

Project No.

PCN

E Bis Intr E to E of Menoken Intr - WB



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: Bismarck

Highway: I-94

Location: E Bis Intr E to E of Menoken Intr - WB

Reference Point: RP 162.360 to RP 172.126 – 9.7708 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 2028

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 | 1,315 | 4,460 | 1,240 | 2,025 |
| Forecast Traffic | 2040 | 1,775 | 6,025 | 1,670 | 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 over-height 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" |

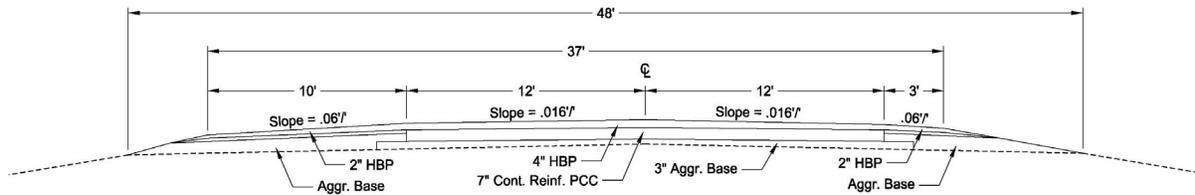
RP 162.360 to RP 172.126

| Actual Age | IRI | IRI Rating | SI or SCI | Faulting |
|---------------|----------|----------------|-----------|---------------|
| 6 | 46 | Excellent | 4 | N/A |
| Effective Age | Distress | Distress Score | Rutting | Rutting Score |
| 6 | 91 | Good | .16 | 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 | 13.1,0,7.7 | - |
| 1966 | PLANT MIX BIT BASE | 2.0 | 11.9,0,5.8 | 120-150 |
| 1966 | HOT BIT PAVEMENT | 3.0 | 10,0,3 | 120-150 |
| 1967 | CONTRACT SAND SEAL | - | 10,0,3 | RC-800 |
| 1979 | DISTRICT CHIP SEAL | - | 10,0,0 | AE-150S |
| 1983 | CONCRETE PAVEMENT REP | - | - | - |
| 1985 | DISTRICT SAND SEAL | - | 10,0,3 | MC-800 |
| 1988 | CONCRETE PAVEMENT REP | - | - | - |
| 1992 | DISTRICT SAND SEAL | - | 10,0,3 | RCLMITE |
| 1999 | CONCRETE PAVEMENT REP | - | 24.0 | - |
| 1999 | HOT BIT PAVEMENT | 2.0 | 10,0,0 | 120-150 |
| 1999 | HOT BIT PAVEMENT | 2.0 | 27.0 | 120-150 |
| 1999 | HOT BIT PAVEMENT | 2.0 | 27.0 | PG 58-34 |
| 2014 | MILLING | -2.0 | 10,24,3 | - |
| 2014 | HBP-SUPERPAVE-FAA 45 | 2.0 | 10,24,3 | PG 64-28 |
| 2016 | MICROSURFACING | - | 24.0 | - |
| 2016 | FEDERAL AID SAND SEAL | - | 10,0,3 | 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 | 3.7 |
| RP 164.333 | 75 | 5730 | 2500 | 0.0 | 3.7 |
| RP 165.376 | 75 | 7639 | 2500 | 0.0 | 2.9 |
| RP 165.995 | 75 | 11459 | 2500 | 0.0 | RC |
| RP 170.833 | 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 162.307 | 600 SAG | L = 183 |
| RP 162.660 | 600 SAG | L = 296 |
| RP 162.811 | 800 CREST | K = 8,219 |
| RP 163.411 | 600 SAG | L = 96 |
| RP 163.666 | 2,200 CREST | K = 383 |
| RP 164.313 | 600 SAG | L = 241 |
| RP 164.643 | 800 CREST | K = 4,649 |
| RP 164.908 | 600 SAG | L = 107 |
| RP 165.361 | 600 SAG | L = 109 |
| RP 165.665 | 1,020 CREST | K = 366 |
| RP 165.931 | 600 SAG | L = 47 |
| RP 166.045 | 600 CREST | K = 12,210 |
| RP 166.329 | 600 SAG | L = 156 |

| Location | Curve Length (ft) | Existing K/ Required L |
|------------|-------------------|------------------------|
| 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 |
| 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 |
| RP 172.981 | 600 SAG | L = 8 |

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 – NE Ramp | 4° | --- | 40:1 |
| Menoken Interchange – NW 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 |
| 94-162.739 | Single, 9X316' SPP | - | 9 | - | N/A | N/A | N/A | 7 |
| Recommendation: Fill scour hole. | | | | | | | | |
| 94-164.527 | Gibbs Twp. Separation | 16'0" | 241 | 24 | 6 | 6 | 6 | N/A |
| Recommendation: Do nothing scheduled to be replaced. | | | | | | | | |
| 94-164.917 | Single, 84"X302' SPP | - | 13 | - | N/A | N/A | N/A | 4 |
| Recommendation: Do Nothing | | | | | | | | |
| 94-166.531 | I94/Apple Creek Sep | 16'3" | 241 | 24 | 7 | 7 | 6 | N/A |
| Recommendation: Do nothing scheduled to be replaced. | | | | | | | | |
| 94-167.314 | Single, 11X354' SPP W/HW | - | 11 | - | N/A | N/A | N/A | 7 |
| Recommendation: Fill scour hole | | | | | | | | |
| 94-168.101 L | Apple Creek | - | 195 | 36 | 5 | 7 | 7 | N/A |
| Recommendation: Replace Approach Slabs \$80,000 | | | | | | | | |
| 94-170.519 | Menoken Interchange | 16'4" | 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: None

Reservation: None

Surface Trust Land: None

Public Land: None

Adjacent Land Usage: Residential, 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 existing lighting at the rest area. Lighting is proposed to be upgraded to LED as part of the EB 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 overhead power lines and buried water, power, and telephone lines along the project.

- 14. Landscaping? Yes No

15. Approach or Ditch Block Flattening? Yes X No _____

There are numerous median ditch blocks along this segment. Slopes steeper than 6:1 will be flattened to 10:1 as part of the Eastbound reconstruction.

16. T Intersection Recovery Approaches? Yes _____ No X

17. Fence? Yes X No _____

The existing ROW 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. There is also existing snow fence from RP 164.33 to 164.50 and 164.53 to 164.57.

18. Railroad Crossings? Yes _____ No X

19. Detours? Yes _____ No X

20. Automatic Traffic Recorder Locations? Yes X No _____

There is a ATR site at RP 169.8. No suggested improvements.

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

There is a WIM site at RP 169.8. No suggested improvements.

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

There is a proposed camera site and active DMS site at RP 162.5. There is also an active camera site at the rest area at RP 168.5. No suggested improvements.

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 _____ No X

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 | 164.516 | L | 243 |
| Blocked Out "W" Beam | 166.522 | L | 243 |
| Blocked Out "W" Beam | 168.110 | L | 264 |
| Blocked Out "W" Beam | 168.110 | R | 259 |
| Blocked Out "W" Beam | 170.524 | L | 300 |

31. Milling? Yes X No _____

Rest area.

I. PERFORMANCE GUIDELINES

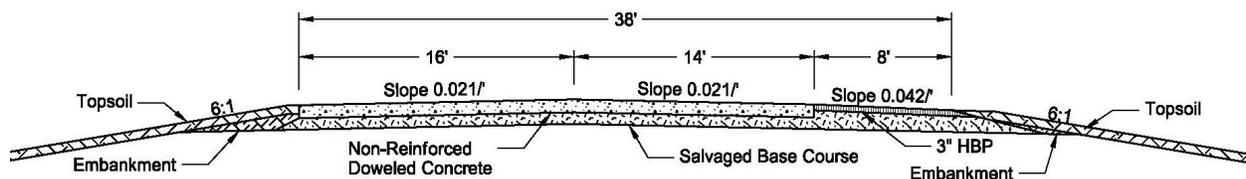
Design Speed: 75 mph
Clear Zone (from edge of driving lane): 32'
Shoulder Surface: Paved

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

J. PROPOSED IMPROVEMENTS

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.

Proposed Typical Section:
Proposed typical section used for estimating purposes only.



Ramps, Crossroads, and Rest Areas:

Rest Area – Mill & overlay

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 | \$975,000 |
| 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 | \$310,000 |
| Erosion Control | \$500,000 |
| Trees/Landscaping/Fencing | \$225,000 |
| Field Office/Labs | \$50,000 |
| Work Zone Traffic Control | \$350,000 |
| | |
| Subtotal= | \$17,045,000 |
| Inflation= | \$3,950,000 |
| Engineering= | \$3,409,000 |
| Estimated Total Cost = | \$24,404,000 |

M. DECISIONS

1. Should this project advance as Reconstruction?

Yes Estimated Cost of \$24,404,000
 No

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

Rest Area

Mill & Overlay Estimated Cost \$140,000
 Advance as an option to the Environmental Document

DDE Comments: _____



 Deputy Director for Engineering

6/29/2020

 Date