

Project No.

PCN

**E Bis Intr E to E of Menoken Intr - EB**



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Prepared by

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

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# SCOPING REPORT

## A. GENERAL INFORMATION

**Project Number:**

**District:** Bismarck

**Highway:** I-94

**Location:** E Bis Intr E to E of Menoken Intr - EB

**Reference Point:** RP 162.360 to RP 172.126 – 9.766 miles

**Counties:** Burleigh County

**Legal Description:** T139N, R80W, Sec 25 to T139N, R78W, Sec 27

**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 2029

Unconstrained: Minor Asphalt 2027

## 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 1966. 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:

A New/Reconstruction PCC 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

	Year	Trucks	Total AADT	Flex ESALs	Rigid ESALs
Current Traffic	2020	1,280	4,380	1,245	2,025
Forecast Traffic	2040	1,730	5,915	1,680	2,735

**Crash Analysis:** There were a total of 51 crashes from 5/1/2015 to 4/30/2020. Animal crashes were not included.

Notes/Trends:

- There were zero fatal crashes.
- The 2017-2019 Rural Highway Segment Crash Map shows this segment is in the moderately-low range for weighted crashes per mile.

- Of total crashes, 55% occurred during non-dry conditions and 29% occurred during dark conditions.
- There were 5 crashes where WB vehicles hit the bridge guardrail at RP 168.1, but no causation patterns were identified.
- There were 3 crashes where overweight loads hit the 80th St overpass at RP 164.5 (2 EB,1 WB). All 3 involved loads that were higher than what was listed on their permits.

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"

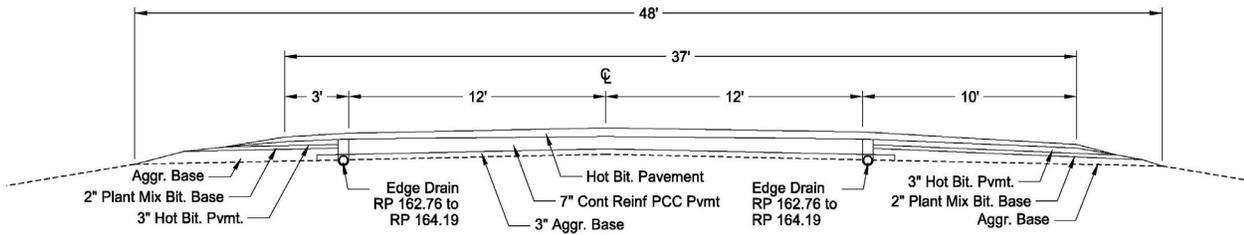
### RP 162.360 to RP 172.126

Actual Age	IRI	IRI Rating	SI	Faulting
6	46	Excellent	4	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
6	90	Good	.12	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1965	GRADE	-	48.0	-
1965	C-C 84 FEET	-	-	-
1966	AGGREGATE BASE	3.0	27.0	-
1966	CONT - REINF PCC	7.0	24.0	-
1966	AGGREGATE BASE	3.7	7.7,0,13.1	-
1966	PLANT MIX BIT BASE	2.0	5.8,0,11.9	120-150
1966	HOT BIT PAVEMENT	3.0	3.0,0,10.0	120-150
1967	CONTRACT SAND SEAL	-	3.0,0,10.0	RC-800
1979	DISTRICT CHIP SEAL	-	0,0,10.0	AE-150S
1983	CONCRETE PAVEMENT REP	-	-	-
1985	DISTRICT SAND SEAL	-	3.0,0,10.0	MC-800
1988	CONCRETE PAVEMENT REP	-	-	-
1992	DISTRICT SAND SEAL	-	3.0,0,10.0	RCLMITE
2000	CONCRETE PAVEMENT REP	-	24.0	AE
2000	HOT BIT PAVEMENT	3.0	0,0,10.0	PG 58-28
2000	HOT BIT PAVEMENT	2.5	3.0,24.0,0	PG 58-28
2000	HOT BIT PAVEMENT	2.2	3.0,24.0,0	PG 58-34
2014	MILLING	-2.0	3.0,24.0,10.0	-
2014	HBP-SUPERPAVE-FAA 45	2.0	3.0,24.0,10.0	PG 64-28
2016	MICROSURFACING	-	24.0	-
2016	FEDERAL AID SAND SEAL	-	-	CRS2P

Existing Foreslopes: 4:1 - 6:1

### Existing Typical Sections:



## 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	Speed (mph)	Radius (ft)		Superelevation (%)	
		Existing	Required	Existing	Required
RP 162.717	75	5730	2500	2.1	3.6
RP 164.333	75	5730	2500	0.0	3.6
RP 165.376	75	7639	2500	0.0	2.8
RP 165.995	75	11459	2500	0.0	RC
RP 170.829	75	57296	2500	0.0	NC

**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 162.660	600 SAG	L = 290
RP 163.027	600 SAG	L = 57
RP 163.666	2,200 CREST	K = 387
RP 164.313	600 SAG	L = 266
RP 164.643	800 CREST	K = 4,649
RP 164.908	600 SAG	L = 107
RP 165.361	600 SAG	L = 79
RP 165.665	1,020 CREST	K = 452
RP 165.931	600 SAG	L = 12
RP 166.329	600 SAG	L = 156
RP 167.011	800 CREST	K = 798
RP 167.466	600 SAG	L = 10
RP 167.882	600 SAG	L = 124
RP 168.262	600 SAG	L = 209

Location	Curve Length (ft)	Existing K/ Required L
RP 168.667	800 CREST	K = 504
RP 169.137	800 CREST	K = 3,375
RP 169.402	600 SAG	L = 24
RP 170.901	800 CREST	K = 3,978
RP 171.518	800 CREST	K = 2,003
RP 171.953	600 SAG	L = 52

**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
Menoken Interchange – SW Ramp	4°	---	40:1
Menoken Interchange – SE Ramp	4°	50:1	---

**F. EXISTING STRUCTURES**

Required Clearance = 16'6"

Bridge No.	Name	Vertical Clear	Length (ft)	Width (ft)	Rating			
					Deck	Sup	Sub	Cul
<b>94-162.739</b>	Single, 9X316' SPP	-	9	-	N/A	N/A	N/A	7
Recommendation: Fill scour hole.								
<b>94-164.527</b>	Gibbs Twp. Separation	16'0"	241	24	6	6	6	N/A
Recommendation: Do nothing Scheduled to be replaced.								
<b>94-164.917</b>	Single, 84"X302' SPP	-	13	-	N/A	N/A	N/A	4
Recommendation: Do Nothing								
<b>94-166.531</b>	I94/Apple Creek Sep	16'3"	241	24	7	7	6	N/A
Recommendation: Do nothing Scheduled to be replaced.								
<b>94-167.314</b>	Single, 11X354' SPP W/HW	-	11	-	N/A	N/A	N/A	7
Recommendation: Fill scour hole								
<b>94-168.101 R</b>	Apple Creek	-	195	36	6	7	7	N/A
Recommendation: Replace Approach Slabs \$80,000								
<b>94-170.519</b>	Menoken Interchange	16'4"	240	28	8	7	7	N/A
Recommendation: Spall repairs \$10,000								

**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:** None

**Reservation:** None

**Surface Trust Land:** None

**Public Land:** Robert W. Henderson Wildlife Management Area (RP 167.5 to RP 168.5)

**Adjacent Land Usage:** Residential, Commercial, Agricultural

## H. ISSUES AND APPURTENANCES CHECKLIST

- |                               |     |              |    |              |
|-------------------------------|-----|--------------|----|--------------|
| 1. Curb and Gutter?           | Yes | _____        | No | <u>  X  </u> |
| 2. Sidewalk?                  | Yes | _____        | No | <u>  X  </u> |
| 3. Multi-Use Path?            | Yes | _____        | No | <u>  X  </u> |
| 4. Curb Ramps?                | Yes | _____        | No | <u>  X  </u> |
| 5. Detectable Warning Panels? | Yes | _____        | No | <u>  X  </u> |
| 6. Lighting?                  | Yes | <u>  X  </u> | No | _____        |

There is existing lighting at the EB and WB rest areas that needs to be upgraded to LED. The WB rest area lighting should be completed with the EB project as that project will not have other lighting work. A cost is included in the estimate for this.

- |                             |     |              |    |              |
|-----------------------------|-----|--------------|----|--------------|
| 7. Signals?                 | Yes | _____        | No | <u>  X  </u> |
| 8. Storm Sewer?             | Yes | _____        | No | <u>  X  </u> |
| 9. Manholes?                | Yes | _____        | No | <u>  X  </u> |
| 10. Other Underground Work? | Yes | _____        | No | <u>  X  </u> |
| 11. Parking Facilities?     | Yes | _____        | No | <u>  X  </u> |
| 12. Frontage Roads?         | Yes | _____        | No | <u>  X  </u> |
| 13. Utility Issues?         | Yes | <u>  X  </u> | No | _____        |

There are overhead power lines and buried water, power, and telephone lines along the project.

- |   |     |              |    |              |
|---|-----|--------------|----|--------------|
| 14. Landscaping?                        | Yes | _____        | No | <u>  X  </u> |
| 15. Approach or Ditch Block Flattening? | Yes | <u>  X  </u> | No | _____        |

There are numerous median ditch blocks along this segment. Slopes steeper than 6:1 should be flattened to 10:1.

- |   |     |       |    |              |
|---|-----|-------|----|--------------|
| 16. T Intersection Recovery Approaches? | Yes | _____ | No | <u>  X  </u> |
|---|-----|-------|----|--------------|

17. Fence? Yes  X  No  \_\_\_\_\_

The existing fence is in very poor condition. It consists of wood fence posts, many which are missing, and has large sections that are down. Replacement of 100% of the fence is included in the estimate.

18. Railroad Crossings? Yes  \_\_\_\_\_  No  X

19. Detours? Yes  \_\_\_\_\_  No  X

20. Automatic Traffic Recorder Locations? Yes  X  No  \_\_\_\_\_

There is an ATR site at RP 165.0. No suggested improvements.

21. Weigh-In-Motion Sites? Yes  X  No  \_\_\_\_\_

There is a WIM site at RP 165.0. No suggested improvements.

22. ITS (Deicing, Snow Gates, VMS, RWIS, etc.) Yes  \_\_\_\_\_  No  X

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

There is a rest area at RP 168.5. An option to mill & overlay the rest area is included.

24. Additional Right of Way? Yes  \_\_\_\_\_  No  X

25. Drainage Issues? Yes  \_\_\_\_\_  No  X

26. Snow Impact Areas? Yes  \_\_\_\_\_  No  X

27. Subgrade Issues? Yes  X  No  \_\_\_\_\_

RP 162.76 to 164.19 has edgedrain and may have subgrade issues.

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

29. Maintenance Issues? Yes  \_\_\_\_\_  No  X

30. Guardrail? Yes  X  No  \_\_\_\_\_

Type	RP	L/R	Length (ft)
Blocked Out "W" Beam	164.512	R	238
Blocked Out "W" Beam	166.473	R	243
Blocked Out "W" Beam	168.031	R	227
Blocked Out "W" Beam	168.023	L	269
Blocked Out "W" Beam	170.505	R	238

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

31. Milling? Yes  X  No  \_\_\_\_\_

Crossroads and rest area.

## I. PERFORMANCE GUIDELINES

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

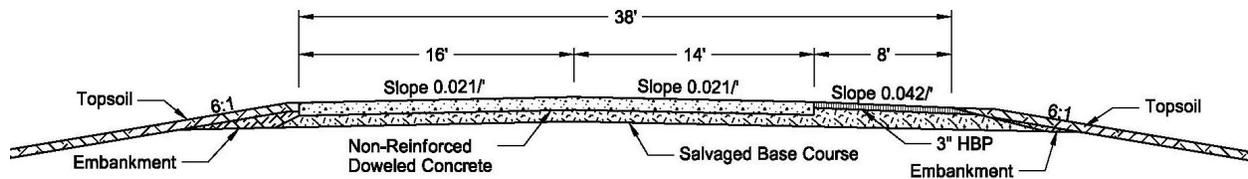
**Ride/Distress Goal:** Excellent  
**Operational Reliability:** High  
**Minimum Roadway Width:** 38'  
**Foreslopes:** 6:1

## 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:

Rest Area – Mill & overlay

Menoken Interchange – Mill & overlay ramps and crossroad

## K. ADDITIONAL COMMENTS

**District Engineer:**

## L. COST ESTIMATE

(Inflation factor of 4% was used to estimate costs for bid year)

Item	Estimated Cost
Contract Bond & Mobilization	\$1,050,000
Removals	\$1,550,000
Dirtwork	\$540,000
Aggregate	\$1,200,000
HMA	\$1,150,000
Concrete	\$9,500,000
Structures	\$120,000
Pipe/Drainage Issues	\$575,000
Striping/Signing/Guardrail/Lighting	\$350,000
Erosion Control	\$500,000
Trees/Landscaping/Fencing	\$225,000
Field Office/Labs	\$50,000
Work Zone Traffic Control/Crossovers/Ramp Conn.	\$1,550,000
Subtotal=	\$18,360,000
Inflation=	\$3,950,000
Engineering=	\$3,672,000
<b>Estimated Total Cost =</b>	<b>\$25,982,000</b>

**M. DECISIONS**

1. Should this project advance as Reconstruction?

Yes **Estimated Cost of \$25,982,000**

No

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

Rest Area

Mill & Overlay **Estimated Cost \$135,000**

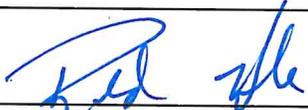
Advance as an option to the Environmental Document

Menoken Interchange (Exit 170)

Overlay Ramps & crossroad  
**Estimated Cost: \$170,000**

Advance as an option to the Environmental Document

DDE Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

  
\_\_\_\_\_  
Deputy Director for Engineering

12/29/2020  
Date