

Project No.

PCN

State Line to E Camel Hump Dam - EB



Prepared by

**NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
BISMARCK, NORTH DAKOTA**

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

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SCOPING REPORT

A. GENERAL INFORMATION

Project Number:

District: Dickinson

Location: State Line to E Camel Hump Dam - EB

Reference Point: RP 0.000 to RP 11.841 – 11.841 miles

Counties: Golden Valley County

Legal Description: T140N, R106W, Sec 15 to T140N, R104W, Sec 16

Functional and Funding Roadway Classification: Interstate

Speed Limit: 75 mph

Freight Level: 1

Project Schedule: Proposed to be added to the STIP as Reconstruction.

dTIMS Recommendations: Constrained: Minor Asphalt 2027

Unconstrained: Minor Asphalt 2026

B. PURPOSE, NEED, AND IMPROVEMENT

Purpose and Need of Project:

The underlying concrete pavement on this segment is from the original interstate construction completed in 1969. This segment requires regular HMA mill and overlays as well as concrete pavement repair. That work will likely become more frequent and significant as the underlying concrete ages.

Proposed Improvement:

PCC reconstruction is proposed. All safety hardware will be in compliance with MASH performance criteria or NCHRP Report 350 if MASH compliant hardware is not available. All regulatory and warning signs and pavement markings will be verified to comply with current MUTCD standards or brought up to MUTCD standards if necessary.

C. TRAFFIC AND CRASH ANALYSIS

RP 0.000 to RP 11.841

	Year	Pass	Trucks	Total AADT	Flex ESALs	Rigid ESALs
Current Traffic	2019	1,285	580	1,865	540	855
Forecast Traffic	2039	1,840	865	2,705	805	1,275

Crash Analysis:

There was a total of 45 crashes from 8/1/14 to 7/31/19. Four were intersection related and 41 were not. Animal crashes were not included.

Notes/Trends:

-The 2016-2018 Rural Highway Segment Crash Map shows RP 0 to RP 4 is in the low

range for weighted crashes per mile and RP 4 to RP 11.8 is in the low-moderate range.

-Nearly 80% of crashes were single vehicle crashes, with 2/3 of them occurring during non-dry conditions (17 ice/snow, 6 wet).

-There were 14 crashes at the Exit 1 (Beach) interchange area, but no patterns/trends were identified.

-There were 6 crashes near RP 11.3, and 5 of 6 involved WB vehicles that lost control during ice/snow conditions and hit guardrail on the north side of the road.

There are no recommendations at this time.

D. EXISTING ROADWAY CHARACTERISTICS

	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"

Segment 1: RP 0.000 to RP 4.200

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
18	45	Excellent	6	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
15	88	Good	.23	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1968	GRADE	-	48.0	-
1968	C-C 84 FEET	-	-	-
1969	AGGREGATE BASE	2.0	27.0	-
1969	CONT - REINF PCC	8.0	24.0	-
1969	PLANT MIX BIT BASE	8.0	6.7,0.0,12.5	85-100
1969	HOT BIT PAVEMENT	2.0	3.0,0.0,10.0	85-100
1979	RECLAMITE	-	0.0,0.0,10.0	-
1983	RECLAMITE	-	3.0,0.0,0.0	-
1991	EDGE DRAIN RETROFIT	-	-	-
1995	SUBCUT AREAS	11.5	17.0	-
1995	BLENDED BASE	12.0	0.0,0.0,12.0	-
1995	CONCRETE PAVEMENT REP	-	24.0	-
1995	MILLING	-4.0	0.0,0.0,10.0	-
1995	HOT BIT PAVEMENT	3.5	0.0,0.0,10.0	120-150
1997	INT CONT PATCH-2.0"	-	24.0	120-150
1998	FEDERAL AID SAND SEAL	-	3.0,0.0,10.0	MC-3000P
1999	PREVENTIVE MAINTENANC	-	24.0	-
2002	CONCRETE PAVEMENT REP	-	24.0	-
2002	HBP-SUPERPAVE-FAA 40	2.0	4.0,24.0,0.0	PG 58-34
2002	HBP-SUPERPAVE-FAA 40	2.0	4.0,24.0,0.0	PG 58-28

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
2002	HOT BIT SPECIAL 408	3.0	0.0,0.0,10.0	PG 58-28
2005	FEDERAL AID CHIP SEAL	-	4.0,24.0,0.0	HFMS-2
2015	CONCRETE PAVEMENT REP	-	24.0	-
2015	MILLING	-3.0	24.0	-
2015	HBP-SUPERPAVE-FAA 45	3.0	24.0	PG 64-28
2015	MILLING	-1.0	4.0,0.0,10.0	-
2015	HBP-SUPERPAVE-FAA 45	1.0	4.0,0.0,10.0	PG 64-28
2018	SLURRY SEAL	-	24.0	-
2018	FEDERAL AID SAND SEAL	-	10.0,0.0,4.0	CRS2P

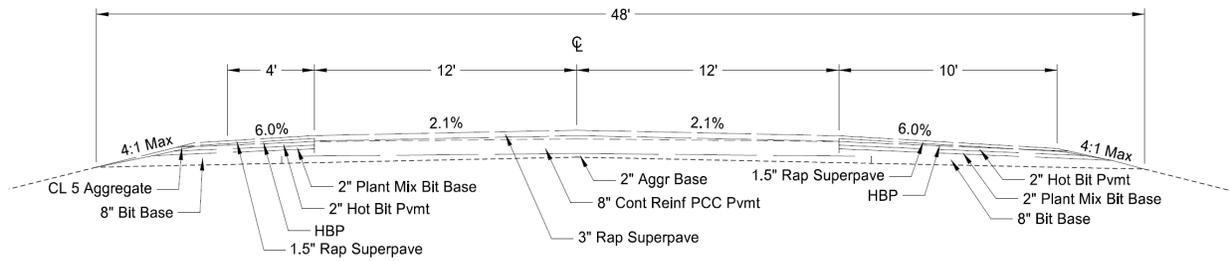
Segment 2: RP 4.200 to RP 11.841

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
18	45	Excellent	7	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
15	87	Fair	.22	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1968	GRADE	-	48.0	-
1968	C-C 84 FEET	-	-	-
1969	AGGREGATE BASE	2.0	27.0	-
1969	CONT - REINF PCC	8.0	24.0	-
1969	BITUMINOUS BASE	6.0	6.7,0.0,12.5	SM-K
1969	PLANT MIX BIT BASE	2.0	4.9,0.0,11.2	85-100
1969	HOT BIT PAVEMENT	2.0	3.0,0.0,10.0	85-100
1979	RECLAMITE	-	0.0,0.0,10.0	-
1983	RECLAMITE	-	3.0,0.0,0.0	-
1995	SUBCUT AREAS	11.5	17.0	-
1995	BLENDED BASE	12.0	0.0,0.0,12.0	-
1995	CONCRETE PAVEMENT REP	-	24.0	-
1995	MILLING	-4.0	0.0,0.0,10.0	-
1995	HOT BIT PAVEMENT	3.5	0.0,0.0,10.0	120-150
1997	INT CONT PATCH-2.0"	-	24.0	120-150
1998	FEDERAL AID SAND SEAL	-	3.0,0.0,10.0	MC-3000P
1999	PREVENTIVE MAINTENANC	-	24.0	-
2002	CONCRETE PAVEMENT REP	-	24.0	-
2002	HBP-SUPERPAVE-FAA 40	2.0	4.0,24.0,0.0	PG 58-34
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2015	MILLING	-3.0	24.0	-
2015	HBP-SUPERPAVE-FAA 45	3.0	24.0	PG 64-28
2015	MILLING	-1.0	4.0,0.0,10.0	-
2015	HBP-SUPERPAVE-FAA 45	1.0	4.0,0.0,10.0	PG 64-28
2018	SLURRY SEAL	-	24.0	-
2018	FEDERAL AID SAND SEAL	-	10.0,0.0,4.0	CRS2P

Existing Foreslopes: 4:1 - 6:1

Existing Typical Section:



E. EXISTING GEOMETRY

Horizontal Curves: Use AASHTO Standards. The horizontal curves are listed in the table below. All of the curves meet the minimum required radius but none meet the minimum required superelevations for a 75 mph design speed.

Location	Radius (ft)		Superelevation (%)	
	Existing	Required	Existing	Required
RP 0.141	5730	2500	2.1	3.7
RP 2.243	5730	2500	NC	3.7
RP 2.744	6903	2500	0.0	3.2
RP 4.947	8552	2500	0.0	2.7
RP 5.236	7539	2500	0.0	3.0
RP 6.546	5730	2500	2.1	3.7
RP 8.809	5730	2500	0.0	3.7
RP 9.692	8552	2500	0.0	2.7
RP 10.708	5730	2500	0.0	3.7

Vertical Curves: Use stopping sight distance for crest curve design and comfort curve design for sag curves. The required value of K for 75 mph is 312. All curves meet requirements.

Location	Curve Length (ft)	Existing K/ Required L
RP 0.075	800 SAG	L = 104
RP 0.311	800 CREST	K = 2,615
RP 0.511	1,200 SAG	L = 196
RP 0.921	1,160 CREST	K = 381
RP 1.468	800 CREST	K = 467
RP 2.056	800 SAG	L = 355
RP 2.435	800 SAG	L = 31

RP 2.719	800	SAG	L = 0
RP 2.908	800	CREST	K = 3,825
RP 3.060	800	CREST	K = 6,122
RP 3.363	800	SAG	L = 37
RP 3.931	800	SAG	L = 9
RP 4.404	800	CREST	K = 2,756
RP 5.010	800	SAG	L = 176
RP 5.653	800	SAG	L = 54
RP 6.105	800	CREST	K = 524
RP 6.601	800	CREST	K = 469
RP 7.006	800	SAG	L = 528
RP 7.606	2,200	CREST	K = 383
RP 8.244	1,000	SAG	L = 617
RP 8.781	1,450	CREST	K = 382
RP 9.160	800	CREST	K = 682
RP 9.419	800	SAG	L = 399
RP 9.711	850	CREST	K = 397
RP 9.863	750	CREST	K = 5,398
RP 10.014	800	SAG	L = 16
RP 10.214	800	CREST	K = 528
RP 10.498	800	SAG	L = 251
RP 11.265	800	SAG	L = 249
RP 11.606	800	SAG	L = 129

Ramps:

Requirements: Degree of Curve = 4° Max; Acceleration Taper = 50:1; Deceleration Taper = 40:1

Interchange and Ramp Location	Degree of Curve	Acceleration Taper	Deceleration Taper
Beach Interchange – SW Ramp	4°	---	40:1
Beach Interchange – SE Ramp	4°	50:1	---
Home on the Range Interchange – SW Ramp	4°	---	40:1
Home on the Range Interchange – SE Ramp	4°	50:1	---
Sentinel Butte Interchange – SW Ramp	4°	---	40:1
Sentinel Butte Interchange – SE Ramp	4°	50:1	---

F. EXISTING STRUCTURES

Required Clearance = 16'6"

Bridge No.	Name	Vertical Clearance	Length	Width	Rating			
			(ft)	(ft)	Deck	Super-Structure	Sub-Structure	Culvert
0094-001.849	Beach Interchange	16'7"	265	29.9	6	6	7	N/A
Recommendation: Do nothing.								

Bridge No.	Name	Vertical Clearance	Length	Width	Rating			
			(ft)	(ft)	Deck	Super-Structure	Sub-Structure	Culvert
0094-002.234	Quad, 12X12X158' RCB	-	50	-	N/A	N/A	N/A	7
Recommendation: Do nothing.								
0094-004.170	Triple, 8X10X160' RCB	-	25	-	N/A	N/A	N/A	7
Recommendation: Do nothing.								
0094-004.829	East Beach Separation	16'3"	240	28	6	6	6	N/A
Recommendation: Do nothing.								
0094-007.368 R	Home on the Range Interchange	-	140	37	6	6	7	N/A
Recommendation: Deck overlay & replace approach slabs. \$120,000								
0094-010.478	Sentinel Butte Interchange	16'6"	240	28	8	7	7	N/A
Recommendation: Do nothing.								

Centerline Culverts:

A pipe survey and hydraulic study should be conducted. All pipes needing extensions and upgrades should have cost effective solutions applied. For the cost estimate, it is assumed that half of the centerline pipes will be replaced.

G. LAND INTERESTS

Small Community: Beach, Population 1,064, Exit 1
Reservation: None
Public Land: None
Refuge: Camel Hump Lake Wildlife Management Area
Adjacent Land Usage: Commercial, Agricultural

H. ISSUES AND APPURTENANCES CHECKLIST

- 1. Curb and Gutter? Yes No
- 2. Sidewalk? Yes No
- 3. Multi-Use Path? Yes No
- 4. Curb Ramps? Yes No
- 5. Detectable Warning Panels? Yes No
- 6. Lighting? Yes No

There is lighting at the Highway Patrol Inspection Site at RP 1.0 and at the Beach Interchange from approx. RP 1.55 to RP 2.23. Lighting work is proposed to be done as part of the WB reconstruction project.

- 7. Signals? Yes No

- 8. Storm Sewer? Yes No
- 9. Manholes? Yes No
- 10. Other Underground Work? Yes No
- 11. Parking Facilities? Yes No
- 12. Frontage Roads? Yes No
- 13. Utility Issues? Yes No

There are numerous utility crossings, including telephone, electric, and water lines.

- 14. Landscaping? Yes No
- 15. Approach or Ditch Block Flattening? Yes No
- 16. T Intersection Recovery Approaches? Yes No
- 17. Fence? Yes No

There are numerous original wood fence posts that need to be replaced. There is also a location where fencing was placed in the ditch bottom rather than along the ROW line on a hill slope. The district has requested that the fence be moved back onto the slope if feasible. Replacement of 25% of the fence has been included in the estimate.

- 18. Railroad Crossings? Yes No
- 19. Detours? Yes No
- 20. Automatic Traffic Recorder Locations? Yes No
- 21. Weigh-In-Motion Sites? Yes No
- 22. ITS (Deicing, Snow Gates, VMS, RWIS, etc.)? Yes No

There is a camera site at the Highway Patrol inspection site at RP 1.00.

Replacing the interstate closure system with new advanced warning signs, beacons, and gates is included in the estimate.

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

There is a Highway Patrol inspection site at RP 1.00. The Highway Patrol has noticed some foundation issues at the scale pit, but the pit is the responsibility of Highway Patrol. An option to CPR and mill & overlay the site is included.

There is a visitor center/rest area off the interstate in Beach. The district requested some work be completed on the grounds and building, but that has not been included for funding reasons.

24. Additional Right of Way? Yes No

25. Drainage Issues? Yes No

The State Water Commission believes that the pipe in the south ditch (EB) by Camel Hump Dam has separated or has a hole in it causing sink holes immediately adjacent to the dam. They have requested the NDDOT repair this as soon as possible to ensure the continued safety of the dam. It is proposed to include this work with the WB reconstruction to comply with the State Water Commission request sooner as the district would like WB constructed first.

There are several asphalt flumes along this corridor that were placed to prevent erosion. Most of them have broken up, been undercut, or have washed away. These flumes should be removed.

Home on the Range interchange underpass and EB ramps do not drain well and water ponds around the bridge piers.

Cattle Pass at RP 9.47 also drains the median and currently holds water. Options to be investigated as part of WB reconstruction.

26. Snow Impact Areas? Yes No

27. Subgrade Issues? Yes No

The district noted issues with settlement or soft spots on the WB Beach off ramp and just west of Boys Ranch interchange structure. They also have subgrade issues with the badlands soils towards the east end of the project.

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

29. Maintenance Issues? Yes No

A structural plate pipe @ RP 4.91 has minimal cover and typically heaves. Options to be investigated as part of WB reconstruction.

Several hills sides have sloughed off into the interstate ditch and the ROW fencing has been moved to border the slides. The limited ditch section remaining is more difficult to maintain. The district has requested the ditch section be reestablished and the fence be moved back to the ROW line where feasible.

30. Guardrail?

Yes X No _____

Type	RP	L/R	Length (ft)
"W" Beam	4.78	R	275
Blocked Out "W" Beam	7.2915	L	301
Blocked Out "W" Beam	7.2985	R	251
Blocked Out "W" Beam	10.439	R	224
Blocked Out "W" Beam	11.18	R	774

A cost to replace guardrails is included in the cost estimate.

The district requested that guardrail be removed under the Home on the Range Interchange and curb & gutter be placed instead as was done at the Buffalo Gap Interchange (RP17). Options to be investigated as part of WB reconstruction.

31. Milling?

Yes X No _____

At the Highway Patrol inspection site.

I. PERFORMANCE GUIDELINES

Design Speed: 75 mph
Clear Zone (from edge of driving lane): 32'
Shoulder Surface: Paved

Ride/Distress Goal: Excellent
Operational Reliability: High

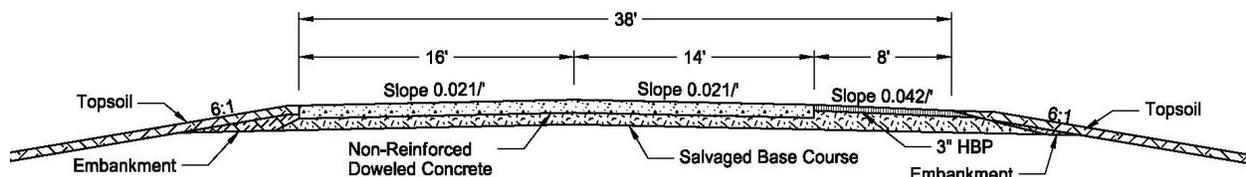
Minimum Roadway Width: 38'
Foreslopes: 6:1

J. PROPOSED IMPROVEMENTS

PCC reconstruction is proposed. All safety hardware will be in compliance with MASH performance criteria or NCHRP Report 350 if MASH compliant hardware is not available. All regulatory and warning signs and pavement markings will be verified to comply with current MUTCD standards or brought up to MUTCD standards if necessary.

Proposed Typical Section:

Proposed typical section used for estimating purposes only.



Ramps, Crossroads, and Rest Areas:

RP 0.5 Highway Patrol Inspection Site – CPR and Mill & overlay

Work on ramps and crossroads is proposed to be a part of the WB reconstruction.

K. ADDITIONAL COMMENTS

District Engineer:

Landscaping/plantings should be considered at the Welcome to ND sign to improve aesthetics.

L. COST ESTIMATE

(Inflation factor of 8% was used to estimate costs for 2021 bid year)

Item	Estimated Cost
Contract Bond & Mobilization	\$1,150,000
Removals	\$2,000,000
Dirt work	\$650,000
Aggregate	\$1,450,000
HMA	\$1,575,000
Concrete	\$11,500,000
Structures	\$120,000
Pipe/Drainage Issues	\$300,000
Striping/Signing/Guardrail	\$465,000
Erosion Control	\$575,000
Trees/Landscaping/Fencing	\$65,000
Field Office/Labs	\$50,000
Work Zone Traffic Control	\$425,000
Subtotal=	
	\$20,325,000
Inflation=	
	\$3,400,000
Engineering=	
	\$4,065,000
Estimated Total Cost =	
	\$27,790,000

M. DECISIONS

1. Should this project advance as Reconstruction?

Yes **Estimated Cost of \$27,790,000**

No

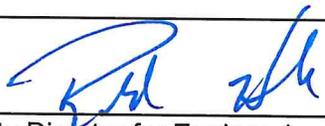
2. Which option(s) should advance with the project at an additional cost?

Highway Patrol Weigh Station (RP 1.0)

CPR and Mill & overlay
Estimated Cost of \$125,000

Advance as an option to the Environmental Document.

DDE Comments: _____



Deputy Director for Engineering

6/29/2020
Date