SCOPING REPORT

Project No.
NH-3-015(042)001

PCN
24901

ND 15 - Fessenden Pump Station

Prepared by

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
BISMARCK, NORTH DAKOTA

http://www.dot.nd.gov/

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February 2026

23 USC § 407
NDDOT Reserves All Objections

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SCOPING REPORT

A. GENERAL INFORMATION

Project Number: NH-3-015(042)001
District: Devils Lake
Highway: 15
Location: Fessenden Railroad Underpass
Reference Point: 0.700 to 1.000

Counties: Wells
Legal Description: T148N, R70N, Sec 8, 17

Functional and Funding Roadway Classification: District Corridor
National Highway System: Yes
Speed Limit: 45 mph
Freight Level: 2
Freight Constraints: Width (< 26 ft)
Project Schedule: Proposed to be added to the STIP as a Reconstruction

dTIMS Recommendations: Constrained: Preventative Maintenance 2025
Unconstrained: Major Reconstruction 2028
Functional Capacity Constrained: Minor Sliver Grade 2026
Functional Capacity Unconstrained: Minor Sliver Grade 2025

B. PURPOSE, NEED, AND IMPROVEMENT

Purpose and Need of Project:

The purpose of this project is to maintain reliable and safe transportation by addressing deficiencies in the pumping station and pavement structure at the Fessenden railroad underpass.

The approximately 80-year-old pumping station is functionally obsolete. Replacement parts for the pump are no longer manufactured, requiring custom fabrication by district staff. This has led to increasing maintenance challenges and frequent equipment breakdowns. As a result, the underpass has experienced flooding and periodic roadway closures, posing safety risks and disrupting travel for the public. Additionally, the existing pumping system's capacity is insufficient to reliably manage stormwater during weather events.

The pavement in this section also exhibits significant distress. The existing roadway structure consists of a non-reinforced PCC constructed in 1973, with a thin lift overlay constructed in 2007. Underlying joints and cracks have been reflected on the surface, reducing ride quality, increasing maintenance costs, and limiting the roadway's long-term serviceability.

Addressing deficiencies in both the pumping station and the pavement is necessary to ensure safe, reliable, and efficient travel through this critical corridor.

Proposed Improvement:

The proposed project would reconstruct the roadway structure and replace the pump station infrastructure to restore safe, reliable transportation at the Fessenden railroad underpass. Both concrete and asphalt surfacing options are considered to meet long-term serviceability needs, and all safety features will be updated to comply with the American Association of State Highway and Transportation Officials (AASHTO) *Manual for Assessing Safety Hardware (MASH)* standards.

- Alternative 1 – Do Nothing
- Alternative 2 – Pump Station Replacement with HMA Pavement
- Alternative 3 – Pump Station Replacement with PCC Pavement

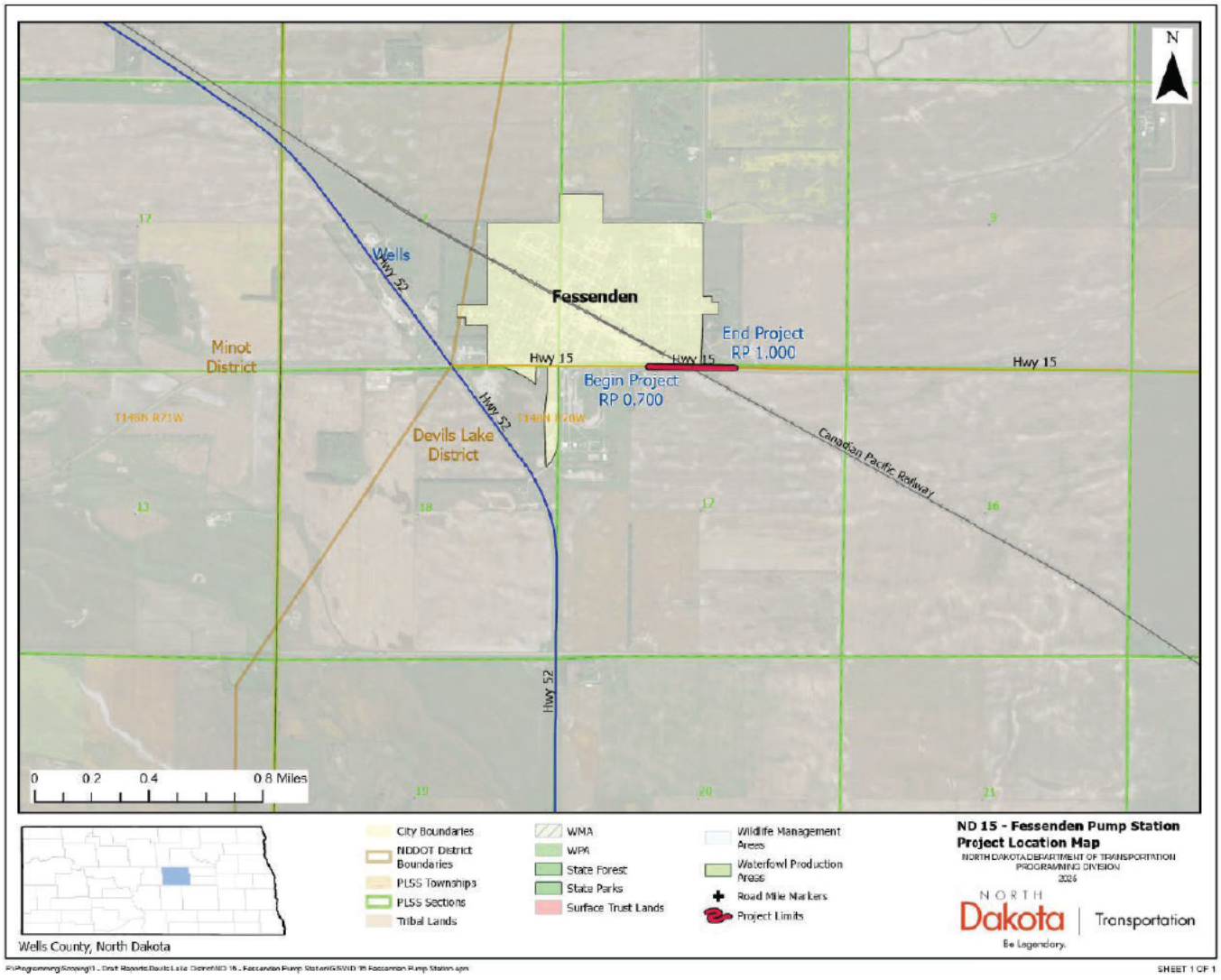

Figure 1 – Project Location Map

Note – Exact limits to be determined during project development

C. TRAFFIC AND CRASH ANALYSIS

Average Annual Daily Traffic (AADT) and Equivalent Single Axle Loads (ESALs) are shown in Table 1.

Table 1 – Current & Forecast Traffic Data

RP 0.00 to 1.00	Year	Pass	Trucks	Total AADT	Flex ESALS	Rigid ESALS
Current Traffic	2024	815	100	915	70	110
Forecast Traffic	2044	995	150	1,145	100	165

Crash Analysis:
There were no reported crashes between RP 0.700 and 1.000 within the 5-year analysis period from 1/1/2020 to 12/31/2024. There are no recommendations.

D. EXISTING ROADWAY CHARACTERISTICS

Pavement condition data from 2006, before the thin lift overlay, showed poor IRI, fair distress, transverse cracking, longitudinal cracking, and bituminous patching. Updated pavement condition data after 2006 is unavailable.

Table 2 – Pavement Condition Performance Measures

	International Roughness Index (IRI)	Distress Score	Rut
Excellent	< =60	≥ 98	< 0.25″
Good	61 – 99	88 – 97	0.25″ to 0.375″
Fair	100 – 145	77 – 87	0.376″ to 0.50″
Poor	> 145	≤ 76	> 0.50″

Table 3 – Pavement Condition Data RP 0.700 – 0.100

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
52	N/A	N/A	N/A	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
31	N/A	N/A	N/A	N/A

The construction history is outlined in Table 3. The Thin Lift Overlay project in 2007 also included replacing the existing heaved manhole castings with floating manhole castings.

Table 4 – Construction History RP 0.700 – 0.100

Year	Construction	Depth (in)	Width (ft)	Oil
1973	GRADE	-	32.0	-
1973	AGGREGATE BASE	2.0	31.0	-
1973	NON-REINF PCC	8.0	24.0	-
1989	CONCRETE PAVEMENT REP	-	-	SS-1
1998	DRIVE SLOPE FLATTENIN	-	-	120-150
2005	MICROSURFACING	-	24.0	MC-3000
2007	HOT BIT PAVEMENT	1.5	24.0	PG 58-28

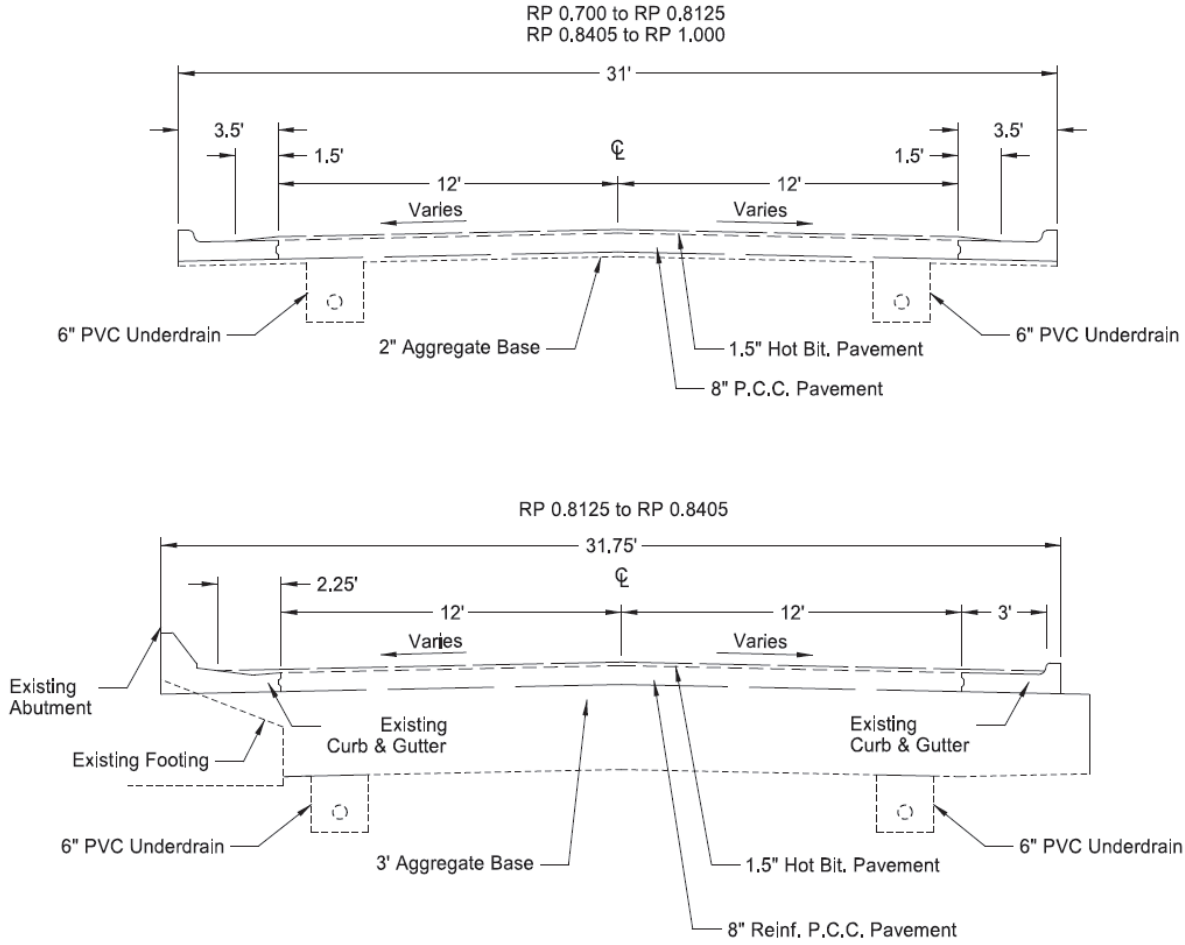

Figure 2 – Existing Typical Sections

E. EXISTING GEOMETRY

Cross-Section:
ND 15 between RP 0.700 and RP 1.000 does not meet the 30-foot width requirement outlined in the NDDOT *Design Manual Section I-06.03.07*. The roadway traveled width is constrained by the CP railway bridge abutments.

Horizontal Curves & Superelevation:
There are no horizontal curves in the project area.

Vertical Curves:
Use stopping sight distance for crest curves and comfort criteria for sag curves. Vertical curves are summarized in Table 4.

Table 5 – Vertical Curves

Location	Curve Length (ft)	Existing K/ Required L
RP 0.695	540 CREST	K = 4,399
RP 0.831	680 SAG	L = 288
RP 0.980	890 CREST	K = 35,034

F. EXISTING STRUCTURES

Bridges
The existing steel girder bridge is owned, operated, and maintained by CP Railway. The existing vertical clearance is 15'-8".

Table 6 – Existing Structure

Bridge No	Description	Feature	Length (ft)	Width (ft)	Rating
15-000.899 B	Steel-Girder-FB	CP Railway	95	-	-
Recommended Improvement: N/A (Owned, inspected, and maintained by CP Railway)					

Centerline Pipes: N/A.

G. LAND INTERESTS

Communities: Fessenden
Reservation: None
Surface Trust Land: None
National Parks/Grasslands: None
State Parks/Forests: None
Waterfowl Production Area: None
Wildlife Management Area: None
Adjacent Land Usage: Agricultural, Industrial

H. ISSUES AND APPURTENANCES CHECKLIST

1. Curb and Gutter? Yes X No ____

   Replacement of the curb and gutter is included in the cost estimate.

2. Sidewalk? Yes ____ No X
3. Multi-Use Path? Yes ____ No X
4. ADA Ramps? Yes ____ No X
5. State Bicycling Network? Yes ____ No X
6. Lighting? Yes ____ No X

7. Signals? Yes ____ No __X__

8. Storm Sewer? Yes __X__ No _____

The storm sewer system consists of 6" PVC underdrains, 48" manholes, and a 12" pipe connecting inlets at the lowest point of the underpass. The lift station pump house outlets using 24" corrugated plastic pipe and 60" manholes. The cost estimate includes replacement of the lift station and storm sewer system. Discharge pipes would likely need upsizing to 15".

9. Manholes? Yes __X__ No _____

The wet well for the existing facility is likely undersized, with a 15' square manhole needed based on preliminary scoping. Replacement of manholes and floating castings is included in the cost estimate.

10. Water, Sewer, or Other Underground Work? Yes ____ No __X__

11. Parking Facilities? Yes ____ No __X__

12. Frontage Roads? Yes ____ No __X__

13. Utility Issues? Yes __X__ No _____

Buried utilities may be impacted within the project area:

Table 7 – Utilities

Company	Type	Dir.	From RP	To RP	Length (ft)	Offset (ft)	Position
Mid-Continent Communications	Buried Television	E	0.8663	1.8347	5094	44	Right Of Centerline
CenturyLink	Buried Telephone	E	0.606	0.6308	131	60	Left Of Centerline
CenturyLink	Buried Telephone	E	0.632	1.0121	1988	44	Right Of Centerline

14. Landscaping? Yes ____ No __X__

15. Approach or Ditch Block Flattening? Yes ____ No __X__

16. T Intersection Recovery Approaches? Yes ____ No __X__

17. Fence? Yes ____ No __X__

18. Railroad Crossings? Yes __X__ No _____

The 95'x66' Canadian Pacific (CP) railway steel girder bridge was built in 1940 and rehabilitated in 1973. Historic plans show 24-inch smooth wall steel outlet pipes bored under the railway line southeast of the underpass.

19. Detours? Yes X No _____

A detour route may be necessary to support the major rehabilitation of the underpass pavement and drainage structures. A route through Fessenden (0.850 miles) is possible but lies outside the state system and includes an at-grade railroad crossing. The estimated cost for a mill and overlay of the following detour was included in the overall estimate:

Country Rd 1 (Wells County) to 2nd Street NE (City of Fessenden) – 0.200 miles
2nd Street NE to 7th Avenue (City of Fessenden) – 0.400 miles
7th Avenue (City of Fessenden) to ND 15 – 0.25 miles

Additional coordination with the City of Fessenden and Wells County should be done during project development to identify other detour options.

20. Automatic Traffic Recorder Locations? Yes ____ No X

21. Weigh-In-Motion Sites? Yes ____ No X

22. ITS (Deicing, Snow Gates, VMS, RWIS, etc.)? Yes ____ No X

23. Highway Patrol/Truck Pullouts or Rest Areas? Yes ____ No X

24. Additional Right of Way? Yes X No _____

The existing ROW varies between 33 feet and 100 feet on either side of the highway centerline. Temporary construction easements and/or permanent ROW may be needed for the roadway and lift station infrastructure. Old plans show the pump station outlet structure bored beneath the CP Railway tracks.

25. Drainage Issues? Yes X No X

The presence of underground water and poor drainage were significant factors in the deterioration of the existing pavement. During freeze/thaw cycles, the existing 12” pipe connecting the underpass inlets freezes, causing water to stand and freeze on the roadway. The hydraulic analysis during project development should adequately size the lift station, underdrains, inlets, and outlet structures.

26. Snow Impact Areas? Yes ____ No X

27. Subgrade Issues? Yes ____ No X

28. Noise Analysis: Type I Project? Yes ____ No X Maybe _____

29. Maintenance Issues? Yes X No _____

The underpass has experienced flooding and periodic roadway closures. Poor drainage has led to significant deterioration of the pavement structure. The lift station pump is undersized and requires frequent repair by District Staff.

30. Guardrail? Yes X No _____

The existing w-beam guardrail and transitions to the railroad bridge abutment walls do not meet National Cooperative Highway Research Program (NCHRP) Report 350 requirements. The cost estimate includes replacement of the w-beam guardrail, end treatments, and transitions.

31. Milling? Yes X No ____

Milling is anticipated to provide pavement transitions.

32. Repeated ER Events? Yes ____ No X

33. Interstate Access Gates? Yes ____ No ____ N/A X

34. Steep Slopes? Yes X No ____ N/A ____

There are steep slopes between 2:1 and 3:1 approaching the railroad bridge abutments; slope flattening is unlikely to be feasible.

35. Potential Turn Lanes Yes ____ No X N/A ____

I. Load Restrictions

Travel Information Map Proposed Load Restriction: 8 tons
Freight Level Required Minimum Load Restriction: 8 tons
Projected Load Restrictions after project is complete: Legal Weight

J. Roadway Widths

Required Minimum Roadway Width: 30’ (Design Manual Section I-06.03.07)
Freight Level Required Minimum Width: 26’
Surrounding Corridors: ND 15 (West): 24’, ND 15 (East): 24’

K. PERFORMANCE GUIDELINES

Design Speed: 45 mph
Clear Zone: 20 feet (NDDOT Design Manual Section I-06.03.04 - Major Rehabilitation)
Foreslopes: 4:1 (NDDOT Design Manual Section I-06.03.04 - Major Rehabilitation)

L. PROPOSED IMPROVEMENTS

A reconstruction/major rehabilitation is proposed to reconstruct the roadway and replace the pumping station and pump. Both concrete and asphalt surfacing options are presented. Typical Sections are provided for estimating purposes only.

Alternatives:

- Alternative 1 – Do Nothing
  The roadway and pumping station would remain in their current condition with only routine maintenance. Flooding, closures, and pavement deterioration would continue.
- Alternative 2 – Pump Station Replacement with HMA Pavement

Reconstruct the roadway with HMA (FAA 43, PG 58S-34), replace the lift station, pump house, and upgrade safety hardware to meet MASH standards.

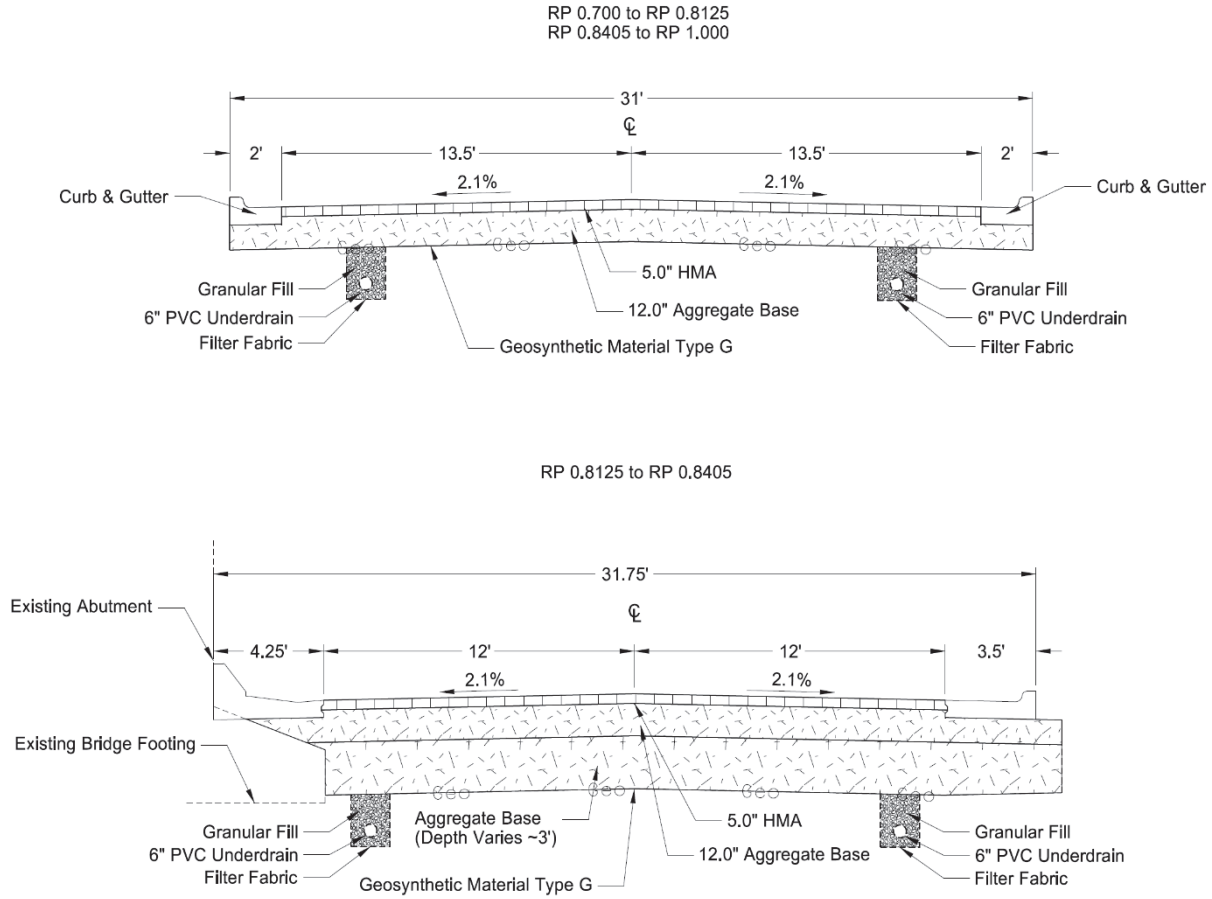

Figure 3 – Alternative 2: Proposed Typical Sections

- Alternative 3 – Pump Station Replacement with PCC Pavement
  Reconstruct the roadway with PCC (8.5” non-reinforced concrete pavement doweled), replace the lift station, pump house, and upgrade safety hardware to meet MASH standards.

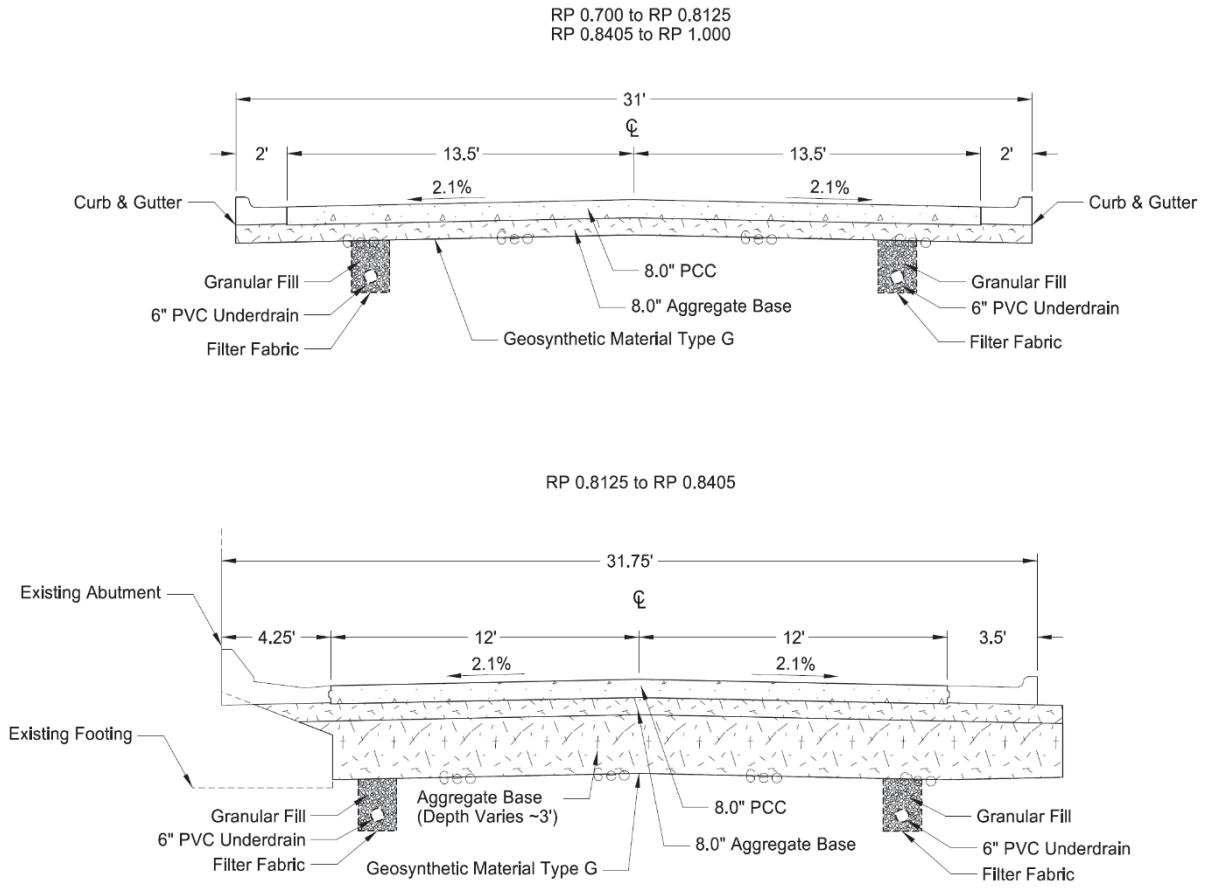

Figure 4 – Alternative 3: Proposed Typical Sections

Potential Engineering & Environmental Issues:

- ND 15 between RP 0.700 and RP 1.000 does not meet the 30-foot minimum roadway width requirement outlined in the NDDOT Design Manual Section I-06.03.07, constrained by the CP railway bridge abutments. For the major rehabilitation strategy, a design exception may be required due to the width constraint.
- Limited right-of-way of between 33 feet and 100 feet of the highway centerline within the project limits. The limited width near the Canadian Pacific Railway Bridge would result in temporary and permanent right of way impacts.
- Additional easements may be needed with surrounding property owners for drainage infrastructure.
- Redirecting state roadway traffic onto County and City roadways for a detour may increase the environmental scope during project development.
- Temporary shoring and vibration monitoring requirements for working near the railroad bridge abutments and footings should be investigated during project development.

M. ADDITIONAL COMMENTS

District Engineer:

- Stated that concrete is already in place and typical for the project type.
- Noted approximately $13,000 in maintenance costs each time the pump fails or trips.
- Stated that nearby residents and the State Senator have raised concerns about the flooding and temporary closures.

N. COST ESTIMATE

The total estimated costs for each alternative are summarized below. Alternative 1 is the Do Nothing Alternative.

Assumptions:

- Begin/End Reconstruction Limits – RP 0.700 – 1.000
- Inflation – 4% per year, Engineering – 20%, Bond – 1%, Mobilization – 5%
- Removals include removing the old pump house and lift station equipment
- Lift Station/Pump House/Electrical includes all costs for a replacement pump house, lift station, electrical service, outlet structure, and all temporary dewatering measures, including bypass pumping for the duration of construction.
- The Temporary shoring and structural monitoring were based on a similar project, NH-3-003(030)202, PCN 21984.

Table 8 - Alternative 2: Pump Station Replacement with HMA

Item	Estimated Cost
Contract Bond & Mobilization	
Removals	
Dirtwork	
Aggregate	
HMA	
Concrete	
Structures	
Drainage	
Lift Station/Pump House/Electrical	
Striping/Signing/Guardrail	
Erosion Control	
Trees/Landscaping/Fencing	
Field Office/Labs	
Shoring/Structural Monitoring	
Work Zone Traffic Control	
Subtotal=	
Inflation=	
Engineering=	
Estimated Total Cost =	

Table 9 - Alternative 3: Pump Station Replacement with PCC

Item	Estimated Cost
Contract Bond & Mobilization	
Removals	
Dirtwork	
Aggregate	
HMA	
Concrete	
Structures	
Drainage	
Lift Station/Pump House/Electrical	
Striping/Signing/Guardrail	
Erosion Control	
Trees/Landscaping/Fencing	
Field Office/Labs	
Shoring/Structural Monitoring	
Work Zone Traffic Control	
Subtotal=	
Inflation=	
Engineering=	
Estimated Total Cost =	

O. DECISIONS

Which alternative should proceed?

Alternative 1: Do Nothing.

____ Yes X No

Alternative 2: Stormwater lift station replacement with HMA from RP 0.700 to RP 1.000, with an estimated total cost of [redacted].

____ Yes X No

Alternative 3: Stormwater lift station replacement with PCC from RP 0.700 to RP 1.000, with an estimated total cost of [redacted].

X Yes ____ No

DDP Comments: _____

Deputy Director for Planning 02/23/26
Date

APPENDIX A – SITE PHOTOS

SOUTH ABUTMENT

PUMPS

NORTH ABUTMENT

LIFT STATION/PUMP HOUSE

APPENDIX B – PRELIMINARY PAVEMENT DESIGN

Preliminary Pavement Recommendation

Project: ND 15 – RP 0.7 to RP 1.0

Completed by: Kaylin Kautzman

General Information

- Project Description: ND 15 – Reconstruction
- Project Limits: RP 0.7 to RP 1.0
- Project Length: 0.3 Miles
- Highway Classification: District Corridor

Preliminary Pavement Recommendation

HMA Option

The recommended thickness for flexible reconstruction is 5.0” of HMA Superpave on 12” of dense-graded base.

This design was prepared using AASHTO Darwin 1993 pavement design methodology.

Concrete Option

The recommended concrete pavement design is 8.0” of doweled, jointed, plain PCC with 12-foot-wide slabs and 15-foot maximum transverse joint spacing, constructed on 8.0” of dense-graded base.

This design was prepared using AASHTO-ME pavement design methodology.

APPENDIX C – PRELIMINARY HYDRAULICS (SCOPING)

From: Deis, Monte D.
To: Andrews, Miguel
Cc: Bossert, Lindsay A.
Subject: FW: Scoping Study, ND 15 PCC Reconstruction & Fessenden Pump Station Replacement
Date: Thursday, May 15, 2025 10:09:28 AM
Attachments: image001.png
Drainage Map.pdf

Miguel,

Randy and I briefly discussed this, but see his response below here.

Thank You,

Monte Deis, PE
Preliminary Engineering & Hydraulics Engineer
NDDOT Bridge Division

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From: Sandvig, Randall D. <rsandvig@nd.gov>
Sent: Wednesday, May 14, 2025 7:57 AM
To: Deis, Monte D. <mdeis@nd.gov>
Cc: Bossert, Lindsay A. <lbossert@nd.gov>
Subject: RE: Scoping Study, ND 15 PCC Reconstruction & Fessenden Pump Station Replacement

I looked at the old lift station file we had in the cabinet. The old map showed the drainage area was about 3.9 acres. There's a CL pipe coming in from the north side, and the old plan assumed water would flow south into a ditch, keeping it away from the pump. But when I looked at the LiDAR data, I didn't see anything like a ditch or block that would stop water from reaching the pump. Since this pump station is already thought to be too small, I added the extra area to the east and made a few small changes based on the LiDAR. That brought the total drainage area up to 5.10 acres, with a flow for a 25-year storm of about 11.81 cfs.

If we use two pumps to handle that flow, each pump would need to move about 5.91 cfs, which is roughly 2,653 gpm. Discharge pipes would likewise need upsizing to around 15". I estimated the pump head to be about 27 feet. I assumed the wet well is undersized and

roughed a 15' square manhole. Good enough for preliminary/scoping.

From: Deis, Monte D. mdeis@nd.gov
Sent: Monday, May 5, 2025 8:56 AM
To: Sandvig, Randall D. <rsandvig@nd.gov>
Cc: Bossert, Lindsay A. <lbossert@nd.gov>
Subject: FW: Scoping Study, ND 15 PCC Reconstruction & Fessenden Pump Station Replacement

Randy,

Is could you help analyze some or all of what Miguel is looking for here ?

Thank You,

Monte Deis, PE
Preliminary Engineering & Hydraulics Engineer
NDDOT Bridge Division

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From: Andrews, Miguel <msandrews@nd.gov>
Sent: Monday, April 28, 2025 3:13 PM
To: Deis, Monte D. <mdeis@nd.gov>
Cc: Bossert, Lindsay A. <lbossert@nd.gov>
Subject: Scoping Study, ND 15 PCC Reconstruction & Fessenden Pump Station Replacement

Monte – We are currently scoping a project for the replacement of outdated pumping station equipment at a railroad underpass in Fessenden, North Dakota. The project will replace the ~80-year-old pumping station building and other hydraulic infrastructure, including connected pipes, stormwater conveyance conduits, manholes & risers. The section of roadway served by the pump station is exposed to occasional flooding due to non-functioning equipment and an undersized system. To assist in coming up with a realistic figure for the new system, I'm looking for technical input to create a high-level planning level estimate, including:

Approximate Drainage Area
- Preliminary Inflow Rates
- Storage Volume Size & Pump Discharge
- Pump Head/Capacity

Is there any preliminary analysis that your team could come up with to help us estimate the ballpark facility size? My initial guess is a small pump station <5000 gpm. Please let me know if your team is available and if you have the potential time commitment to do a preliminary analysis.

I attached some details about the existing site but if there's anything else you need from me, please let me know.

Thank you,

Miguel Andrews, P.E.
Scoping Engineer, Programming Division

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