

Project No.

PCN

Near Jct. 57 to New 281



---

Prepared by

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

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

**DIRECTOR**  
Grant Levi, P.E.

**OFFICE OF TRANSPORTATION PROGRAMS**  
Steve Salwei, P.E.

Principal Author:  
Jared Loegering, E.I.T.  
December 2014

# SCOPING REPORT

Report Completed By: Jared Loegering

## A. GENERAL INFORMATION

**Project Number:**

**District:** Devils Lake

**Location:** Near Jct. 57 to New 281

**Reference Point:** RP 148.879 – 154.817, 5.938 miles

**Counties:** Benson

**Legal Description:** T152N, R66W, Sec 20 to T152N, R67W, Sec 14

**Functional and Funding Roadway Classification:** Interregional Corridor

**National Highway System:** Yes

**Project Schedule:** Proposed to be added to the STIP for a 2017/2018 Major Rehabilitation

**dTIMS Recommendations:**

**RP 148.879 – RP 153.203:**

Constrained: PM Asphalt 2015

Unconstrained: PM Asphalt 2014

**RP 153.203 – RP 154.817:**

Constrained: PM Asphalt 2014

Unconstrained: Struc Ovl 2015

## B. PURPOSE, NEED, AND IMPROVEMENT

**Purpose and Need of Project:**

The IRI score is in the fair to good range. The distress score is in the poor to good range.

There are longitudinal and transverse cracks on the roadway along with alligator cracking. The project was added from the 2014 Interregional Review.

**Proposed Improvements:**

A Major Rehabilitation Full Depth Reclamation with widening is proposed to extend the service life and provide operational improvements to the roadway. The safety items that will be addressed are safety hardware that does not meet NCHRP 350 standards or better and safety items within the 20' clear zone. A 90-1 survey will also be completed and areas needing safety improvements will be addressed. There is an exception area for the widening from RP 148.879 to 149.5834. This was reconstructed in 2004, project No. NH-3-057(005)000, PCN 60. The district has requested that this section of roadway be milled 1 inch and overlaid with 3 inches of HBP.

A decision item is included to widen the roadway to 40 feet to allow for 8 foot shoulders. This option would go beyond the design guideline requirements. This option is proposed because traffic is forecasted to continue to increase and to keep roadway width continuity with the surrounding corridor. 8 foot shoulders would also allow trucks the ability to pull off the roadway.

**District Proposed Improvements:**

**Radial T Construction:**

At RP 153.2 There is one location of a tangential approach on the project. The district has requested that this intersection be eliminated and a radial T be constructed at approximately RP 153.20. Traffic Operations Section of the Programming Division will need to review the intersection to determine the appropriateness of a radial T. This will involve right of way, wetland, and utility concerns. A decision item and cost estimate is included to address the radial T.

**Turning Lanes:**

The district has requested that a right and left turning lane be constructed on US 281 at approximately RP 153.2 at the new radial T that has been requested. The traffic operations section will complete a study to find if the requested turning lanes and any additional turning lanes are warranted along the roadway. A decision item is included to address the districted requested turning lanes and a cost is included in the estimate.

**Grade Raise:**

The district has requested that the roadway near RP 151.7 be raised due to water encroaching on the roadway. From the hydraulic analysis completed 2/13/2012 it appears that the roadway is built above the outlet but does not provide two feet of freeboard above the outlet which is typically used for grade raise recommendations. Presently there is approximately 0.81 feet of freeboard provide between the overflow elevation and the surveyed edge-line elevation. If it is decided to proceed with a grade raise at this location, it is recommended that the roadway grade be raised to an elevation sufficient to provide 2 feet of freeboard above the outlet elevation. Also, it would be beneficial to increase the capacity of the crossing by extending the existing 24" RCP culvert and adding a single 54" smooth-walled or a signal 60" corrugated culvert. The existing 24" RCP culvert could also be replaced with a single 60" smooth-walled or corrugated culvert. A decision item and cost estimate is included to address the grade raise and pipe improvement. A grade raise does not fall within the scope of a major rehab. It is typically considered a reconstruction strategy

**C. TRAFFIC AND CRASH ANALYSIS**

**Traffic:**

RP 149.879 to 153.184

	Year	Truck AADT	Total AADT	Flexible ESALs
Current Traffic	2014	225	455	195
Forecast Traffic	2034	335	650	285

RP 153.184 to 154.817

	Year	Truck AADT	Total AADT	Flexible ESALs
Current Traffic	2014	265	800	225
Forecast Traffic	2034	395	1120	340

**Speed Limit:**

From RP	To RP	Speed Limit
149.879	152.855	65 mph
152.855	153.382	Advisory 55 mph
153.382	154.817	65 mph

**Crash Analysis:**

There were a total of 2 crashes from 10/1/2009 to 9/30/2014. Animal crashes were not included. The crash rate per 1 million vehicles is 0.2315

- There was 1 fatal crash near curve at RP 153.0: V1 was SB, veered off roadway navigating a curve, overcorrected, and rolled over.

No other trends were identified and 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 148.879 to 149.106**

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
10	95	Good	3	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
10	82	Fair	0.13	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
2004	GRADE	-	65.0	-
2004	SALVAGED BIT BASE	15.0	43.0	-
2004	HOT BIT PAVEMENT	2.0	9.0-24.0-9.0	PG 58-28
2005	HOT BIT PAVEMENT	2.0	9.0-24.0-9.0	PG 58-28
2010	SLURRY SEAL	-	26.0	CRS-2

**Segment 2, RP 149.106 to 149.5834**

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

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
2004	GRADE	-	65.0	-
2004	SALVAGED BIT BASE	15.0	43.0	-
2004	HOT BIT PAVEMENT	2.0	9.0-24.0-9.0	PG 58-28
2005	HOT BIT PAVEMENT	2.0	9.0-24.0-9.0	PG 58-28
2010	SLURRY SEAL	-	26.0	CRS-2

**Segment 3, RP 149.5834 to 153.203**

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
24	72	Good	1	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
15	93	Good	0.16	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1952	GRADE	-	36.0	-
1952	TRAFFIC SERVICE GRAVE	1.0	34.0	-
1955	AGGREGATE BASE	5.0	34.0	-
1955	STABILIZED BASE	2.0	32.0	-
1955	HOT BIT PAVEMENT	2.5	24.0	120-150
1991	MILLING	-1.0	24.0	-
1991	HOT BIT PAVEMENT	2.5	24.0	120-150
1991	SALVAGED AGGR BASE	-	-	-
1996	CONTRACT CHIP SEAL	-	24.0	MC-3000
1997	RIPRAP	-	-	-
2010	HOT BIT PAVEMENT	2.0	24.0	PG 58-28
2014	MICROSURFACING	-	24.0	-

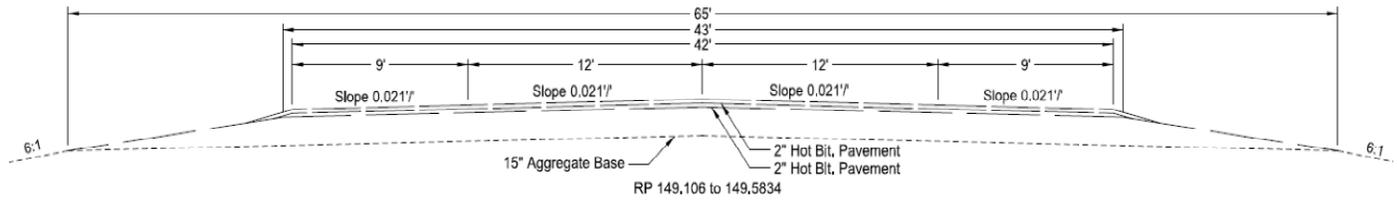
**Segment 4, RP 153.203 to 154.817**

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
24	94	Good	5	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
24	95	Good	0.17	Excellent

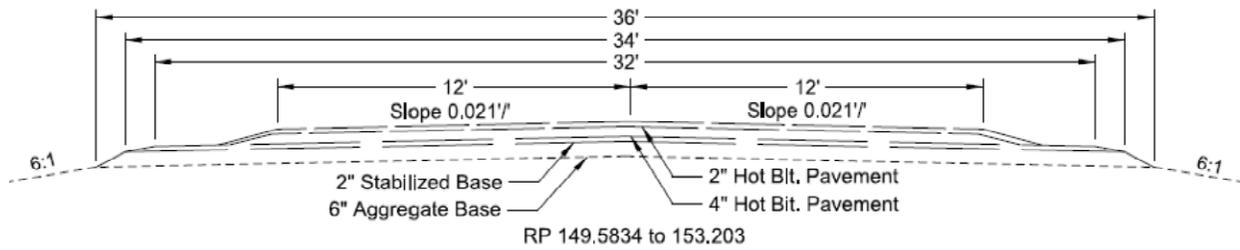
CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1952	GRADE	-	36.0	-
1952	TRAFFIC SERVICE GRAVE	1.0	34.0	-
1955	AGGREGATE BASE	5.0	34.0	-
1955	STABILIZED BASE	2.0	32.0	-
1955	HOT BIT PAVEMENT	2.5	24.0	120-150
1991	MILLING	-1.0	24.0	-
1991	HOT BIT PAVEMENT	2.5	24.0	120-150
1991	SALVAGED AGGR BASE	-	-	-
1996	CONTRACT CHIP SEAL	-	24.0	MC-3000
1997	RIPRAP	-	-	-
2014	MICROSURFACING	-	24.0	-

**Existing Foreslopes: 6:1**

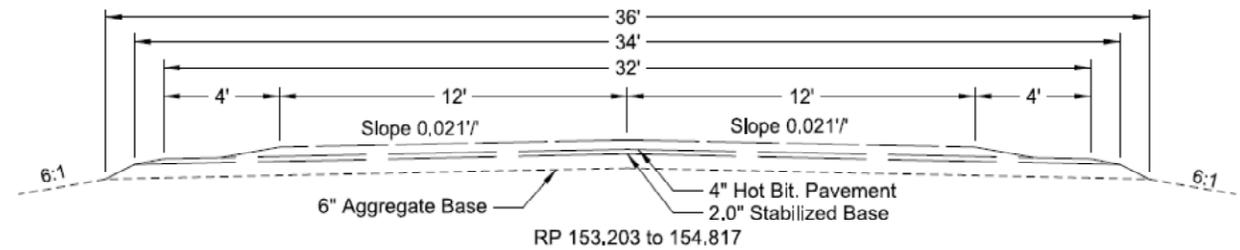
**Existing Typical Sections:  
Section 1, RP 148.879 to 149.5834**



**Section 2, RP 149.5834 to 153.203**



**Section 3, RP 153.203 to 154.817**



**E. EXISTING GEOMETRY**

**Horizontal Curves:**

The District has requested that the curve at RP 152.923 have its radius increased. For the Major Rehabilitation strategy, if horizontal curves on interregional corridors with an ADT of greater than 750 is designed for less than 15 mph than the posted speed make a cost effective improvement or sign accordingly. The curve at RP 152.923 meets this requirement. 50 mph (15 mph less than posted of 65):

Location	Radius (ft)		Superelevation (%)	
	Existing	Required	Existing	Required
RP 152.923	1146	833	8.3	5.6

Based on a design speed of 65 the radius of the horizontal curve needs to be addressed. 65 mph:

Location	Radius (ft)		Superelevation (%)	
	Existing	Required	Existing	Required
RP 152.923	1146	1657	8.3	6

**Vertical Curves:** On Interregional system when the ADDT is less than 2,000 existing vertical curvature is used.

**F. EXISTING STRUCTURES**

**Bridges:** None

**Centerline Pipes:**

There are 18 centerline pipes on the project that will need to be extended to accommodate the clear zone requirements and roadway widening. The district has noted that the hydraulics at RP 150 will need to be addressed and a new centerline pipe will possibly need to be installed to equalize the water on both sides of the roadway. The district also noted that the end sections on the centerline pipe need to be tied as the road is widened. A cost is included in the cost estimate to address the pipe work.

**G. LAND INTERESTS**

**Communities:**

None

**Reservation:**

The project is in the Spirit Lake Reservation

**Surface Trust Lands:**

None

**Refuge:**

None

**Adjacent Land Usage:**

Agricultural and Residential

**H. ISSUES AND APPURTENANCES CHECKLIST**

- 1. Curb and Gutter? Yes  No
- 2. Sidewalk? Yes  No
- 3. Multi-Use Path? Yes  No
- 4. ADA Ramps? Yes  No
- 5. Detectable Warning Panels? Yes  No
- 6. Lighting? Yes  No
- 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 possibly may be some utility issues with the construction of the district requested radial T.

14. Landscaping? Yes  No
15. Approach or Ditch Block Flattening? Yes  No   
All steep approaches are to be addressed under the Major Rehab Strategy.
16. Fence? Yes  No
17. Railroad Crossings? Yes  No
18. Detours? Yes  No
19. Automatic Traffic Recorder Locations? Yes  No
20. Weigh-In-Motion Sites? Yes  No
21. ITS (Deicing, Snow Gates, VMS, RWIS, etc.)? Yes  No
22. Highway Patrol/Truck Pullouts or Rest Areas? Yes  No
23. Additional Right of Way? Yes  No   
Additional right of way may be needed due to the roadway widening and the curve and radial-T construction on the project.
24. Drainage Issues? Yes  No
25. Snow Impact Areas? Yes  No
26. Subgrade Issues? Yes  No   
The district has requested that a discretionary subcut location be added to the project. A cost is included in the estimate to address the subcut.
27. Noise Analysis: Type I Project? Yes  No  Maybe
28. Maintenance Issues? Yes  No
29. Guard Rail? Yes  No
30. Riprap? Yes  No   
Riprap needs to be added at RP 150.0 and at the district requested grade raise at RP 151.7. A cost is included in the estimate to address the riprap.
31. Milling? Yes  No   
It was assumed to mill 1" from RP 149.106 to 149.5834.
32. Local Road Safety Program? Yes  No   
The LRSP recommends signing and striping upgrades at the Intersection of US 281 and Benson 329. The LRSP recommends upgrading Stop Sign, Junction Sign, Stop Ahead

Sign, Stop Ahead Marking, and the Stop Bar. These recommendations will be addressed through the HSIP process.

### I. Load Restrictions

Travel Information Map Proposed Load Restriction: Legal weight  
HPCS Load Restriction: Legal weight  
Projected load restrictions after project is completed: Legal weight

### J. Roadway Widths

Required minimum Roadway Width:  
RP 149.106 to 153.184: 30'  
RP 153.184 to 154.817: 36'

#### Surrounding Corridor Roadway Widths:

##### US 281 (North and South of Project):

North of project: 40'  
South of project: 28'. Project is planned to widen out to 36' or 40'

ND 57 (East of Project): 40' to 44'

### K. PERFORMANCE GUIDELINES

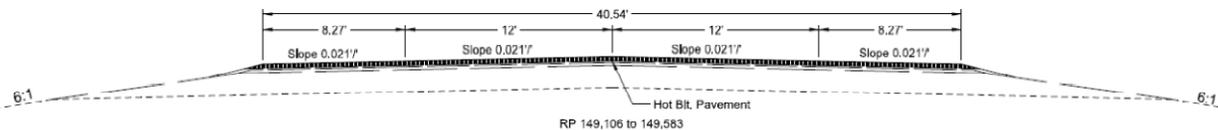
Design Speed: 55 and 65 mph  
Clear Zone (from edge of driving lane): 20'  
Ride/Distress Goal: Excellent  
Operational Reliability: Highly Reliable  
Foreslope: 4:1

### L. PROPOSED IMPROVEMENTS

A Major Rehabilitation Full Depth Reclamation with widening is proposed. The safety items that will be addressed are safety hardware that does not meet NCHRP 350 standards or better and safety items within the 20' clear zone. A 90-1 survey will also be completed and areas needing safety improvements will be addressed. There is an exception area for the widening from RP 148.879 to 149.5834. This was reconstructed in 2004, project No. NH-3-057(005)000, PCN 60. The district has requested that this section of roadway be milled 1 inch and overlaid with 3 inches of HBP.

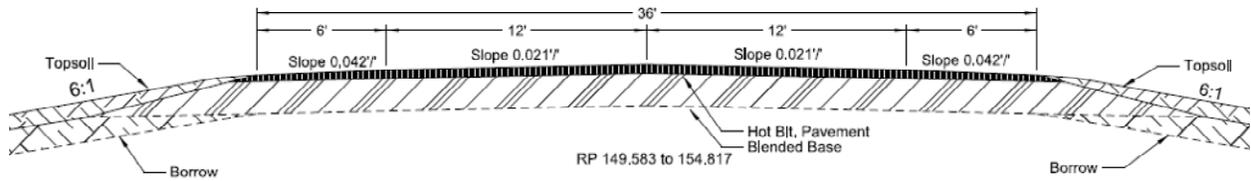
#### Proposed Typical Sections:

##### Section 1, RP 148.879 to 149.5834



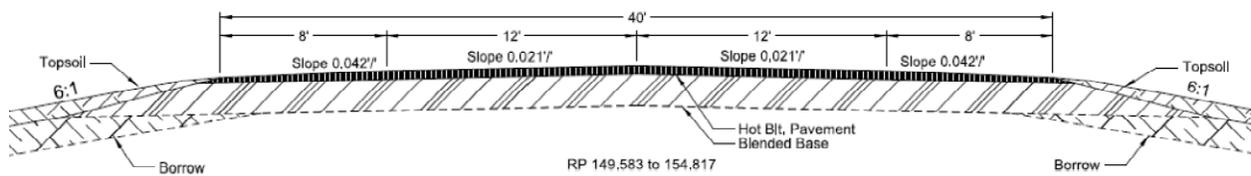
### Option 1: 36' Wide Roadway

#### Section 2, RP 149.5834 to 154.817



### Option 2: 40' Wide Roadway

#### Section 2, RP 149.5834 to 154.817



### District Requests

#### Radial T Construction:

The district has requested that a radial T be constructed at approximately RP 153.20. A possible layout of the radial T intersections is shown below. This layout is preliminary and is for informational purposes only. Traffic Operations Section of the Programming Division will need to review the intersection to determine the appropriateness of a radial T. A decision item and cost estimate is included to address the radial T.



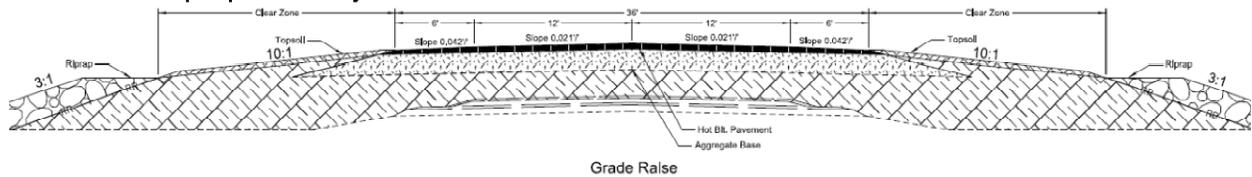
**Turning Lanes:**

The district has requested that a right and left turning lane be constructed on US 281 at approximately RP 153.2 at the new radial T that has been requested. The traffic operations section will complete a study to find if the requested turning lanes and any additional turning lanes are warranted along the roadway. A decision item is included to address the districted requested turning lanes and a cost is included in the estimate.

**Grade Raise:**

The district has requested that the roadway near RP 151.7 be raised due to water encroaching on the roadway. From the hydraulic analysis completed 2/13/2012 it appears that the roadway is built above the outlet but does not provide two feet of freeboard above the outlet which is typically used for grade raise recommendations. Presently there is approximately 0.81 feet of freeboard provide between the overflow elevation and the surveyed edgeline elevation. If it is decided to proceed with a grade raise at this location, it is recommended that the roadway grade be raised to an elevation sufficient to provide 2 feet of freeboard above the outlet elevation. Also, it would be beneficial to increase the capacity of the crossing by extending the existing 24" RCP culvert and adding a single 54" smooth-walled or a signal 60" corrugated culvert. The existing 24" RCP culvert could also be replaced with a single 60" smooth-walled or corrugated culvert. A decision item and cost estimate is included to address the grade raise and pipe improvement.

**Proposed Grade Raise Typical Section:** The following typical section is preliminary and is for informational purposes only:



**M. ADDITIONAL COMMENTS**

**District Engineer:**

By the time you widen the road at 151.7. It will not cost that much more to go up the additional elevation. This may also be true at RR 150.0 as well.

Decision 1: Yes.

Decision 2: Check item 1, 2, 3, 4 and 5.

**Safety Division Director:** No comments.

**N. COST ESTIMATE**

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

ITEM	ESTIMATED COST
Contract Bond	\$44,000
Mobilization	\$236,000
Hot Bit Pavement (5" HBP, Includes AC, Tack, Prime and cores)	\$2,459,000
Field Lab and Office	\$20,000
Traffic Control	\$200,000
Pavement Markings and Rumble Strips	\$28,000
Borrow and Water	\$633,000
Aggregate Base (18")	\$1,151,000
Seeding, Mulching, and Erosion Control	\$78,000

ITEM	ESTIMATED COST
Topsoil	\$206,000
Mine and Blend	\$259,000
Milling	\$44,000
Discretionary Subcut	\$161,000
Riprap	\$224,000
Centerline Pipe Extensions	\$150,000
Subtotal	\$5,893,000
20% Engineering	\$1,179,000
Construction and CE Total Cost	\$7,072,000
Decision Items (All items include 20% engineering)	
Decision Item 1: Widen to 40' Roadway Top	\$719,000
Decision Item 2: Grade Raise	\$1,276,000
Decision Item 3: Radial-T	\$185,000
Construction and CE Total Cost Including Decision Items	\$9,252,000

**O. DECISIONS**

1. Should this project advance as a major rehabilitation widening, Full Depth Reclamation, with an HBP overlay for an estimated cost of **\$7,072,000**?
- Yes                       No

**The following item(s) should be considered for an additional cost:**

2. Which item(s) should be chosen for this project?
- Item 1: Widen Roadway to 8 foot shoulders (40 foot Roadway Top) **Estimated cost \$719,000**
  - Item 2: Construct grade raise near RP 151.7. (out of scope) **Estimated cost \$1,276,000**
  - \*  Item 3: Install radial-T. **Estimated cost \$185,000**
  - \*  Item 4: Install district requested left and right turn lanes if they are found to be NOT warranted (assumed all warranted turn lanes will be installed).
  - Item 5: Correct Curve at RP 152.923 to meet 65 mph.
  - Item 6: Advance all items to the Environmental Document as decision items.
  - Item 7: Advance none.

\* DDE Comments: Advance to PCR and study

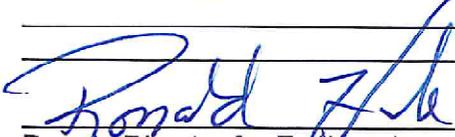
---



---



---

  
 Deputy Director for Engineering

5/3/15  
 Date