

HAUL ROUTE INSPECTION REPORT

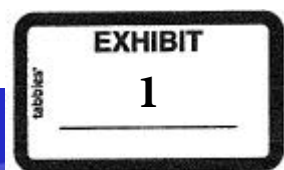
HUGHES COUNTY, SOUTH DAKOTA
NORTH BEND ROAD USE AGREEMENT
Post-Construction Report

PROJECT NUMBER: 2302136

DATE: 05/31/2024



REPORT PREPARED BY:
Brosz Engineering, Inc.
3030 Airport Road
Pierre, SD 57501
(605) 224-1123
www.broszeng.com



CERTIFICATION

PROJECT NO. 2302136

HAUL ROUTE INSPECTION SERVICES

for

HUGHES COUNTY

I, Kyle Kurth, PE, hereby certify that this report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of South Dakota, Registration Number 14611.

Kyle Kurth, PE

Date

14611
Registration No.

Table of Contents

Chapter 1.0 – Introduction

1.1 Purpose.....	1-1
1.2 Project Location	1-1

Chapter 2.0 – Scope of Services

2.1 Evaluation of Designated Roads Prior to Construction.....	2-2
2.2 Evaluation of Designated Roads During to Construction	2-3
2.3 Evaluation of Designated Roads After Construction	2-4

Chapter 3.0 – Roadway Data Collection

3.1 Gravel Surfacing & Rut Data	3-5
3.2 Geometry Data	3-5
3.3 Video & Pictures	3-6

Chapter 4.0 – Pipe Culvert Data Collection

4.1 Pipe Culvert Data	4-7
-----------------------------	-----

Chapter 5.0 – Bridge/Box Culvert Pictures

5.1 Bridge Structure Pictures.....	5-8
------------------------------------	-----

Chapter 6.0 – Inspection Comparisons

6.1 Change in Gravel Surfacing and Rut Data	9-10
6.2 Change in Elevation Data/Roadway Geometry	10

Chapter 7.0 – Summary and Restoration Needs

7.1 203 rd Street.....	11
7.2 204 th Street.....	11
7.3 321 st Avenue	11-12
7.4 324 th Avenue	12
7.5 208 th Street.....	12
7.6 Restoration Cost Breakdown	13

Figures

Sheet 1	Haul Route Location Map
Sheets 2-13	Sample Data Collection Maps
Sheets 14-25	Pipe Location Maps
Sheet 26	Bridge and Structure Location Map

Appendices

Appendix A	Post-Construction Gravel Surfacing & Rut Data
Appendix B	Post-Construction Pipe Data
Appendix C	Post-Construction Pipe Pictures
Appendix D	Post Construction Visual Observation Pictures

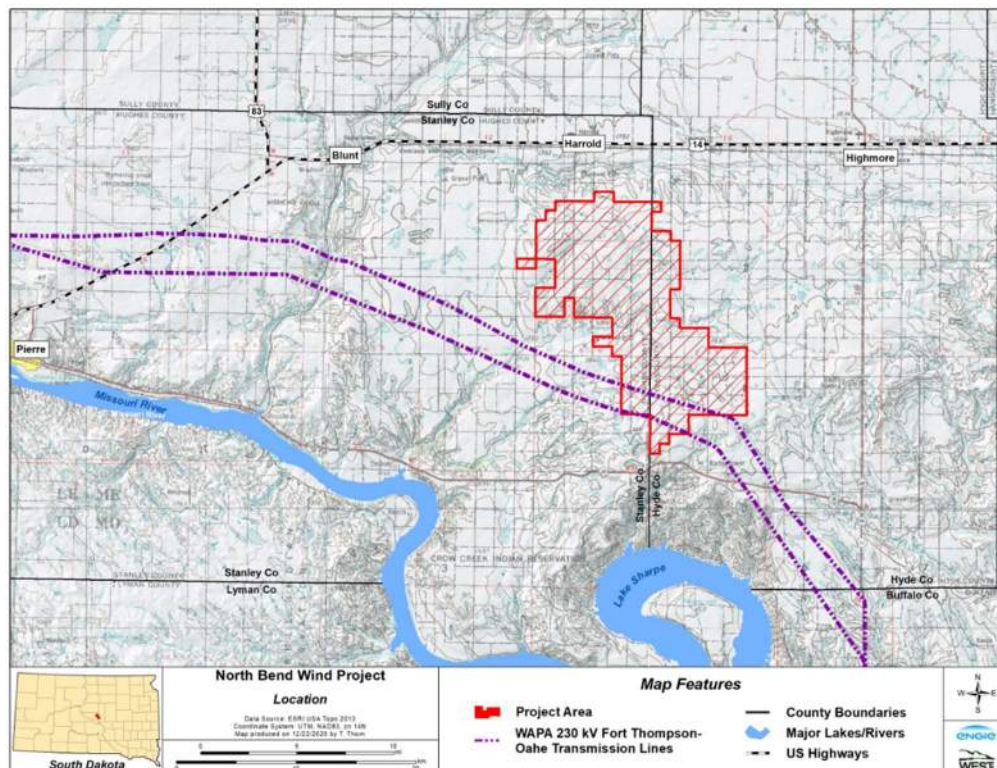
1.1 PURPOSE

North Bend Wind Project, LLC is developing a wind-powered electricity generating facility with a planned capacity of up to approximately 200 mega-watts, located in Hyde and Hughes Counties, South Dakota.

Hughes County is responsible for the maintenance of its roadway system within the County. The County has limited resources and cannot afford to repair damage to the highway system caused by large-scale industrial development. The increased frequency of heavy loads associated with large-scale industrial development will shorten the lifespan of the highway system whether there are visible signs of damage, or not.

Hughes County authorized Brosz Engineering to perform an evaluation of the designated haul routes before the development commences and once again after the development is completed. The data collected during the pre-development inspection is detailed in this report.

1.2 PROJECT LOCATION



1. North Bend Wind Farm, LLC. Project Map (Courtesy of WAPA.gov)

CHAPTER 2.0

SCOPE OF SERVICES

2.1 EVALUATION OF DESIGNATED ROADS PRIOR TO CONSTRUCTION

The initial evaluation captured the existing condition(s) of the roadways, bridges, and culverts along the Designated Roads. The following tasks were completed:

- Determination of gravel surfacing thicknesses.
- Collected location and geometry data at investigation locations.
- Measured rutting at investigation locations.
- Videos were taken of each designated road segment.
- Completed culvert inspections documenting the following:
 - Location
 - Diameter
 - Material Type
 - Condition
 - Pictures
- Collected bridge structure pictures.
- Compiled the most recent full bridge inspection reports.

A total of 6.8 miles were included in the initial evaluation. Those segments are detailed below:

Segment Name	Start	End	Distance (Miles)	Bearing
203rd Street	324th Avenue	County Line	1.0	E/W
204th Street	321st Avenue	324th Avenue	3.0	E/W
208th Street	W. of County Line	County Line	0.2	E/W
321st Avenue	204th Street	N. of 205th Street	0.5	N/S
324th Avenue	N. of 203rd Street	S. of 204th Street	2.1	N/S

6.8 Miles

2.2 EVALUATION OF DESIGNATED ROADS DURING CONSTRUCTION

This scope of work was included as a line item for if/when the Developer wished to add Designated Roads once construction commenced as laid out in the Haul Route Agreement between Hughes County and the Developer. Prior to commencement of construction, but after execution of the contract, the Developer made such request. Therefore, the same scope of work as listed in Section 2.1 was conducted.

The evaluation captured the existing condition(s) of the roadways, bridges, and culverts along the Designated Roads. The following tasks were completed:

- Determination of gravel surfacing thicknesses.
- Collected location and geometry data at investigation locations.
- Measured rutting at investigation locations.
- Videos were taken of each designated road segment.
- Completed culvert inspections documenting the following:
 - Location
 - Diameter
 - Material Type
 - Condition
 - Pictures
- Collected bridge structure pictures.
- Compiled the most recent full bridge inspection reports.

A total of 5.8 miles were added due to this request by the Developer. This segment is detailed below:

Segment Name	Start	End	Distance (Miles)	Bearing
208th Street	319th Avenue	W. of County Line	5.8	E/W

5.8 Miles

2.3 EVALUATION OF DESIGNATED ROADS AFTER CONSTRUCTION

This post construction evaluation includes the same scope of work as laid out in Sections 2.1 and 2.2.

The evaluation included capturing the post-construction condition(s) of the roadways, bridges, and culverts along the Designated Roads. The following tasks have been completed:

- Determination of gravel surfacing thicknesses.
- Collection of location and geometry data at investigation locations.
- Measure rutting at investigation locations.
- Videos will be taken of each designated road segment.
- Complete culvert inspections documenting the following:
 - Location
 - Diameter
 - Material Type
 - Condition
 - Pictures
- Collect bridge structure pictures.

A total of 12.6 miles have been inspected in post-construction condition. These segments are detailed below:

Segment Name	Start	End	Distance (Miles)	Bearing
203rd Street	324th Avenue	County Line	1.0	E/W
204th Street	321st Avenue	324th Avenue	3.0	E/W
208th Street	W. of County Line	County Line	0.2	E/W
321st Avenue	204th Street	N. of 205th Street	0.5	N/S
324th Avenue	N. of 203rd Street	S. of 204th Street	2.1	N/S
208th Street	319th Avenue	W. of County Line	5.8	E/W

12.6 Miles

Results of post construction evaluation will be compared against the pre-construction information. The report will include:

- An itemized list of any restoration needs.
- A cost estimate to bring the roadways, bridges, and culverts along the designated roads back to pre-construction condition.

ROADWAY DATA COLLECTION**3.1 GRAVEL SURFACING & RUT DATA**

To collect representative gravel surfacing and rut data, information was collected no less than once per segment and no less than once per quarter mile. Below is a table showing segment names, segment lengths, number of samples and the calculated average distance between samples.

Segment Name	Segment Length (Miles)	# of Samples	Avg. Distance Between Sample
203rd Street	1.0	5	0.20
204th Street	3.0	13	0.23
208th Street	0.2	1	0.20
321st Avenue	0.5	3	0.17
324th Avenue	2.1	10	0.21
208th Street	5.8	26	0.22

At each sample location the existing gravel surfacing was removed until subgrade was exposed and visually confirmed. Depth measurements were taken and recorded. These pre-construction gravel surfacing thicknesses will be compared to the post-construction gravel surfacing thicknesses at the same location to determine any significant changes throughout the construction period.

Additionally, at each sample location a rut measurement was determined and recorded using a 10-foot straightedge and a tape measure from approximate roadway centerline. These pre-construction gravel surfacing thicknesses will be compared to the post-construction gravel surfacing thicknesses at the same location to determine any significant changes throughout the construction period.

Tabulated data for Pre-Construction Gravel Surfacing and Rut Data can be found in Appendix A.

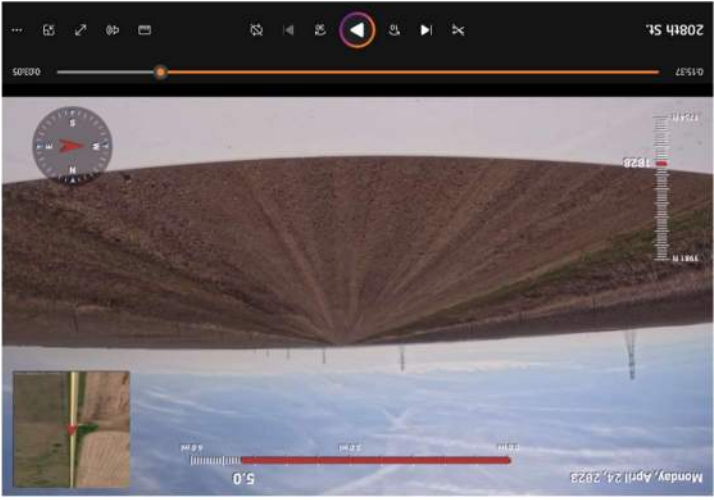
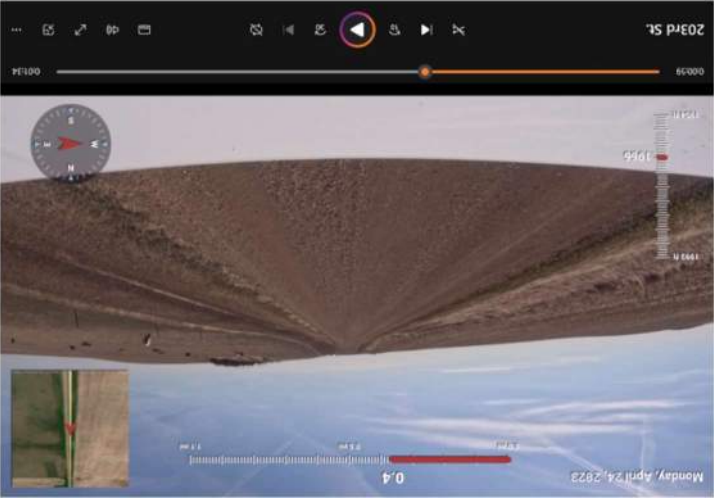
3.2 GEOMETRY DATA

For comparison purposes post-construction, cross-sectional data was collected with survey equipment. This data captures both horizontal and vertical data to allow a geometric comparison between the pre-construction and post-construction roadway segment. Currently, only tabulated data is provided. Raw pre-construction geometry data is available and will be shared with the County and Developer upon request.

3.3 VIDEO & PICTURES

At the conclusion of roadway data collection for each segment, the segment was driven while recording via a Go-Pro Hero 11. These pre-construction videos & pictures can be compared to the post-construction videos & pictures at the same location to determine significant changes throughout the construction period.

Video & Picture data is available via thumb drive and will be supplied to both the County and the Developer to have baseline information.



PIPE CULVERT DATA COLLECTION

4.1 PIPE CULVERT DATA

Post-construction pipe culvert data was collected at all pipes located along the roadway segments. Below is a table showing segment names, segment lengths and the number of culverts inspected.

Segment Name	Segment Length (Miles)	Culverts Inspected
203rd Street	1.0	3
204th Street	3.0	11
208th Street	0.2	0
321st Avenue	0.5	1
324th Avenue	2.1	3
208th Street	5.8	12

At each pipe culvert location, the following information was collected*:

- Pipe Size (Diameter)
 - Horizontal & Vertical measurements taken on both ends of the pipe.
- Material Type
- Condition Assessment
- Pictures
- Roadway Data Collection Information

*There are locations where not all data could be collected due to water elevation or presence of sediment.

The pre-construction pipe culvert data will be compared to the post-construction pipe culvert data at the same location to determine any significant changes throughout the construction period.

Tabulated data for Post-Construction Pipe Culvert Data can be found in Appendix B. Post-Construction Pipe Pictures can be found in Appendix C.

BRIDGE/BOX CULVERT STRUCTURE PICTURES

5.1 BRIDGE/BOX CULVERT STRUCTURE PICTURES

Post-construction bridge/box culvert structure pictures were taken at each of the structures listed in the North Bend Road Use Agreement between the County and the Developer. Those structures include the following:

Structure #	Type of Structure	# of Pictures
33-372-020	Bridge	25
33-380-021	Box Culvert	19
33-380-121	Box Culvert	13
33-380-125	Box Culvert	13
33-390-023	Bridge	23
33-410-024	Box Culvert	17
33-410-112	Bridge	29
33-420-025	Bridge	28
33-440-102	Box Culvert	15

Pre-construction bridge/box culvert structure pictures have been compared to the post-construction pictures to determine any significant changes throughout the construction period.

Pre-Construction and Post-Construction Bridge/Box Culvert Structure Data is available via thumb drive and will be supplied to both the County and the Developer.

INSPECTION COMPARISONS

6.1 CHANGE IN GRAVEL SURFACING & RUT DATA

The gravel surfacing and rut data collected in this post-construction inspection has been compared to the data collected and reported in the pre-construction inspection. Below is the tabulated data for the change in Gravel Depth, Rut Data, and Roadway Width throughout the construction period:

Roadway Segment	Segment Sample (#)	Station (XX+XX)	Δ Gravel Surfacing (in)	Δ Rut ₁ (in)	Δ Rut ₂ (in)	Δ Roadway Width (ft)
203rd Street	1	9+00	-0.5	0.00	0.00	0.0
203rd Street	2	22+95	0.0	0.25	-0.50	0.0
203rd Street	3	33+08	-0.5	-0.25	-0.25	0.0
203rd Street	4	43+00	-1.0	0.00	-0.25	0.6
203rd Street	5	56+39	0.5	0.00	0.25	0.0
204th Street	1	3+00	2.0	0.00	0.00	-0.2
204th Street	2	13+64	0.5	0.25	0.25	0.0
204th Street	3	24+96	0.0	0.25	0.25	-0.7
204th Street	4	37+00	0.0	0.25	-0.50	-0.1
204th Street	5	50+00	-0.5	-0.25	-0.25	-0.3
204th Street	6	62+00	-1.0	-0.25	0.25	1.0
204th Street	7	75+00	0.0	0.00	-0.25	0.1
204th Street	8	88+00	-1.0	-0.25	0.25	0.0
204th Street	9	102+00	0.0	0.00	0.00	0.0
204th Street	10	114+05	0.0	-0.25	0.00	0.0
204th Street	11	127+00	-0.5	0.00	-0.25	0.0
204th Street	12	140+84	0.0	0.00	0.50	1.0
204th Street	13	155+00	0.0	-0.25	0.25	0.0
321st Avenue	1	26+82	0.5	0.00	-0.25	0.0
321st Avenue	2	39+00	0.0	-0.75	-0.75	0.0
321st Avenue	3	50+00	0.5	-0.75	-0.25	0.0
324th Avenue	1	60+00	-1.5	0.00	0.00	0.0
324th Avenue	2	72+00	-0.5	-0.25	0.00	0.0
324th Avenue	3	84+00	-0.5	0.00	-0.25	0.0
324th Avenue	4	93+82	4.0	0.25	2.00	0.0
324th Avenue	5	104+00	0.0	0.25	0.25	0.0
324th Avenue	6	111+00	0.0	0.00	0.50	0.0
324th Avenue	7	128+00	-0.5	0.00	0.00	0.0
324th Avenue	8	143+29	-0.5	0.50	0.50	0.0
324th Avenue	9	153+00	-1.5	0.00	0.00	0.0
324th Avenue	10	167+00	-0.5	0.00	0.25	0.0

Roadway Segment	Segment Sample (#)	Station (XX+XX)	Δ Gravel Surfacing (in)	Δ Rut ₁ (in)	Δ Rut ₂ (in)	Δ Roadway Width (ft)
208th Street	1	7+00	0.0	-0.50	-0.25	0.0
208th Street	2	14+00	-0.5	0.25	-0.50	0.0
208th Street	3	25+96	-0.5	-0.75	-0.25	0.0
208th Street	4	36+51	0.0	0.00	-0.75	0.0
208th Street	5	48+00	-0.5	0.25	0.00	0.0
208th Street	6	60+00	-0.5	0.00	-0.50	0.0
208th Street	7	72+00	0.0	0.25	0.00	0.0
208th Street	8	82+08	-0.5	-0.25	0.50	0.0
208th Street	9	96+00	-1.0	0.50	-0.25	0.0
208th Street	10	108+00	-0.5	-0.25	-0.25	0.0
208th Street	11	120+00	-0.5	0.00	0.25	0.0
208th Street	12	132+00	-1.0	-0.50	0.00	0.0
208th Street	13	144+00	-0.5	0.00	0.25	0.0
208th Street	14	157+60	-1.0	0.25	0.00	0.0
208th Street	15	168+00	-0.5	0.50	-0.25	0.0
208th Street	16	180+00	0.5	0.25	0.00	0.0
208th Street	17	192+00	-0.5	0.00	0.00	0.0
208th Street	18	204+00	-1.0	0.00	-0.50	1.3
208th Street	19	216+00	-0.5	1.25	0.75	0.0
208th Street	20	228+00	0.0	0.25	0.00	0.0
208th Street	21	240+00	-1.5	0.00	0.25	0.0
208th Street	22	252+00	-1.0	0.25	0.00	0.0
208th Street	23	264+00	-1.0	-0.25	-0.50	0.0
208th Street	24	276+00	-1.5	0.25	0.50	0.0
208th Street	25	288+00	-1.0	0.50	-0.25	-0.5
208th Street	26	301+99	-0.5	0.25	0.00	0.0
208th Street	27	316+00	-1.5	0.50	0.25	0.0

Data entries highlighted in red are areas within the roadway that experienced significant change Gravel Depth, Rutting, or Width, throughout the construction period. These changes will be further investigated in Chapter 7.0.

6.2 CHANGE IN ELEVATION DATA/ROADWAY GEOMETRY

Pre and post construction elevation data was gathered; however, it was determined that there was not a significant change. Therefore, there is no recommendation for restoration of elevation. Raw data will be provided upon request.

SUMMARY AND RESTORATION NEEDS

7.1 203RD STREET

SUMMARY

Upon visual inspection of the haul route along 203rd Street, the roadway appeared to be in similar condition as it was observed in pre-construction condition. The data portrayed in Chapter 6.0 supports this observation. The average gravel surfacing depth loss was 0.3 inches. Zero locations where a gravel depth loss of 2.0 inches or greater was observed. No location along this haul route was observed to sustain an increase in rut depth of greater than ¼ inch. No locations along this roadway were observed to change by more than 2.0 feet.

RESTORATION NEEDS

- Vegetation Re-establishment at Approaches & Tie-Ins, see 7.6.

7.2 204TH STREET

SUMMARY

Upon visual inspection of the haul route along 204th Street, the roadway appeared to be in similar condition as it was observed in pre-construction condition. The data portrayed in Chapter 6.0 supports this observation. The average gravel surfacing depth loss was 0.04 inches. Zero locations where a gravel depth loss of 2.0 inches or greater was observed. Only one location along this haul route was observed to sustain an increase in rut depth of greater than ¼ inch. No locations along this roadway where the width was observed to change by more than 2.0 feet.

RESTORATION NEEDS

- Vegetation Re-establishment at intersection of 204th Street and 322nd Avenue, see 7.6.

7.3 321ST AVENUE

SUMMARY

Upon visual inspection of the haul route along 321st Avenue, the roadway appeared to be in similar condition as it was observed in pre-construction condition. Upon arrival for the Post-Construction Inspection, this roadway segment was observed to be bladed by Hughes County forces. With this knowledge, the data collected on this segment may not be as accurate as the county has altered the road from the post-construction condition. The average gravel surfacing depth gained an additional 0.3 inches. Zero locations where a gravel depth loss of 2.0 inches or greater was observed. Zero locations along this haul route was observed to sustain an increase in rut depth of greater than ¼ inch. No locations along this roadway where the width was observed to change by more than 2.0 feet.

RESTORATION NEEDS

- Vegetation Re-establishment at Approaches & Tie-Ins, see 7.6.

7.4 324TH AVENUE

SUMMARY

Upon visual inspection of the haul route along 324th Avenue, with one exception, the roadway appeared to be in similar condition as it was observed in its pre-construction condition. The gravel depth loss was never observed to be 2.0 inches or greater. Four locations along this haul route were observed to sustain an increase in rut depth of greater than ¼ inch. No locations along this roadway experienced a change in width of greater than 2.0 feet.

One area near STA 93+82 was negatively impacted on this haul route. This location is along the curve just north of the intersection with 204th Street. It appears that gravel has been added to widen the road to allow trucks to make it around the curve. The added gravel was loose and uncompacted. This area is severely rutted. A large amount of gravel has been pushed off the shoulder of the road and lays on the foreslope and in the ditch on both sides. Pictures of the visual observation of this area can be found in Appendix D. The gravel thrown off the road has also caused issues with the culvert at STA 93+82. The right end of the culvert was buried in gravel. It appears to have cleared out a little from stormwater washing it out.

RESTORATION NEEDS

- Vegetation Re-establishment at Approaches & Tie-Ins, see 7.6.
- Vegetation Re-establishment at intersection with 203rd Street, see 7.6.
- Major Shoulder pull: approximately 0.08 miles at intersection with 204th, see 7.6.

7.5 208TH STREET

SUMMARY

Upon visual inspection of the haul route along 208th Street, the roadway was observed to have five locations that appeared to be negatively impacted over the construction period. The data portrayed in Chapter 6.0 shows that some testing locations sustained rutting differences. The gravel depth loss was never observed to be 2.0 inches or greater. Eight locations along this haul route was observed to sustain an increase in rut depth of greater than ¼ inch. The roadway width was never observed to have changed 2.0 feet or greater.

Several soft spots were identified via visual inspection along 208th Street. These locations are characterized by significant rutting and potholes. Pictures of these locations can be found in Appendix D.

RESTORATION NEEDS

- Vegetation Re-establishment at Approaches & Tie-Ins, see 7.6.
- Additional gravel will need to be brought into 20+50 and 28+00, and these areas will need to be reworked with a blade, see 7.6.

7.6 RESTORATION COST BREAKDOWN

Segment	Secondary Location	Concern	Restoration	Rate	Unit	Amount	Cost
321st Avenue	Approaches & Tie-Ins	Vegetation Re-establishment	Seeding	\$ 700.00	LS	1	\$ 700.00
			Segment Restoration Needs:				\$ 700.00
Segment	Secondary Location	Concern	Restoration	Rate	Unit	Amount	Cost
324th Avenue	Approaches & Tie-Ins	Vegetation Re-establishment	Seeding	\$ 700.00	LS	3	\$ 2,100.00
	203rd Street Intersection	Vegetation Re-establishment	Seeding	\$ 1,000.00	LS	1	\$ 1,000.00
	204th Street Intersection	Lost Gravel	Major Shoulder Pull	\$ 4,000.00	LS	1	\$ 4,000.00
	204th Street Intersection	Section Width					
	204th Street Intersection	Shoulder Vegetation / Lack of Topsoil					
	204th Street Intersection	Soft Material / Ability to Drain					
			Segment Restoration Needs:				\$ 7,100.00
Segment	Secondary Location	Concern	Restoration	Rate	Unit	Amount	Cost
203rd Street	Approaches & Tie-Ins	Vegetation Re-establishment	Seeding	\$ 700.00	LS	1	\$ 700.00
			Segment Restoration Needs:				\$ 700.00
Segment	Secondary Location	Concern	Restoration	Rate	Unit	Amount	Cost
204th Street	322nd Avenue Intersection	Vegetation & Geometry Re-establishment	Seeding	\$ 1,900.00	LS	1	\$ 1,900.00
	Approaches & Tie-Ins	Vegetation Re-establishment	Seeding	\$ 700.00	LS	2	\$ 1,400.00
			Segment Restoration Needs:				\$ 1,900.00
Segment	Secondary Location	Concern	Restoration	Rate	Unit	Amount	Cost
208th Street	Approaches & Tie-Ins	Vegetation Re-establishment	Seeding	\$ 700.00	LS	1	\$ 700.00
	Pot Holes - Restoration Needed	Rough Area ≈ 20+50	Gravel	\$ 200.00	Load	2	\$ 400.00
			Blade	\$ 126.00	Hour	1	\$ 126.00
			Truck	\$ 126.00	Hour	0.5	\$ 63.00
			Loader	\$ 110.00	Hour	0.5	\$ 55.00
			Gravel	\$ 200.00	Load	2	\$ 400.00
	Pot Holes - Restoration Needed	Rough Area ≈ 28+00	Blade	\$ 126.00	Hour	1	\$ 126.00
			Truck	\$ 126.00	Hour	0.5	\$ 63.00
			Loader	\$ 110.00	Hour	0.5	\$ 55.00
			Segment Restoration Needs:				\$ 1,988.00

POST-CONSTRUCTION GRAVEL SURFACING & RUT DATA

Roadway Segment	Segment Sample (#)	Station (XX+XX)	Gravel Surfacing (in)	Rut ₁ (in)	Rut ₂ (in)	Roadway Width (ft)
203rd Street	1	9+00	7.0	0.00	0.25	21.6
203rd Street	2	22+95	8.0	0.25	0.50	24.5
203rd Street	3	33+08	8.0	0.25	0.50	23.1
203rd Street	4	43+00	8.0	0.00	0.25	21.6
203rd Street	5	56+39	8.5	0.50	0.50	31.2
204th Street	1	3+00	10.0	0.00	0.25	18.2
204th Street	2	13+64	6.5	0.25	0.25	28.7
204th Street	3	24+96	6.5	0.50	0.25	27.0
204th Street	4	37+00	8.5	0.25	0.25	27.3
204th Street	5	50+00	7.5	0.25	0.25	28.0
204th Street	6	62+00	6.5	0.25	0.50	29.1
204th Street	7	75+00	9.0	0.25	0.25	28.0
204th Street	8	88+00	7.0	0.50	0.75	29.4
204th Street	9	102+00	9.0	0.50	0.25	29.6
204th Street	10	114+05	8.5	0.25	0.50	28.5
204th Street	11	127+00	8.0	0.25	0.25	26.6
204th Street	12	140+84	7.5	0.50	0.50	28.7
204th Street	13	155+00	7.5	0.25	0.25	27.9
321st Avenue	1	26+82	11.0	0.50	0.00	25.3
321st Avenue	2	39+00	8.0	0.00	0.25	25.1
321st Avenue	3	50+00	9.0	0.00	0.00	23.1
324th Avenue	1	60+00	7.5	0.25	0.50	26.6
324th Avenue	2	72+00	7.0	0.25	0.75	28.6
324th Avenue	3	84+00	8.0	0.25	0.75	26.1
324th Avenue	4	93+82	12.0	0.75	2.25	28.5
324th Avenue	5	104+00	7.5	0.75	0.50	23.3
324th Avenue	6	111+00	9.0	0.25	0.50	22.9
324th Avenue	7	128+00	7.0	0.50	0.25	23.3
324th Avenue	8	143+29	6.5	0.75	0.50	22.8
324th Avenue	9	153+00	6.0	0.25	0.25	21.2
324th Avenue	10	167+00	8.0	0.25	0.25	21.7

Roadway Segment	Segment Sample (#)	Station (XX+XX)	Gravel Surfacing (in)	Rut ₁ (in)	Rut ₂ (in)	Roadway Width (ft)
208th Street	1	7+00	8.5	0.25	0.25	25.8
208th Street	2	14+00	7.5	0.50	0.25	25.2
208th Street	3	25+96	8.0	0.25	0.25	23.2
208th Street	4	36+51	8.0	0.50	0.25	24.0
208th Street	5	48+00	7.5	0.25	0.25	24.3
208th Street	6	60+00	6.0	0.25	0.50	22.9
208th Street	7	72+00	8.0	0.50	0.25	21.6
208th Street	8	82+08	7.5	0.25	1.00	21.6
208th Street	9	96+00	6.5	0.75	0.25	21.6
208th Street	10	108+00	6.5	0.25	0.50	22.3
208th Street	11	120+00	6.0	0.50	1.00	22.0
208th Street	12	132+00	6.5	0.50	0.50	21.5
208th Street	13	144+00	7.5	0.50	0.50	22.8
208th Street	14	157+60	8.0	0.50	0.75	22.0
208th Street	15	168+00	8.0	0.50	0.75	22.2
208th Street	16	180+00	8.5	0.50	0.50	23.0
208th Street	17	192+00	7.0	0.50	0.25	23.1
208th Street	18	204+00	7.5	0.50	0.25	24.0
208th Street	19	216+00	8.5	1.50	1.25	27.9
208th Street	20	228+00	6.5	0.50	0.25	21.2
208th Street	21	240+00	7.5	0.25	0.50	22.2
208th Street	22	252+00	7.5	0.75	0.25	22.3
208th Street	23	264+00	7.5	0.50	0.25	23.2
208th Street	24	276+00	7.5	0.25	0.50	22.0
208th Street	25	288+00	7.5	0.50	0.25	22.4
208th Street	26	301+99	7.5	0.50	0.25	21.5
208th Street	27	316+00	5.5	0.50	0.50	22.4

APPENDIX B

POST-CONSTRUCTION PIPE CULVERT DATA

Roadway Segment	Segment Sample #	Station (XX+XX)	Pipe Size (in)	Pipe Material	Left		Right		Notes
					D _h (in)	D _v (in)	D _h (in)	D _v (in)	
203rd Street	1	22+95	18.0	CMP	18.0	18.0	18.0	18.0	Left End Bent & Filled with Sediment
203rd Street	2	33+08	24.0	CMP	25.0	X	24.0	24.0	Left End Bent & Filled with Sediment
203rd Street	3	56+39	18.0	CMP	X	X	X	X	Ends Mangled
204th Street	1	13+64	24.0	CMP	24.0	X	X	X	Pipe Submerged & Ends Crushed
204th Street	2	19+40	18.0	CMP	19.0	16.0	18.0	18.0	Left Side Deformed
204th Street	3	24+96	18.0	CMP	18.0	18.0	18.0	18.0	Ends Bent, Left side submerged and silted
204th Street	4	30+37	18.0	CMP	X	X	X	X	Left Side Submerged, Right Side Crushed
204th Street	5	42+53	18.0	CMP	X	X	X	X	Ends Completed Crushed
204th Street	6	96+02	36.0	CMP	36.0	36.0	36.0	36.0	
204th Street	7	96+07	36.0	CMP	36.0	36.0	36.0	36.0	
204th Street	8	114+05	24.0	CMP	X	X	X	X	Ends submerged and Vegetation Covered
204th Street	9	133+80	36.0	CMP	36.0	36.0	36.0	36.0	
204th Street	10	140+84	24.0	CMP	25.0	23.0	25.0	23.0	Both Sides Slightly Deformed
204th Street	11	157+38	18.0	CMP	18.0	18.0	X	X	Left End Cut and fixed
321st Avenue	1	26+82	24.0	CMP	24.00	24.0	24.00	24.0	Left End Slightly Damaged
324th Avenue	1	60+07	18.0	CMP	18.0	18.0	19.0	X	Pipe Bowed Towards Middle / Right End Crushed
324th Avenue	2	93+82	15.0	CMP	X	X	X	X	Ends Buried from Extra Gravel
324th Avenue	3	143+29	18.0	CMP	X	X	X	X	Ends Crushed and Buried
208th Street	1	25+96	24.0	CMP	24.0	24.0	X	X	Bent / Bowed in the Middle
208th Street	2	36+51	24.0	CMP	24.0	24.0	24.0	24.0	
208th Street	3	65+80	36.0	CMP	36.0	36.0	36.0	36.0	
208th Street	4	66+01	36.0	CMP	36.0	36.0	36.0	36.0	
208th Street	5	66+64	48.0	CMP	48.0	48.0	48.0	48.0	Slightly Bowed / Flattened Near Right Shoulder
208th Street	6	66+81	48.0	CMP	48.0	48.0	48.0	48.0	
208th Street	7	82+08	30.0	CMP	30.0	30.0	30.0	30.0	
208th Street	8	157+60	24.0	CMP	24.0	24.0	24.0	24.0	
208th Street	9	167+69	18.0	CMP	X	X	18.0	18.0	Left Side Slightly Smaller Vertically & Horizontally
208th Street	10	187+70	24.0	CMP	24.0	24.0	X	X	Right Side Nearly Buried
208th Street	11	220+63	18.0	CMP	18.0	18.0	18.0	18.0	Curved / Bowed in Middle
208th Street	12	301+99	18.0	CMP	18.0	18.0	19.0	X	Right End Crushed

POST-CONSTRUCTION PIPE PICTURES

203RD STREET



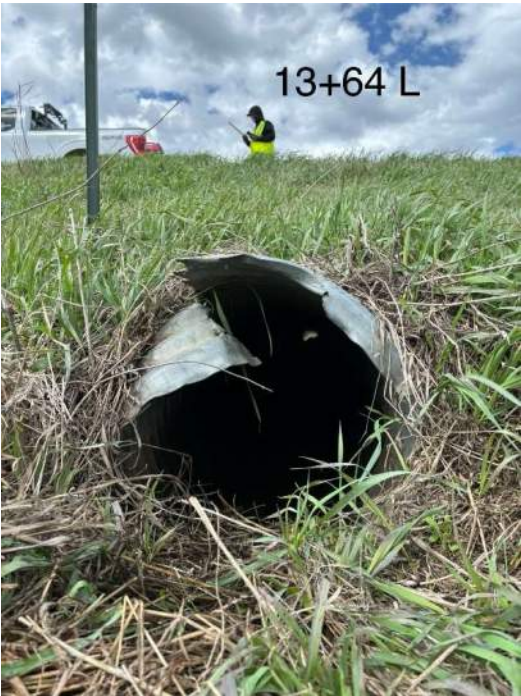
203RD STREET



203RD STREET



204TH STREET



204TH STREET



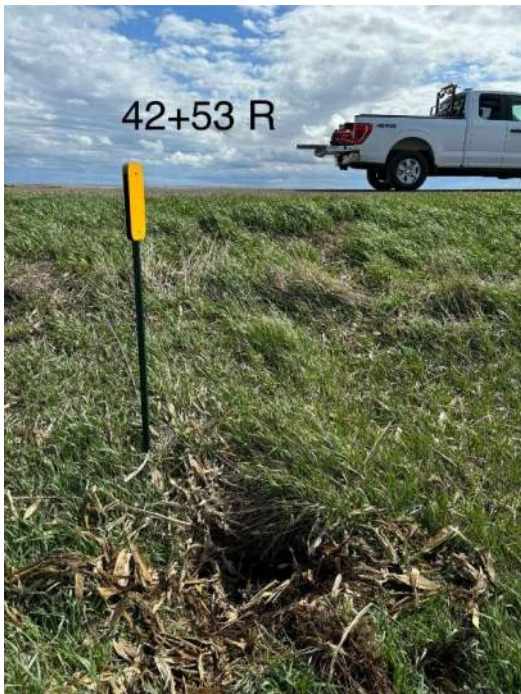
204TH STREET



204TH STREET



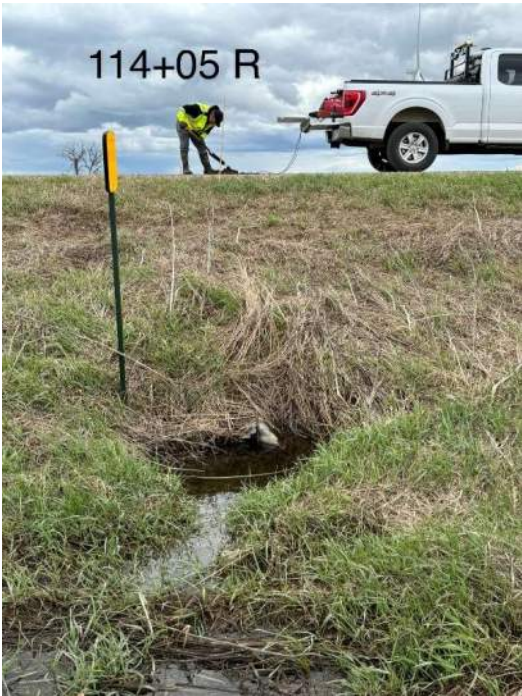
204TH STREET



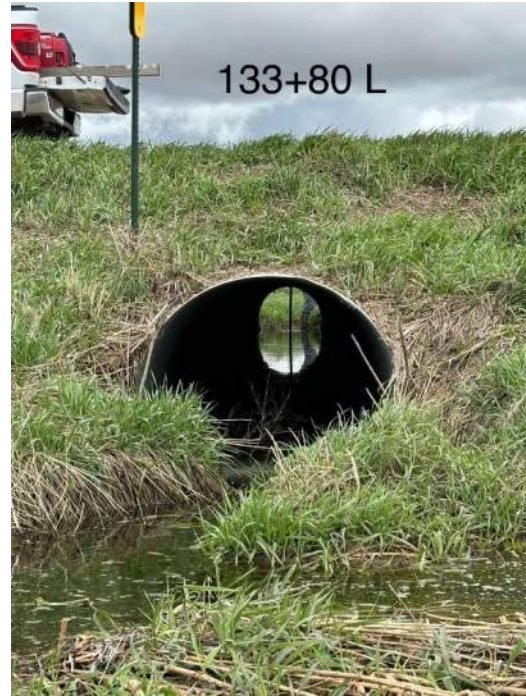
204TH STREET



204TH STREET



204TH STREET



204TH STREET



204TH STREET



208TH STREET



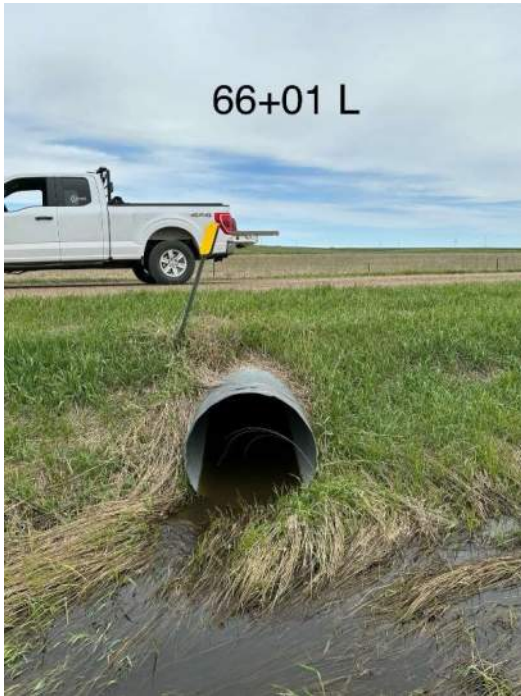
208TH STREET



208TH STREET



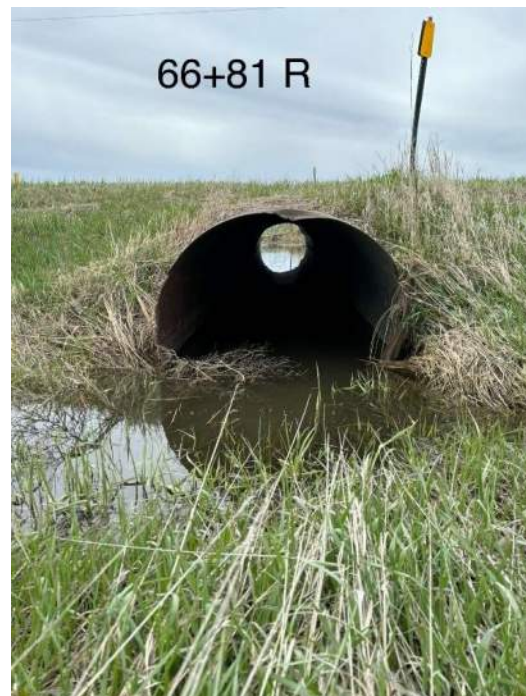
208TH STREET



208TH STREET



208TH STREET



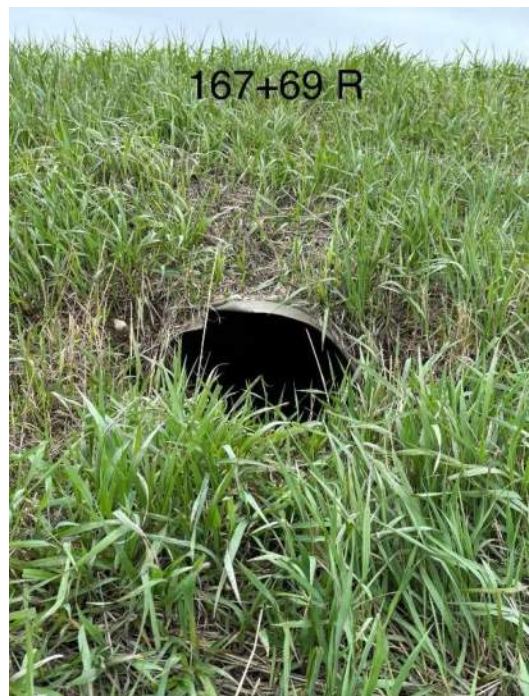
208TH STREET



208TH STREET



208TH STREET



208TH STREET



208TH STREET



208TH STREET



321ST AVENUE



324TH AVENUE



324TH AVENUE



324TH AVENUE



VISUAL INSPECTION OBSERVATION PICTURES

324TH AVENUE



208TH STREET



208TH STREET

