

SCOPING REPORT

Project No.

PCN

Jct ND 1 to W Jct 32



Prepared by

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

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

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August 2021

SCOPING REPORT

A. GENERAL INFORMATION

Project Number:

District: 2

Highway: 46

Location: Jct ND 1 to W Jct 32

Reference Point: RP 60.486 to RP 73.444 – 12.958 Miles

Counties: Barnes

Legal Description: T136N R57W Sec 2 – 5
T136N R58W Sec 1 – 6
T136N R59W Sec 1 – 3
T137N R57W Sec 31 – 36
T137N R58W Sec 31 – 36
T137N R59W Sec 35 – 36

Functional and Funding Roadway Classification: State Corridor

National Highway System: No

Speed Limit: 65 mph

Freight Level: Level 2

Freight Constraints: Roadway Width Restriction

Project Schedule: Proposed to be developed upon available funding. PM in priorities for 2028.

dTIMS Recommendations: Constrained: Do Nothing
Unconstrained: Minor Sliver Grade 2028

B. PURPOSE, NEED, AND IMPROVEMENT

Purpose and Need of Project:

This segment currently has a width restriction due to not meeting the Freight Plan's minimum roadway width of 26' for freight level 2. This segment is currently at its minimum width (24') as specified in the department's design guidelines, which would not allow a preventative maintenance overlay with its current width.

Proposed Improvement:

The primary purpose of the project is to address the roadway width, protecting or restoring the existing pavement may not be needed. This segment has been sealed and overlaid in the last three years and is currently in good/excellent condition. The pavement is also 10.5" thick already. Several different options are being proposed that vary by strategy and if/how the pavement is addressed:

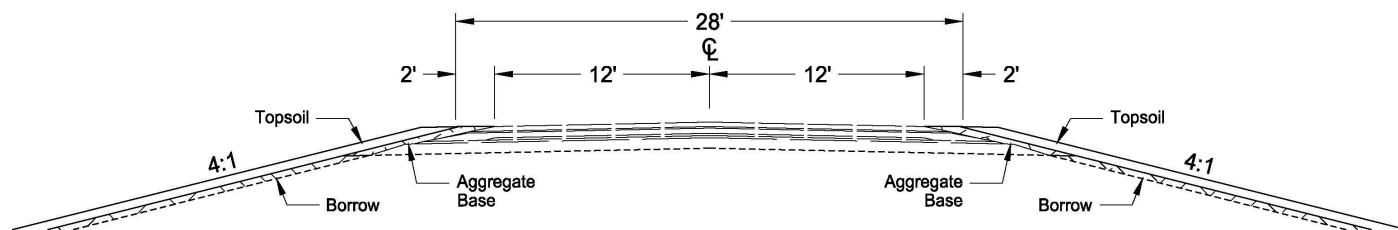
Minor Rehabilitation – Sliver grading would provide 2' shoulders addressing the width restriction. Options under this strategy are:

-Sliver Grade Only w/ Gravel Shoulders (No mainline overlay)

-Sliver Grading w/HMA Overlay

Proposed Typical Section

Minor Rehabilitation Sliver Grading with or without HMA overlay

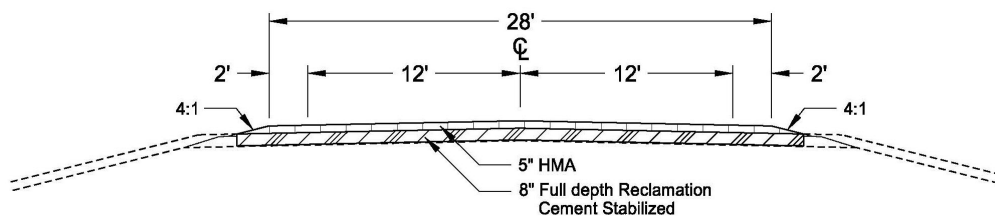


Structural Improvement – By milling off existing pavement the section could be lowered gaining back width to provide 2' shoulders which would address the width restriction. Options under this strategy are:

- Full Depth Reclamation w/ HMA Overlay (2' shoulders)

Proposed Typical Section

Structural Improvement FDR & HMA Overlay

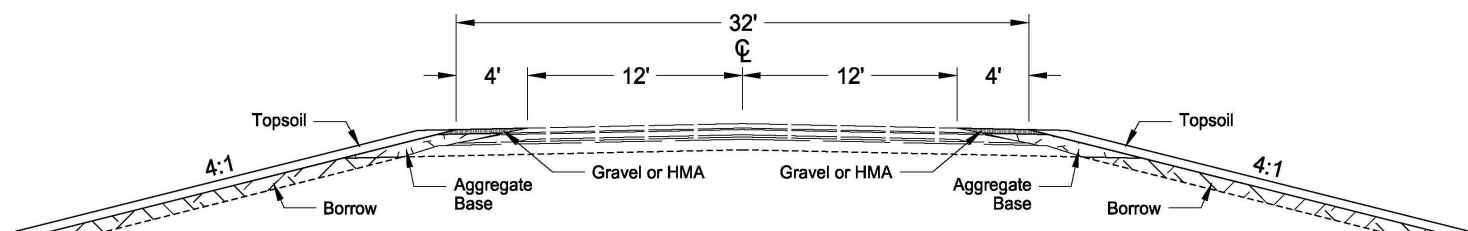


Major Rehabilitation – Major widening would provide 4' shoulders addressing the width restriction. Options under this strategy are:

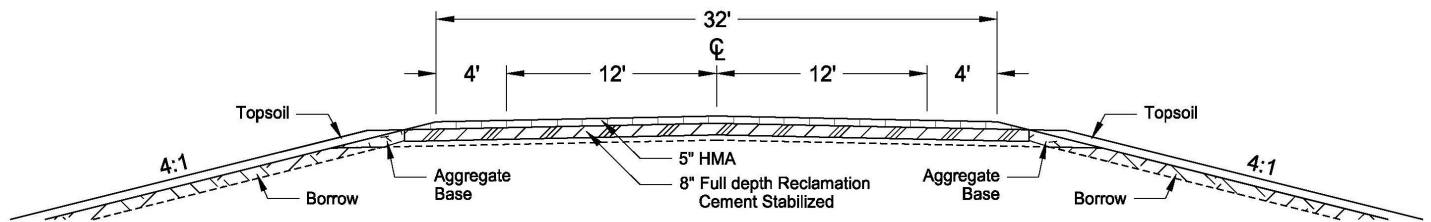
- Major Widening Only w/ gravel or paved shoulders (No mainline overlay)
- Major Widening w/ HMA Overlay
- Major Widening, Full Depth Reclamation & HMA Overlay

Proposed Typical Sections

Major Rehabilitation Widening Only with or without HMA overlay



Major Rehabilitation Widening, FDR & HMA Overlay



These options provide several different philosophies in addressing this roadway segment and provide for different futures. Some highlights of the options are:

- Widening only without an overlay addresses the purpose and need but would leave the pavement to be addressed at a later time when it is more warranted. These options could also be tied to a chip seal or microsurfacing to preserve the pavement until full depth reclamation or overlay would traditionally be needed.

- Widening and overlaying the roadway is not unique but the timing is. Providing 3+ inches of HMA is largely not needed but would ensure a continuation of the quality the roadway is at.

- Either full depth reclamation option would essentially reset the lifecycle of the roadway and provide for a longer future without major projects on this segment. Also note that full depth reclamation options include cement stabilization to prevent the need for adding virgin aggregate.

- The additional width included in the major rehabilitation options would provide for a longer unrestricted future and could also allow additional future overlays.

C. TRAFFIC AND CRASH ANALYSIS

RP 60.486 to RP 73.444	Year	Pass	Trucks	Total AADT	Flex ESALS	Rigid ESALS
Current Traffic	2019	425	285	710	300	470
Forecast Traffic	2039	520	320	870	370	580

Crash Analysis: The 5-year study period used was 10/1/2015 – 9/30/2020 and crash information is attached. Animal crashes were not included. On 8/1/2019 the cost threshold for a reportable crash increased from \$1,000 to \$4,000 due to legislative change, so recent years may show fewer crashes than previous years.

General Summary of Crashes						
Year	Start Date	End Date	Intersection (or Alley/Drwy)	Non-Intersection		Total
				Single Vehicle	Multiple Vehicles	
1	10/1/2015	9/30/2016				
2	10/1/2016	9/30/2017				
3	10/1/2017	9/30/2018	5			5
4	10/1/2018	9/30/2019	1			1
5	10/1/2019	9/30/2020		3		3

Notes/Trends:

- The 2017-2019 Rural Highway Segment Crash Map shows this segment is in the low range for weighted crashes per mile.
- There were two angle crashes at ND 46 & ND 1, but they involved different directions of travel (NB+WB, EB+SB).
- No other crash patterns/trends were identified.
- There is an existing ICWS at the junction of ND 46 and ND 1.

Recommendation: None at this time.

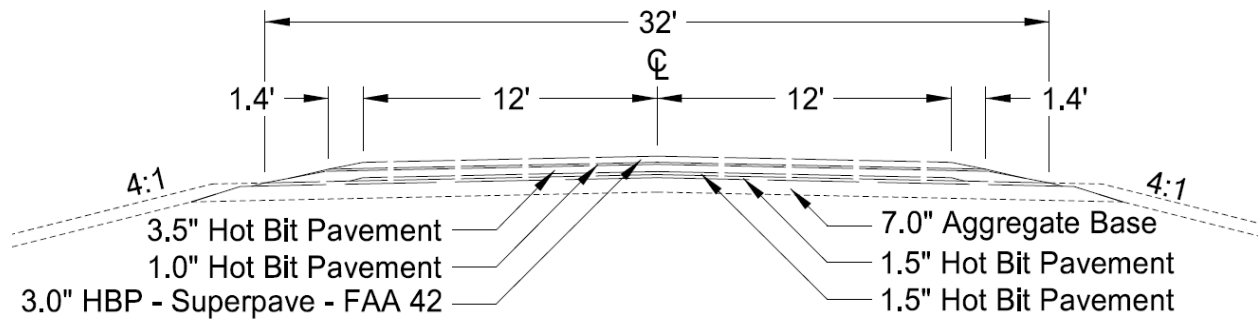
D. EXISTING ROADWAY CHARACTERISTICS

	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 60.486 to RP 73.444

Actual Age	IRI	IRI Rating	SI or SCI	Faulting
26	46	Excellent	0	N/A
Effective Age	Distress	Distress Score	Rutting	Rutting Score
13	93	Good	0.23	Excellent

CONSTRUCTION HISTORY				
Year	Construction	Depth (in)	Width (ft)	Oil
1959	GRADE	-	38.0	-
1961	AGGREGATE BASE	3.5	36.0	-
1961	EMULSIFIED BASE	3.5	34.0	SS – 1
1971	HOT BIT PAVEMENT	1.5	32.0	SC – 3000
1971	HOT BIT PAVEMENT	1.5	24.0	85 – 100
1995	HOT BIT PAVEMENT	3.5	27.0	120 – 150
1995	SAFETY PROJECT	-	-	-
1997	FEDERAL AID CHIP SEAL	-	27.0	HFMS – 2
2008	HOT BIT PAVEMENT	2.0	26.0	PG 58 – 28
2011	SLURRY SEAL	-	26.0	-
2018	MILLING	-1.0	26.0	-
2018	HBP – SUPERPAVE – FAA 42	3.0	24.0	PG 58 – 28
2020	SLURRY SEAL	-	24.0	CRS-2

Existing Typical Section:

*There are also climbing lane sections coming out of the valley by Little Yellowstone Park that are not shown.

E. EXISTING GEOMETRY**Horizontal Curves:**

Minor Rehab: Use Existing

Structural Improvement: Use existing, no substandard curves present.
Attempt to correct superelevations to AASHTO standards.

Major Rehabilitation: Use existing, no substandard curves present.
Correct superelevations to AASHTO standards.

Location	Speed (mph)	Radius (ft)		Superelevation (%)	
		Existing	Required	Existing	Required
RP 65.493	65	11459	1657	-	RC
RP 66.218	65	1910	1657	5.5	6.0
RP 66.498	65	3016	1657	-	4.8
RP 67.187	65	1910	1657	-	6.0
RP 67.794	65	5730	1657	-	3.0

Vertical Curves: Use existing, no substandard curves present.

F. EXISTING STRUCTURES**Bridges:**

Bridge No.	Name	Vertical Clearance	Length	Width	Rating			
			(ft)	(ft)	Deck	Super-Structure	Sub-Structure	Culvert
0046 – 061.980	Triple, 8X4X44' RCB	N/A	25	N/A	N/A	N/A	N/A	7
Recommendations: Spall repair & joint repair if needed. \$25,000 Ok to extend if needed.*								
0046 – 067.147	Sheyenne River Steel Continuous-Stringer	N/A	155	30	9	9	9	N/A
Recommendations: Repair damaged curb. \$5,000								

*Widening the RCB is included in the cost estimate

Centerline Pipes: There are approximately 35 pipes within this segment.

Minor Rehab: Use existing. Pipes impacted by widening should be extended

Structural Improvement: Use existing.

Major Rehab: Use existing. Pipes impacted by widening should be extended

The district would like to complete a centerline pipe inspection and look at correcting any pipe issues during project development.

G. LAND INTERESTS

Communities: None

Reservation: None

Public Land: None

Waterfall Production Area: None

Adjacent Land Usage: Little Yellowstone County Park, Agricultural

H. ISSUES AND APPURTENANCES CHECKLIST

- | | | |
|-----------------------------|---|--|
| 1. Curb and Gutter? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 2. Sidewalk? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 3. Multi-Use Path? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 4. ADA Ramps? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 5. State Bicycling Network? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |

This segment is listed as a Tier 1 State Bike Corridor and a part of the Proposed U.S. Bicycle Route System. There is no expectation of wide, bikeable shoulder on the Tier 1 network. It is recommended to have safe, emergency pull offs provided and signage to improve awareness of bicycle traffic among vehicle traffic as funding allows. The minimum infrastructure expectation is signage.

- | | | |
|---|---|--|
| 6. Lighting? | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> |
| There is existing destination lighting at intersection of ND 1 & ND 46. | | |
| 7. Signals? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 8. Storm Sewer? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 9. Manholes? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 10. Other Underground Work? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 11. Parking Facilities? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 12. Frontage Roads? | Yes <input type="checkbox"/> | No <input checked="" type="checkbox"/> |
| 13. Utility Issues? | Yes <input checked="" type="checkbox"/> | No <input checked="" type="checkbox"/> |

There is buried water and telephone, as well as overhead electric lines within the project.

14. Landscaping? Yes ☐ No ☒

15. Approach or Ditch Block Flattening? Yes ☐ No ☒

Approaches generally appear to meet current standards but this should be verified during project development.

16. T Intersection Recovery Approaches? Yes ☐ No ☒

There are two CMC routes that create "T" intersections with ND 46, but there are existing approaches opposite of the CMC routes. No suggested improvements.

17. Fence? Yes ☐ No ☒

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 ☒

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

24. Additional Right of Way? Yes ☒ No ☐

ROW ranges from 75' – 267' throughout the corridor. Additional ROW is anticipated to be needed for options that include widening.

25. Drainage Issues? Yes ☒ No ☐

There are groundwater issues going down both hills into the river valley. There is existing underdrain, manholes and outlets systems that may be impacted with widening.

26. Snow Impact Areas? Yes ☒ No ☐

The district maintenance staff have noted drifting issues in several locations. Locations should be investigated during project development.

27. Subgrade Issues? Yes ☒ No ☐

The district has noted subgrade issues at the bridge ends of structure 0046-067.147. There are also existing landslide issues on the hills dropping into the river valley. The landslide will need to be reviewed and taken into account with widening.

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

29. Maintenance Issues? Yes ☐ No ☒

30. Guardrail? Yes X No

There is 3-cable guardrail protecting a steep slope at RP 66.366 and W-beam guardrail at structure # 046-067.147

31. Milling? Yes X No

Milling should be completed to help keep the overall pavement thickness down and optimize the base blend in the full depth reclamation options.

32. Repeated ER Events? Yes No X

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

I. Load Restrictions

Travel Information Map Proposed Load Restriction: Legal Weight

Freight Level Required Minimum Load Restriction: 8 – Ton

Projected Load Restrictions after project is complete: Legal Weight

J. Roadway Widths

Required Minimum Roadway Width: Minor Rehab – 26'
 Structural Improvement – 28'
 Major Rehab – 32'

Freight Level Required Minimum Width: 26'

Surrounding Corridors: ND 1 North = 29'
 ND 1 South = 29'
 ND 32 East = 31'
 ND 32 North = 32'

K. PERFORMANCE GUIDELINES

Design Speed: 65 mph

Clear Zone: Minor – Use Existing
 Structural Improvement – 20'
 Major Rehabilitation – 30' or 36'

Foreslopes: 4:1

L. PROPOSED IMPROVEMENTS

The following improvements options are proposed:

Minor Rehabilitation – 2' Shoulders
 Sliver Grading Only - Gravel Shoulders
 Sliver Grading w/HMA Overlay
 Structural Improvement – 2' Shoulder
 Full Depth Reclamation & HMA Overlay

Major Rehabilitation – 4' Shoulders

Widening Only

Gravel Shoulders

Paved Shoulders

Widening & HMA Overlay

Widening, Full Depth Reclamation & HMA Overlay

Proposed Typical Sections are shown under proposed improvements.

Future Outlook

The following table compares the variations in future overlay details based on current requirements of the NDDOT's Freight Plan and Design Guidelines.

Future Overlay Info*				
	28' Minor	32' Major	28' FDR	32' FDR
Number of subsequent overlay that reintroduces width restriction	2	4	2	4
Thickness of pavement when width restriction reintroduced	>13.5"	>18.5"	>5"	>10.5"
Number of subsequent overlays before minimum width of 24' is reached	3	5	3	5
Thickness of pavement when minimum width of 24' is reached	~16.5"	~21"	~11"	~16"

*The table is an approximate future based off of 4:1 sloughs being used. Actual values would vary if flatter sloughs were used as well as if any milling is done.

M. ADDITIONAL COMMENTS**District Engineer:**

Comment: Do not like the options to do major dirt work/widening and not complete a HBP overlay at same time. By the time this project gets completed, maybe 2024 or later, the last HBP overlay will be +6 yrs old.

Comment: The project needs to include necessary centerline pipe work, repairs and replacement. This is the appropriate project to complete this type of work.

Comment: Please add Right of Way pins & markers to this project. Majority of existing markers are missing or disturbed.

L. COST ESTIMATES

Minor Rehabilitation – 2' Shoulders	Widening Only	Widen & Overlay
Item	Estimated Cost	Estimated Cost
Contract Bond & Mobilization	\$185,000	\$380,000
Removals	\$0	\$450,000
Dirtwork	\$1,200,000	\$1,250,000
Aggregate	\$500,000	\$450,000
HMA	\$0	\$2,900,000
Concrete	\$0	\$0
Structures	\$150,000	\$150,000
Pipe	\$175,000	\$175,000
Striping/Signing/Guardrail	\$100,000	\$180,000
Erosion Control	\$600,000	\$525,000
Trees/Landscaping/Fencing	\$0	\$0
Field Office/Labs	\$50,000	\$50,000
Work Zone Traffic Control	\$250,000	\$450,000
Subtotal=	\$3,210,000	\$6,960,000
Inflation=	\$550,000	\$1,150,000
Engineering=	\$642,000	\$1,392,000
Estimated Total Cost =	\$4,402,000	\$9,502,000
Estimated Cost Per Mile=	\$340,000	\$735,000

Structural Improvement FDR & HMA Overlay	
Item	Estimated Cost
Contract Bond & Mobilization	\$480,000
Removals	\$975,000
Dirtwork	\$255,000
Full Depth Reclamation	\$1,050,000
HMA	\$4,900,000
Concrete	\$0
Structures	\$150,000
Pipe	\$25,000
Striping/Signing/Guardrail	\$180,000
Erosion Control	\$110,000
Trees/Landscaping/Fencing	\$0
Field Office/Labs	\$50,000
Work Zone Traffic Control	\$400,000
Subtotal=	\$8,575,000
Inflation=	\$1,450,000
Engineering=	\$1,715,000
Estimated Total Cost =	\$11,740,000
Estimated Cost Per Mile=	\$905,000

Major Rehabilitation - 4' Shoulders	Widen Only Gravel Shoulder	Widen Only Paved Shoulder	Widen & HMA Overlay
Item	Estimated Cost	Estimated Cost	Estimated Cost
Contract Bond & Mobilization	\$275,000	\$340,000	\$535,000
Removals	\$0	\$0	\$450,000
Dirtwork	\$1,800,000	\$1,800,000	\$1,850,000
Aggregate	\$975,000	\$800,000	\$800,000
HMA	\$0	\$1,300,000	\$4,200,000
Concrete	\$0	\$0	\$0
Structures	\$150,000	\$150,000	\$150,000
Pipe	\$175,000	\$175,000	\$175,000
Striping/Signing/Guardrail	\$100,000	\$100,000	\$180,000
Erosion Control	\$525,000	\$525,000	\$525,000
Trees/Landscaping/Fencing	\$0	\$0	\$0
Field Office/Labs	\$50,000	\$50,000	\$50,000
Work Zone Traffic Control	\$300,000	\$300,000	\$650,000
Subtotal=	\$4,350,000	\$5,540,000	\$9,565,000
Inflation=	\$825,000	\$900,000	\$1,600,000
Engineering=	\$870,000	\$1,108,000	\$1,913,000
Estimated Total Cost =	\$6,045,000	\$7,548,000	\$13,078,000
Estimated Cost Per Mile=	\$470,000.00	\$585,000.00	\$1,010,000

Major Rehabilitation Widening, FDR & Overlay	
Item	Estimated Cost
Contract Bond & Mobilization	\$720,000
Removals	\$975,000
Dirtwork	\$1,800,000
Aggregate/Full Depth Reclamation	\$1,900,000
HMA	\$5,500,000
Concrete	\$0
Structures	\$150,000
Pipe	\$175,000
Striping/Signing/Guardrail	\$180,000
Erosion Control	\$600,000
Trees/Landscaping/Fencing	\$0
Field Office/Labs	\$50,000
Work Zone Traffic Control	\$650,000
Subtotal=	\$12,700,000
Inflation=	\$2,150,000
Engineering=	\$2,540,000
Estimated Total Cost =	\$17,390,000
Estimated Cost Per Mile=	\$1,350,000

M. DECISIONS

1. Which option(s) should proceed with the project?

☐ Minor Rehabilitation – 2' Shoulders

☐ Sliver Grading Only - Gravel Shoulders
Estimated Cost = \$4,402,000

☐ Sliver Grading w/HMA Overlay
Estimated Cost = \$9,502,000

☐ Structural Improvement Full Depth Reclamation & HMA Overlay
w/2' shoulders **Estimated Cost = \$11,740,000**

☒ Major Rehabilitation – 4' Shoulders

☒ Widening Only

☐ Gravel Shoulders **Estimated Cost = \$6,045,000**

☒ Paved Shoulders **Estimated Cost = \$7,548,000**

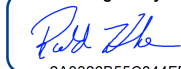
☐ Widening & HMA Overlay **Estimated Cost = \$13,078,000**

☐ Widening, Full Depth Reclamation & HMA Overlay w/ 4'
shoulders **Estimated Cost = \$17,390,000**

DDE Comments: _____
A project to pave ND 46 shoulders in the Fargo District should be setup and tied to this project.

Include no cultivate signs.

DocuSigned by:



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Deputy Director for Engineering

8/30/2021

Date

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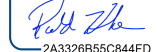
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