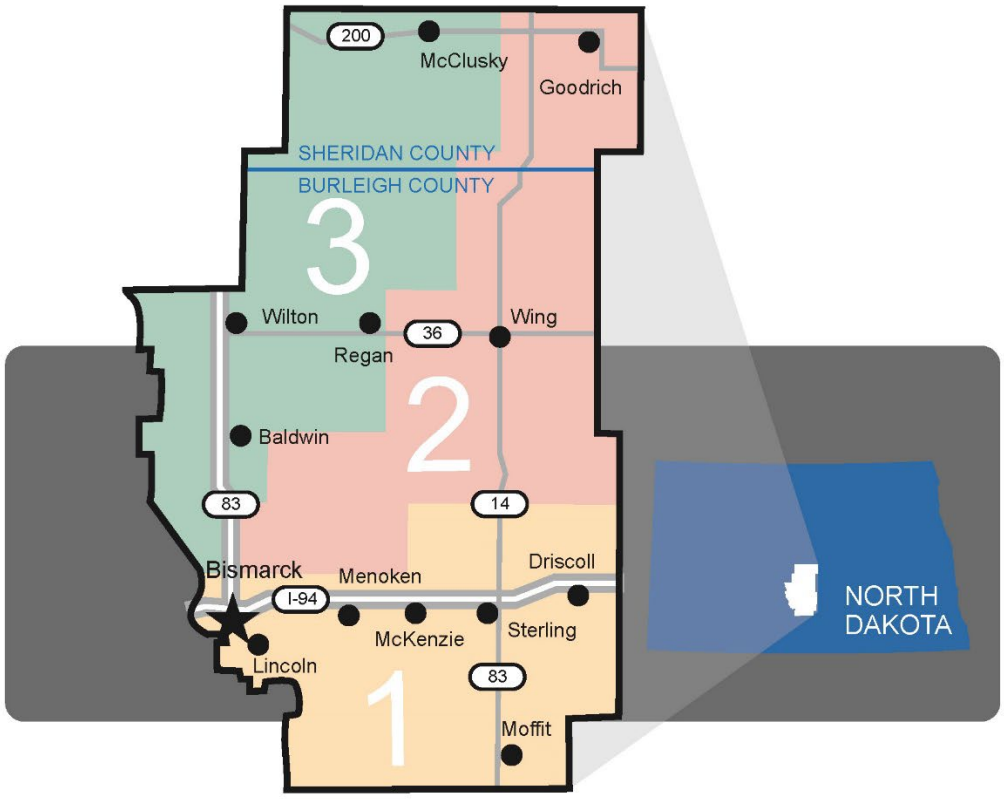

Figure 1: Capital's Service Territory Map

Project Description

Capital's project proposal of converting 49 highway overhead crossings to underground cable is provided in two phases. Phase 1 encompasses converting 18 overhead distribution line road crossings to underground conductors. Phase 1 would bury crossings over North Dakota State Highway 14, between Wing and the Sterling I-94 interchange. This segment of roadway has been proposed by the North Dakota Department of Transportation (NDDOT) to receive an improvement of full-depth pavement reclamation, new surfacing, and widening of the roadway, to be completed in 2024. A summary of the NDDOT project is attached as Exhibit 1 to this proposal. Capital's Phase 1 project would be completed in coordination with the NDDOT project, supporting anticipated construction phasing and milestones.

Capital has completed Phase 1 preliminary engineering and design for converting the existing 18 overhead crossings to underground cable. A summary of each crossing's details and locations is shown in the table below as well as Capital's project summary map is attached as Exhibit 2. Each crossing would install underground cable using directional boring techniques from boundaries of Highway 14 right of way, which varies in width from approximately 200 to 300ft along the project corridor. At each edge of the right of way, cables would be connected at the existing poles to the remaining overhead conductors to continue service, with the final step of removing the overhead conductors from over the roadway.

Table 1: Summary of Phase 1 Project, Highway 14 Road Crossing Locations

Crossing No.	Phase(s)	Section(s)	Township	Range
1	2-ph	10	142	76
2	A-ph	10	142	76
3	B-ph	10	142	76
4	B-ph	10	142	76
5	B-ph	26, 27	142	76
6	B-ph	26, 27	142	76
7	B-ph	2, 3	141	76
8	2-ph	14, 15	141	76
9	C-ph	14, 15	141	76
10	3-ph	26, 27	141	76
11	A-ph	8, 9	140	76
12	A-ph	8, 9	140	76
13	A-ph	16, 17	140	76
14	C-ph	20, 21	140	76
15	3-ph	28, 29	140	76
16	C-ph	8, 9	139	76
17	C-ph	16, 17	139	76
18	A-ph	20. 21	139	76

For the project Phase 2, the concept for 31 additional state and federal highway crossings.

- Along ND Highway 36 between Regan and Kidder County, 14 overhead crossings.
- Along US Highway 83 between Sterling and Emmons County, 8 overhead crossings.
- Along US Interstate 94 between Bismarck and Kidder County, 9 overhead crossings.
- The same techniques used on Phase 1 will be utilized on the Phase 2 project. The I-94 crossings will require longer bores, where the road right of way width approaches 500ft.
- A map of the proposed Phase 2 project is attached as Exhibit 3 and detailed below.

Table 2: Summary of Phase 2 Project, Highway 36, 83, and Interstate 94 Road Crossing Locations

Crossing No.	Highway	Phase(s)	Section(s)	Township	Range
19	ND36	C-ph	4, 9	142	77
20	ND36	C-ph	10	142	77
21	ND36	C-ph	2, 11	142	77
22	ND36	C-ph	2, 11	142	77
23	ND36	C-ph	1, 12	142	77
24	ND36	A-ph	5, 8	142	76
25	ND36	A-ph	4, 9	142	76
26	ND36	2-ph	3	142	76
27	ND36	A-ph	1, 12	142	76
28	ND36	B-ph	6, 7	142	75
29	ND36	B-ph	4, 9	142	75
30	ND36	A-ph	3, 10	142	75
31	ND36	A-ph	2, 11	142	75
32	ND36	A-ph	2, 11	142	75
33	US83	B-ph	4, 5	138	76
34	US83	B-ph	28, 29	138	76
35	US83	A-ph	8, 9	137	76
36	US83	C-ph	16, 17	137	76
37	US83	3-ph	20	137	76
38	US83	B-ph	20	137	76
39	US83	B-ph	28, 29	137	76
40	US83	B-ph	13, 18	136	76, 77
41	I-94	B-ph	11, 14	139	75
42	I-94	B-ph	10, 15	139	75
43	I-94	A-ph	18	139	75
44	I-94	A-ph	14	139	76
45	I-94	B-ph	22, 27	139	77
46	I-94	B-ph	20, 29	139	77
47	I-94	B-ph	19, 30	139	77
48	I-94	C-ph	22, 27	139	78
49	I-94	C-ph	19, 30	139	78

Standards of Success

Enhancing grid resiliency is a core element of Capital's long-term infrastructure plans, demonstrated by annual investments in rebuilding 25 miles of overhead line and strategic conversions of overhead to underground conductors. Specific to overhead highway crossings, Capital converted the final overhead crossing of Highway 83 north of Bismarck in 2022; Bismarck to Wilton is free from overhead distribution line crossings, while some higher voltage transmission lines remain. Eliminating remaining overhead crossings from state and federal highways is a strategic initiative Capital commits to perusing.

The success of the proposed project can be summarized by the following impacts:

1. Reducing the magnitude and duration of grid outages. Power lines, distribution in particular, tend to follow and cross major roadways due to the increased population and development near the roadways. As such, greater numbers of consumers are impacted when these segments are damaged by a major event. Spans between poles tend to be longer, often utilizing taller structures to ensure clearance over the roadways, making them more suspect to weather events such as lightning or strong winds. The same spans present additional hazards when heavily laden with ice or frost, causing extreme sag in the conductors. A downed conductor, especially in these storm conditions, requires additional care and response time to first clear the roadway of debris then utilize additional bucket trucks and/or stringing equipment to safely install new conductor over the roadway. By eliminating overhead roadway crossings, durations of outages are reduced by avoiding the challenges of reconductoring over an active roadway. Putting sections of underground conductors within an overhead segment also reduce the magnitude of grid outages by limiting the domino effect of one downed pole pulling down the next and the next; this is an alternative to installing specialized, expensive overhead structures designed for this cascade-limiting purpose.
2. Reducing the frequency and impacts of a major storm/non-storm event. While most overhead outages are temporary in nature (ex. lightning strikes, animal/tree contact), permanent outages such as a downed line or broken pole have significant effects on grid service. Crews must be dispatched, often after normal business hours, to clear the cause of the fault and then rebuild the overhead structures. By converting the overhead conductors to underground, the temporary causes of outages are eliminated simply by removing the possibility of a contact. Road right of way, especially state or federal right of way, has procedures for entities looking to install facilities within the right of way, so the chances of an unintentional dig-in are yet further reduced specifically in the case of road crossings; thus, the most likely cause of an outage in a crossing location would be a cable fault, of which Capital has yet to experience one in the 30+ years of installing modern underground cable. While Capital cannot guarantee outage-free service, installation of underground cable presents the best solution for obtaining the lowest outage frequency possible.

3. Providing lower-cost energy access to disadvantaged or underserved communities. The impacts in this category of the proposed project can be highlighted as follows:
    a. Converting the overhead lines to underground conductors in this project will utilize larger gauge (diameter) conductors, which inherently have a lower impedance per foot than the existing overhead conductors, resulting in reduced line losses on these segments. Reduction in line losses helps eliminate wasted energy and thus better financial cost of service to the member consumers. Kidder county, east of the proposed project area, is identified as a disadvantaged community (38043966800); Capital's lines impacted by these projects do extend service into Kidder County as well, thus a disadvantaged community will see benefits.
    b. House movers often utilize the Highway 83/36/14 corridor to move homes around the Bismarck area, avoiding the myriad clearance conflicts therein. As such, Capital is often called to raise overhead crossings in this project area to ensure safe passage of a moved home. In a typical year, Capital crews escort 6 homes through this area, with each move committing one crew for the day to raise lines. While movers are charged for the crew's time, this effort makes the crew unavailable for other tasks during the day, which can result in inefficient dispatching of remaining crews in the event of an outage. Each time the lines are raised puts additional stress on the conductors and hardware, making them more susceptible to outages in future storm events. By burying overhead highway crossings, the member consumers benefit from greater crew availability and productivity, as well as reduction in future outage events made more susceptible by these activities.
    c. Perhaps most importantly, converting overhead roadway crossings to underground presents enhanced safety and services to the public. A downed overhead line on a roadway is an extreme hazard to the public, as the line can stay energized without tripping a protective device (asphalt is an excellent insulator). It is commonly thought that a line on the ground is dead and safe to drive over—not true! Education helps, but the best safeguard against accidental contact is to remove the possibility completely. Similarly, eliminating overhead crossings also ensures a downed line is not an impediment to public services such as snowplows, highway patrol, and ambulance services. After hours response time to the proposed project area is often 30 minutes during good driving conditions, with longer times expected during storm events; any minute of delay to a first responder arriving on-scene can make the difference between life or death, thus eliminating the overhead roadway crossings presents a significant benefit to public safety and services. A letter from NDDOT supporting Capital's proposed Phase 1 project is attached as Exhibit 4.

Project Timeline and Team

Capital's proposed Phase 1 project would be completed in 2024, performed in close coordination with NDDOT's project team. The need to coordinate is important for both organizations to:

1. Ensure any existing overhead lines are converted before clearances become a hinderance to road construction. If a line would need to be raised to support construction equipment, installing taller poles just to bury the crossing shortly thereafter is financially imprudent.
2. Ensure any new underground is installed at sufficient depth to not create a conflict during road construction. Cuts to existing roadways are often made to change a grade or install a culvert, thus Capital will work with the NDDOT team to ensure their design requirements are incorporated into Capital's construction.

Once the NDDOT project is awarded and construction begins, Capital anticipates being able to complete on average two crossings per week; the overall Phase 1 project could be completed as quickly as nine weeks yet will likely be executed in segments to correspond with the NDDOT project. These details will be discussed at the NDDOT coordination kickoff meeting and subsequent construction meetings. In summary, Capital's Phase 1 project is expected to begin in May and be completed by November 2024.

Capital's Phase 2 project would enter detailed design and environmental review in 2024, with the goal of being ready to start construction in May of 2025. The 31 crossings proposed in Phase 2 will take a bit longer than Phase 1, especially related to the I-94 crossings; these crossings may average completion of one per week. The remaining 22 crossings can be completed on a similar two-per-week schedule as was completed in Phase 1. The complete scope is anticipated to be completed in six months, yet a project duration of eight months is utilized to account for the unexpected and potential weather delays.

Capital will continue coordination with NDDOT for the proposed Phase 2 project, as I-94 is projected to have resurfacing from Bismarck to Menoken in 2026 as well as a reconstruction of the Sterling Interchange in 2025. Any of the I-94 crossings proposed by Capital will be checked with NDDOT engineers to ensure any underground cables are installed at sufficient depth to avoid any cuts or grading changes being considered for the interstate.

Capital has planned for utilizing the following team to complete the proposed projects:

- Greg Owen, Manager of Engineering Services: point of contact for the projects.
- Beau Townsend, Staking Engineer: design of overhead to underground.
- Corey Bruner, Staking Specialist: design of overhead to underground.
- James Keller, GIS Specialist: edits electronic mapping system.
- Darren Becker, Work Order Coordinator: compiling project accounting records & grant administration.
- Operations Department, including Operations Manager, Foreman, Lead Linemen, Journeymen Linemen, and Apprentice Linemen: responsible for removal of overhead lines and connecting underground cable to remaining overhead structures. All field personnel in the Operations Department participate in Local Union 1593, International Brotherhood of Electrical Workers.
- Underground Contractor, selected from Capital's approved contractor list: responsible for directional boring of new cable under roadway.

Capital's internal team and contractors are highly experienced in completing this type of project. The engineering team utilizes software tools to directly enter and track design and materials throughout a project lifecycle. GIS edits are quickly made to ensure field crews have up-to-date information on their mobile devices. Operations personnel routinely perform these types of overhead retirements and underground connections. Capital's underground contractors are familiar with NDDOT and ND One Call requirements to ensure permits and locates are properly documented. Resumes of specific individuals or positions can be made available upon request. While Capital does not plan on directly hiring additional staff to support this project, an additional dedicated contractor crew of up to four workers may be hired to complete this scope of work.

One variable with scheduling can often be the time required to complete an environmental review (when required). Capital contracted with HDR Engineers to complete an environmental review for Phase 1 in accordance with the RUS review guidelines. The necessary request for comments has been sent to appropriate agencies with any comments received and addressed, including a concurrence of no historic properties affected from the North Dakota State Historical Preservation Office. Threatened and Endangered species have been evaluated and determined the project will have not affect. Relevant environmental review documents are attached as Exhibit 5. A similar effort will be undertaken in 2024 to support the proposed Phase 2 project construction in 2025.

In summary, Capital is prepared and committed to completing the proposed Phase 1 project by November 2024 and Phase 2 project by December 2025.

Project Budget

Due to the variation in road right of way widths and unknowns of any additional considerations from NDDOT's road reconstruction project, the costs for each Phase 1 crossing are based on an assumed 250ft of directional boring. Additional costs are included for each two or three-phase crossing, as well as anticipated costs for administering the required compliance and reporting associated with the grant itself. Phase 2 costs include a price escalation factor to account for inflationary pressures, as well as longer boring lengths for the I-94 crossings. Phase 2 also includes the cost for completing the environmental review process. A contingency of ~5% is included to account for the unknowns of each location (ex. excavation of large rocks) as well as potential cost pressures not yet quantifiable.

In terms of costs avoided by the proposed projects, a downed line over a roadway could take two crews two hours to mobilize/demobilize, plus four hours to remove and repair the damaged overhead conductors. This time may be extended in the event of a major storm, along with utilizing additional resources to string new conductor over an active roadway. This will most likely occur in the afterhours, quite possibly totaling >$2,500 in labor and materials for a single crossing. Each house move through Capital's system typically costs $1,200 in labor and equipment time. Considering the costs if a life was lost, whether due to direct contact or due to impeded first responders, the costs can be hundreds of thousands if not in the millions of dollars. While the cases of an outage or death are difficult to quantify on an annual basis, at minimum the costs for six house moves a year is $7,200, which is approximately equal to one roadway crossing conversion.

Capital is willing to provide more of a cost share (up to 50%); however, due to the overall size of the projects consisting of many smaller components, Capital strongly encourages NDTA to consider providing 2/3 of the cost recovery for Capital to fully realize the benefits of the grant, awarding an amount of $321,930. A summary of the proposed project budget is shown in the table below.

Table 3: Budget Summary for Capital's Proposed Projects

Phase 1 Project Costs: Direct Labor, Overhead, Materials, and Contracted Services, per RUS Accounting			
Crossing No.	Contracted Costs	Internal Costs	Total
1-18	$ 109,000.00	$ 32,400.00	$ 141,400.00
Grant Administration Costs:			$ 7,200.00
		Phase 1 Total	$ 148,600.00
		Ph1 Cont. ~5%	$ 6,654.00
		Ph1 Grand Total	$ 155,254.00
		Ph1 CEC 1/3	$ 51,234.00
		Ph1 Grant 2/3	$ 104,020.00
Phase 2 Project Costs: Direct Labor, Overhead, Materials, and Contracted Services, per RUS Accounting			
Crossing No.	Contracted Costs	Internal Costs	Total
19-49	$ 228,000.00	$ 60,050.00	$ 288,050.00
Environmental Review:			$ 10,850.00
Grant Administration Costs:			$ 12,400.00
		Phase 2 Total	$ 311,300.00
		Ph2 Cont. ~5%	$ 13,938.00
		Ph2 Grand Total	$ 325,238.00
		Ph2 CEC 1/3	$ 107,328.00
		Ph2 Grant 2/3	$ 217,910.00
Summary	Phase 1	Phase 2	Total
Total	$ 148,600.00	$ 311,300.00	$ 459,900.00
Cont. ~5%	$ 6,654.00	$ 13,938.00	$ 20,592.00
Grand Total	$ 155,254.00	$ 325,238.00	$ 480,492.00
CEC 1/3	$ 51,234.00	$ 107,328.00	$ 158,562.00
Grant 2/3	$ 104,020.00	$ 217,910.00	$ 321,930.00

Exhibit 1: NDDOT's Highway 14 Project Summary

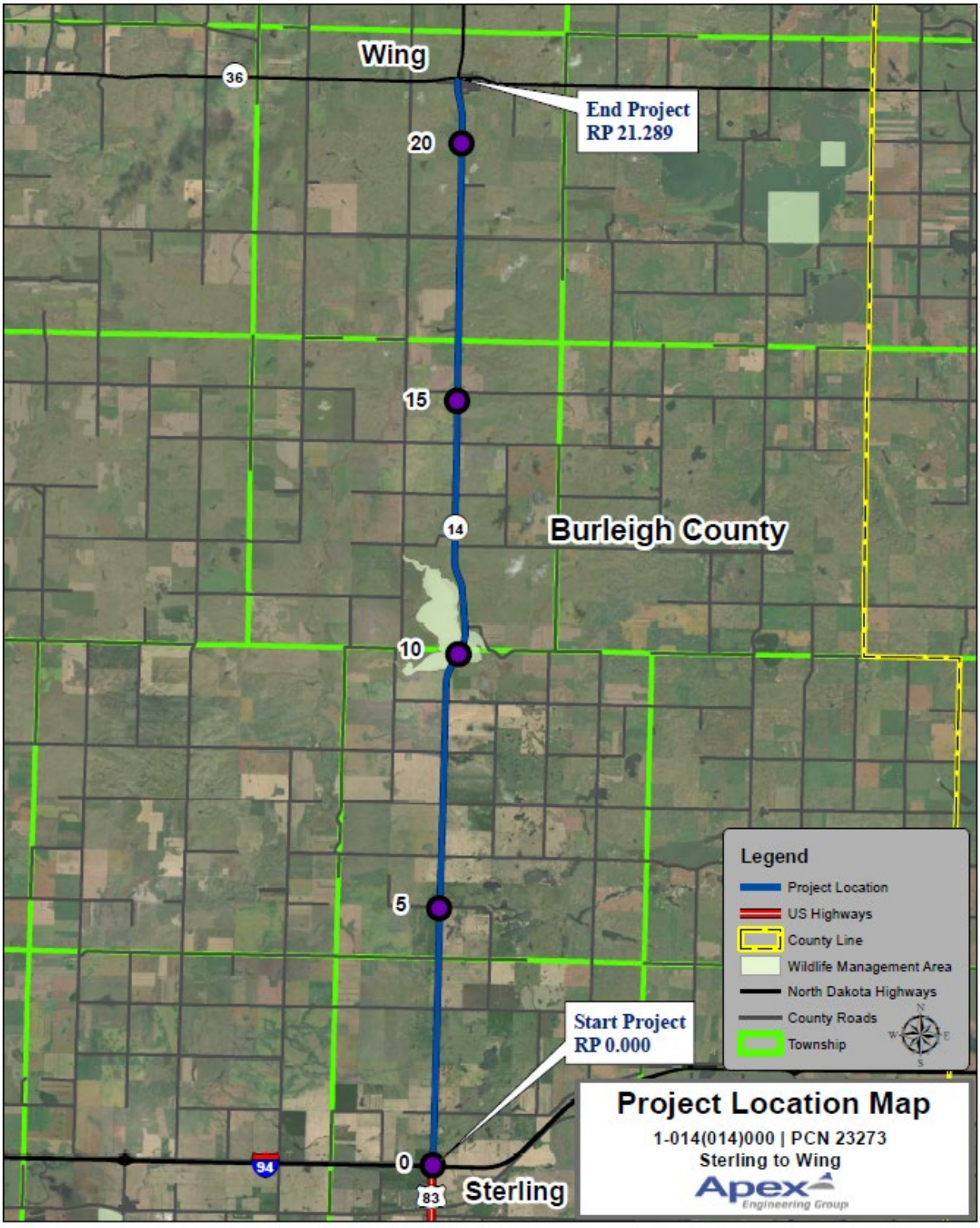

Exhibit 2: Capital's Phase 1 Project Summary

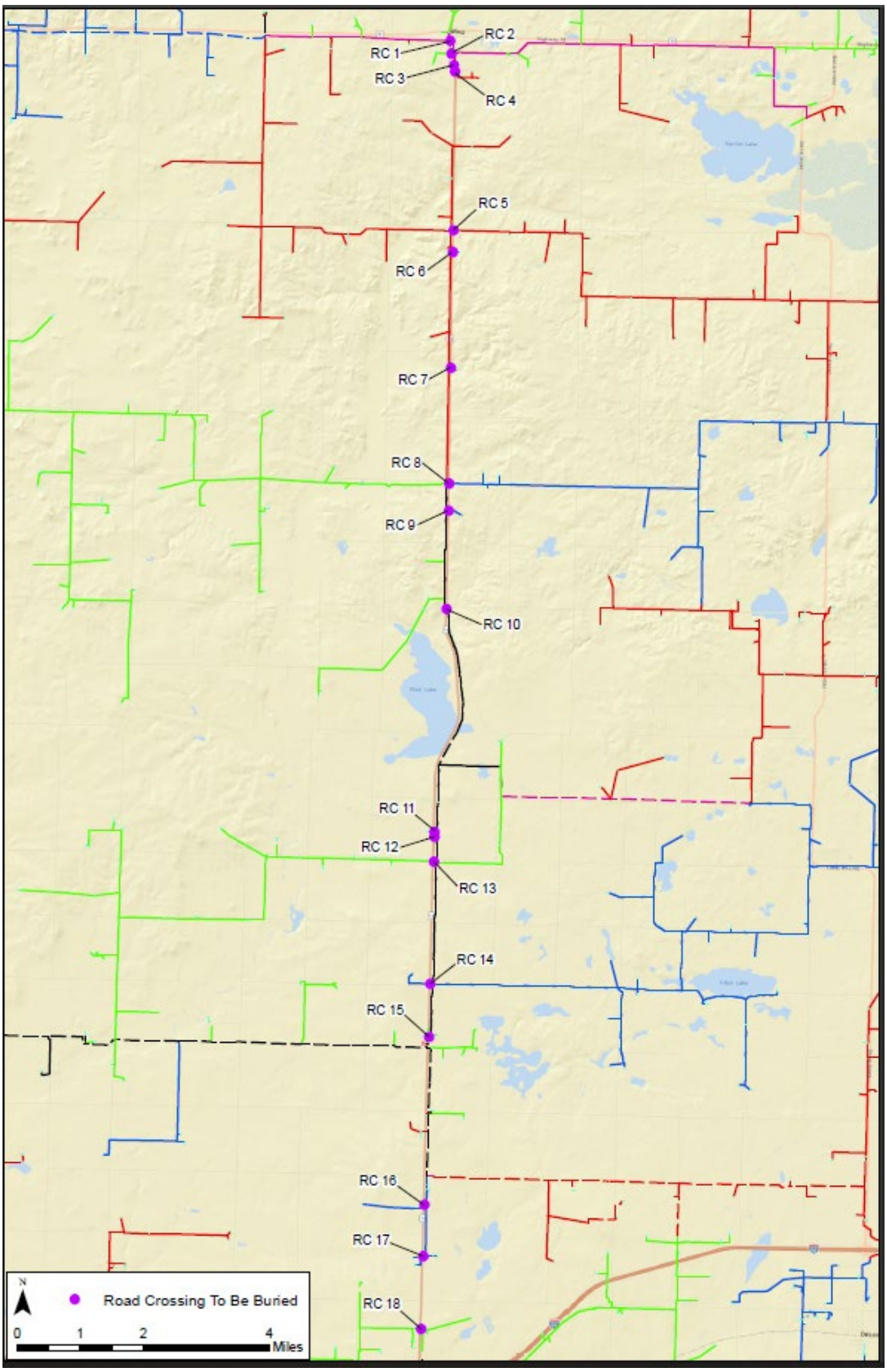

Exhibit 3: Capital's Phase 2 Project Summary

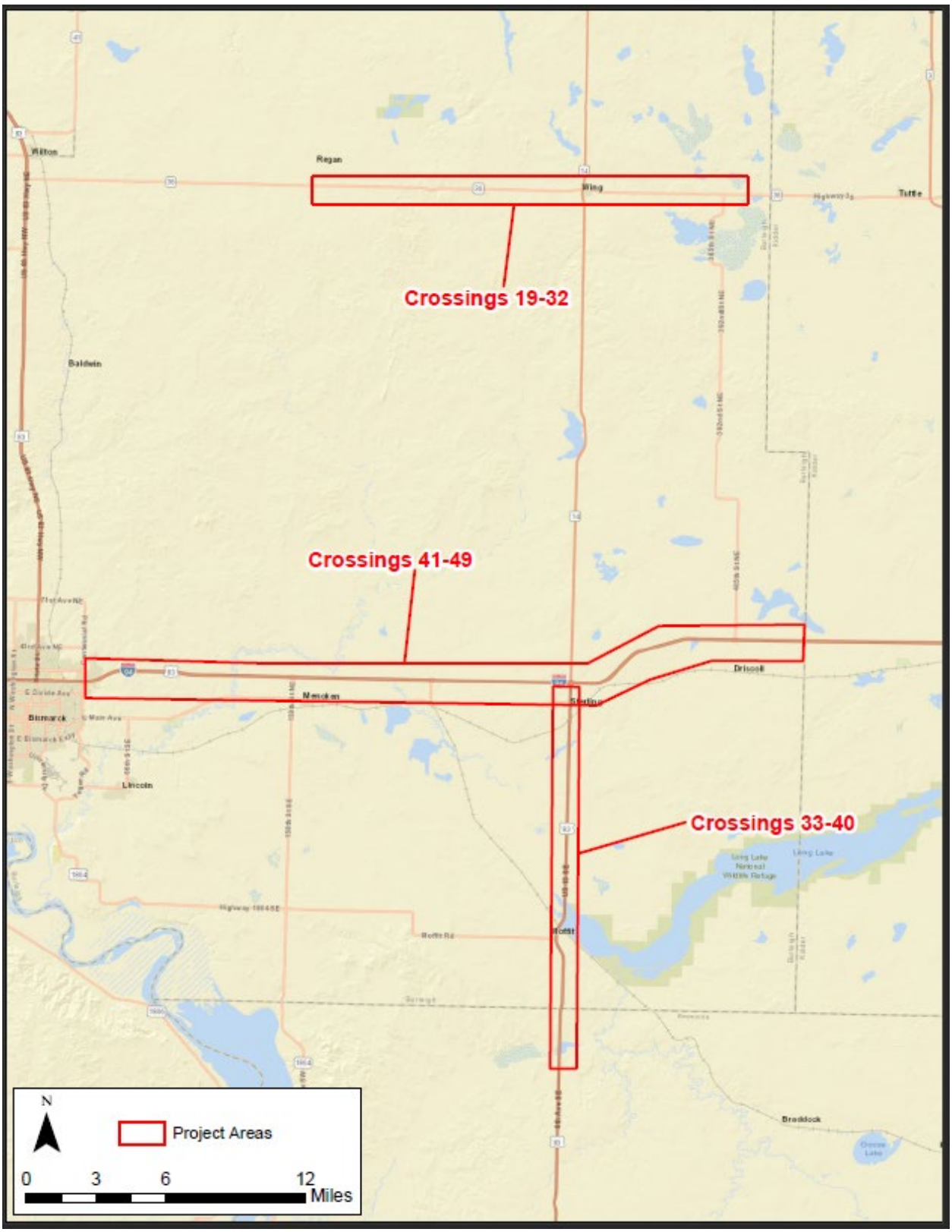

Exhibit 4: NDDOT Letter of Support for Capital's Phase 1 Project

NORTH Dakota | Transportation
Be Legendary.

November 9, 2023

Claire Vigesaa
Executive Director
North Dakota Transmission Authority
600 E. Boulevard Ave, Dept. 405
Bismarck, ND 58505-0840

Dear Director Vigesaa:

RE: NDDOT SUPPORTS CAPITAL ELECTRIC COOPERATIVE'S APPLICATION FOR NORTH DAKOTA TRANSMISSION AUTHORITY (NDTA) FUNDS

The North Dakota Department of Transportation is pleased to support Capital Electric Cooperative in its application under NDTA's grid resilience funding opportunity. We understand that NDTA seeks to deploy and catalyze projects that reduce the magnitude and frequency of interruptions, minimizing impacts that outages can cause to consumers and the public. The project will advance these objectives by eliminating spans of overhead conductor that can cause blockages to not only public traffic, but public services provided by snowplow operations and first responders to an important section of rural area in Capital Electric's service territory.

This Letter of Support confirms the support and involvement of Capital Electric Cooperative, having offices at 7401 Yukon Drive, Bismarck, ND 58503, in the development of a project resulting in a more resilient electric grid in North Dakota. The project is to convert overhead distribution line crossings over North Dakota Highway 14 between the towns of Sterling and Wing to underground cable by boring under the roadway crossing. This segment of highway currently has 20 overhead distribution line crossings, and each of these crossing locations represents a potential failure point that can lead to road closures/blockages hindering response abilities for public service entities. By converting these overhead crossings to underground cables, the impacts to these potential downed conductors can be eliminated.

Our Bismarck District Engineer, Larry Gangl, looks forward to working with Capital Electric Cooperative on this project to coordinate the work within NDDOT right-of-way to ensure a resilient electric grid in North Dakota.

Sincerely,

for the Ronald J. Henke, PE
Director

17/rjg
C: Larry Gangl, Bismarck District Engineer

Exhibit 5: Phase 1 Environmental Review Documents

STATE HISTORICAL SOCIETY
OF NORTH DAKOTA

HISTORY FOR everyone.

March 13, 2023

Tina Fricke-Robinson
HDR, Inc.
3231 Greensboro Drive
Suite 200
Bismarck, ND 58503

ND SHPO Ref.: 23-5416 Capital Electric Cooperative Project 367, Replace 20 miles of OH (overhead) with URD, Hwy Crossings in portions of [T142N R76W Sec - 10, 11, 15, 22, 27 & 34] [T141N R76W Sec - 3, 10, 15, 22, 23, 26, 27, & 35] [T140N R76W Sec - 4, 9, 16, 21, 28, 33] [T139N R76W Sec - 4, 9, 16, 21]Burleigh County, North Dakota

Dear Tina,

We reviewed ND SHPO Ref.: 23-5416 Capital Electric Cooperative Project 367, Replace 20 miles of OH (overhead) with URD, Hwy Crossings in portions of [T142N R76W Sec - 10, 11, 15, 22, 27 & 34] [T141N R76W Sec - 3, 10, 15, 22, 23, 26, 27, & 35] [T140N R76W Sec - 4, 9, 16, 21, 28, 33] [T139N R76W Sec - 4, 9, 16, 21]Burleigh County, North Dakota and we concur with a determination of "No Historic Properties Affected" for this project provided it takes place in the location and in the manner described in the documentation and provided all borrow comes from an approved source.

Thank you for the opportunity to review this project. Please include the ND SHPO Reference number listed above in further correspondence for this specific project. If you have any questions please contact Lisa Steckler, Historic Preservation Specialist at (701) 328-3577 or lsteckler@nd.gov

Sincerely,

for William D. Peterson, PhD
State Historic Preservation Officer
(North Dakota)

23-5416

North Dakota Heritage Center & State Museum
612 East Boulevard Avenue
Bismarck, ND 58505-0830

701.328.2666
histsoc@nd.gov

history.nd.gov
statemuseum.nd.gov

7 CFR 1970 Environmental Policies and Procedures

Environmental Report

RUS Project 367, Burleigh County, ND

Capital Electric Cooperative

Note: this is an excerpt from the full environmental report, including agency responses. A copy of the full report will be made available upon request.

Greg Owen

Table of Contents

Attachments