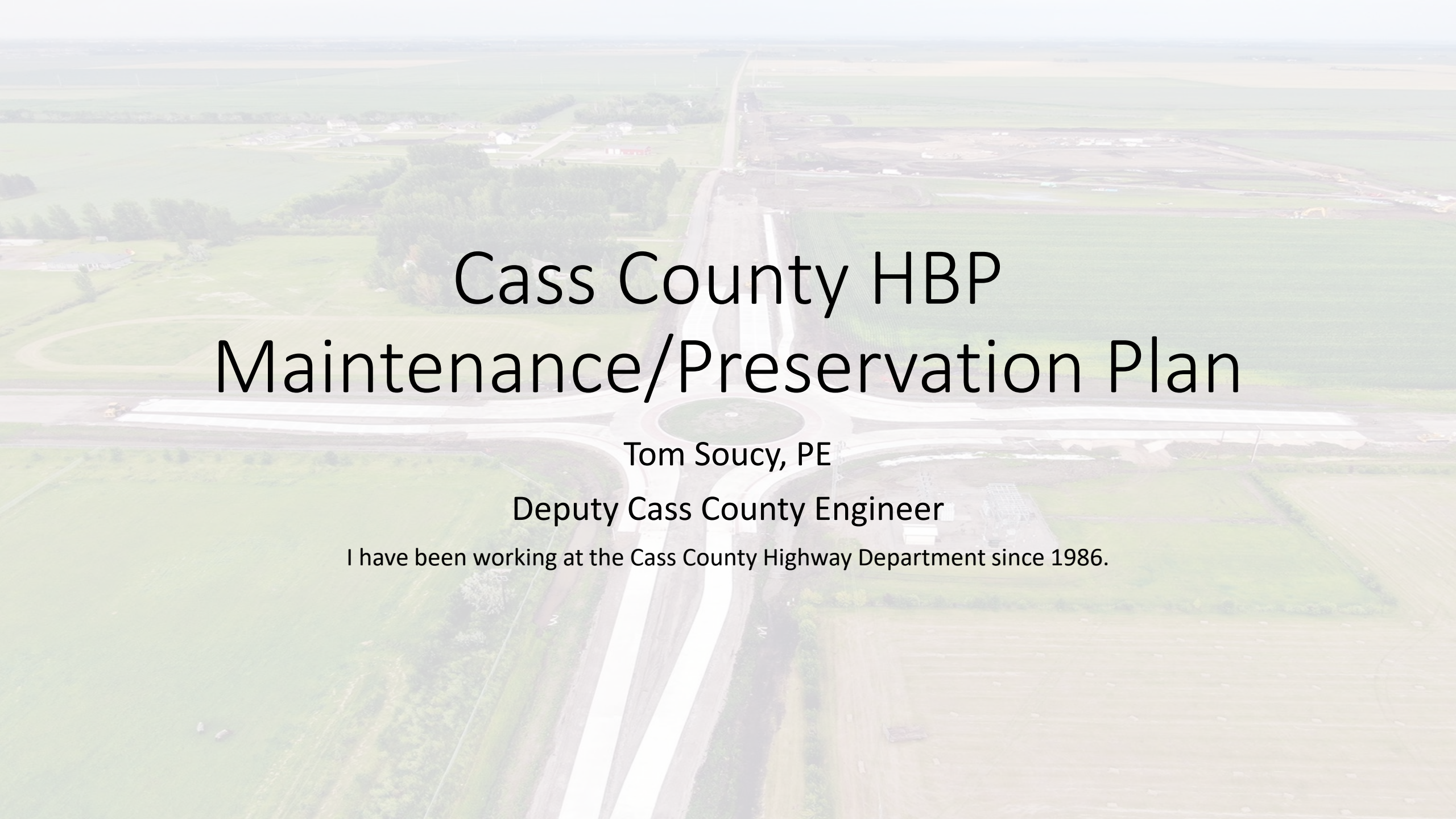




Cass County HBP Maintenance/Preservation Plan

Tom Soucy, PE

Deputy Cass County Engineer

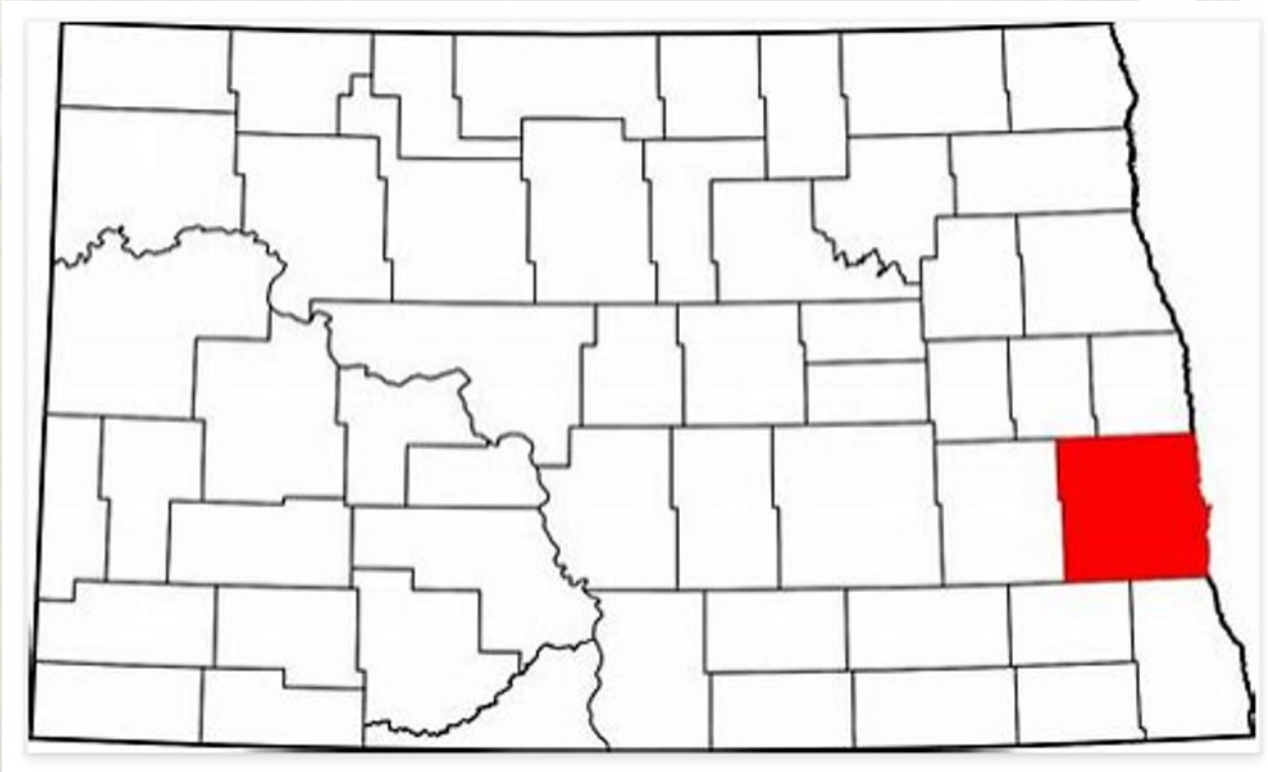
I have been working at the Cass County Highway Department since 1986.

Overview

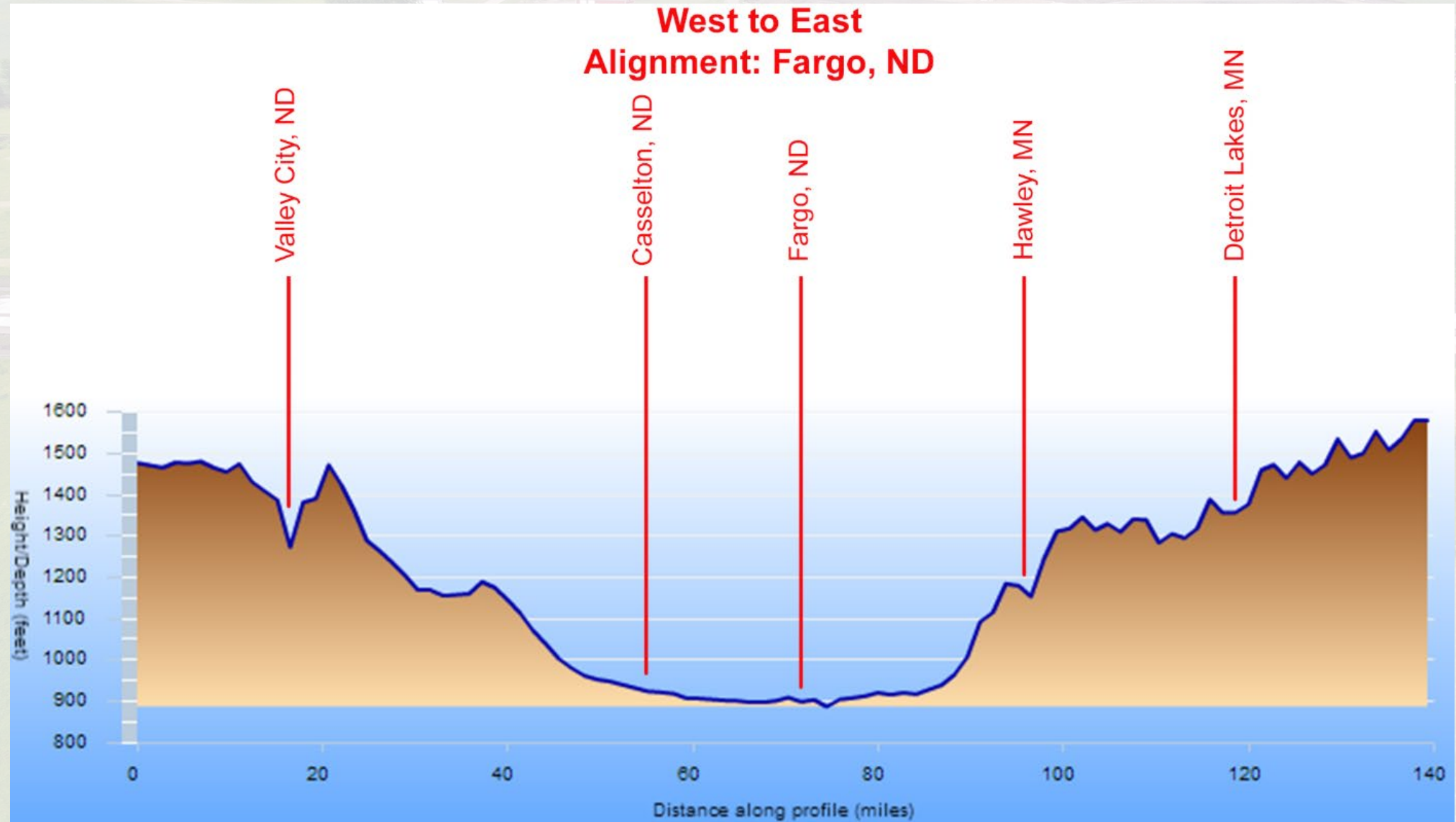
- History/Location
- Infrastructure
- Ultimate goal of perpetual pavement
- Where to Start?
- Design
- 5 Year Road & Bridge Plan
- Pavement Maintenance

Cass County

- Cass County, ND
 - Located in SE, ND
 - I29 & I94 Intersect in Fargo



Cass County



Cass County

Cass County, ND

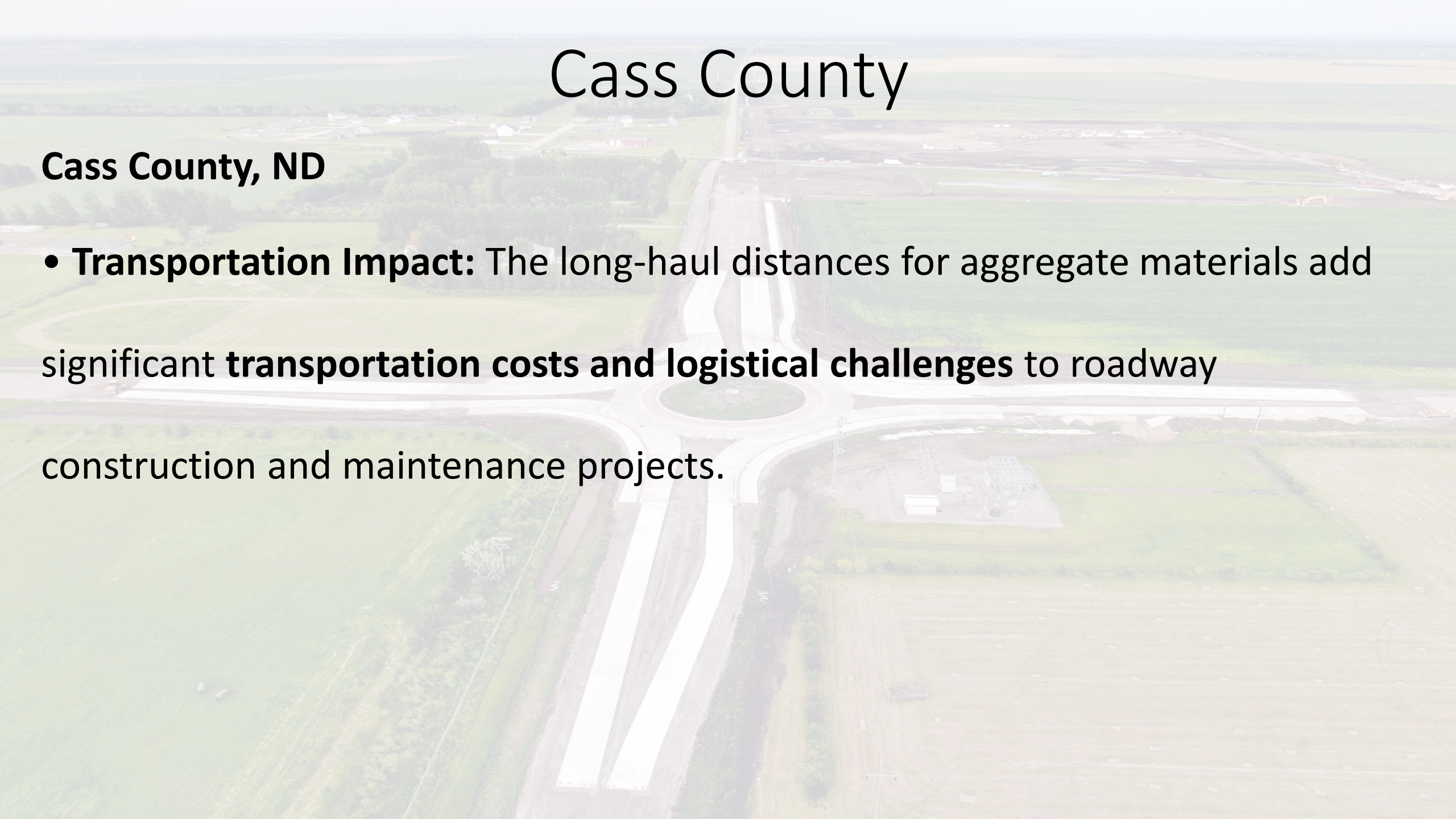
- **Over 10,000 years ago:** The area was covered by glacial meltwater.
- **Fargo Area:** Was under **approximately 300 feet of water.**
- **Glacial Lake:** The flat terrain Red River Valley shaped glacial lake deposits.
- **Legacy:** These glacial deposits helped create the **highly productive soils.**

Cass County

Cass County, ND

- **Aggregate Availability:** Cass County has **no commercial gravel pits located within the county**, requiring virtually all aggregate materials used for roadway construction and maintenance to be **imported from sources more than 50 miles away.**

Cass County

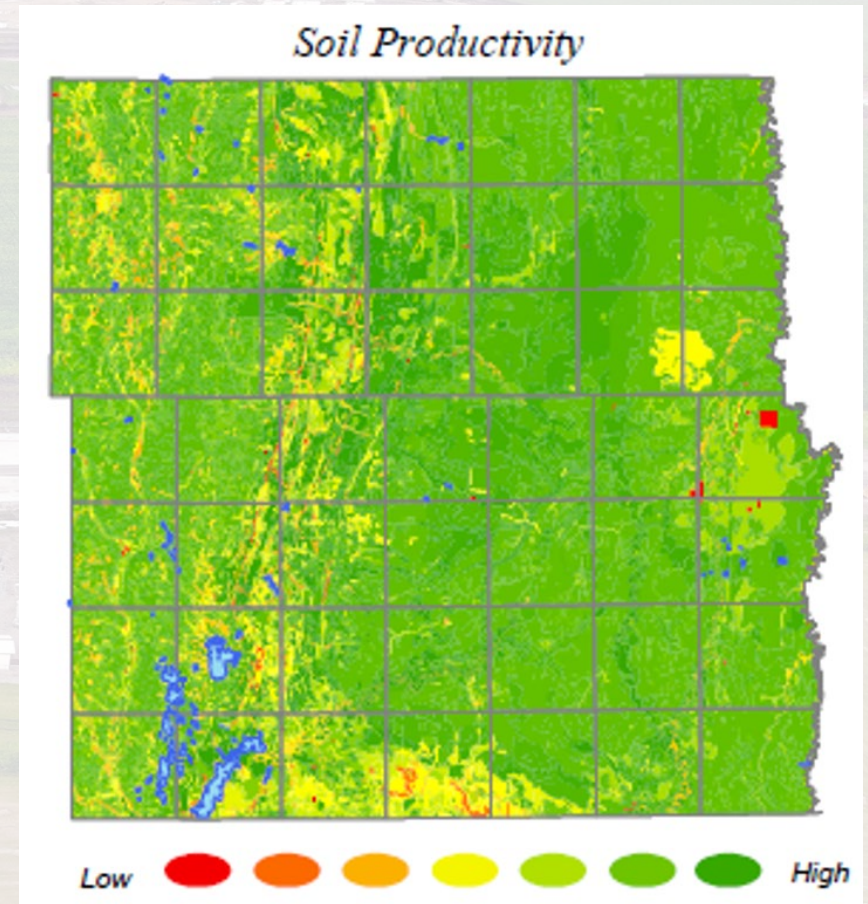
An aerial photograph of a road interchange in a rural area. The interchange features a central roundabout with a green island in the middle, from which several roads branch out. The surrounding landscape is mostly green fields with some scattered trees and a few buildings in the distance. The image is slightly faded, serving as a background for the text.

Cass County, ND

- **Transportation Impact:** The long-haul distances for aggregate materials add significant **transportation costs and logistical challenges** to roadway construction and maintenance projects.

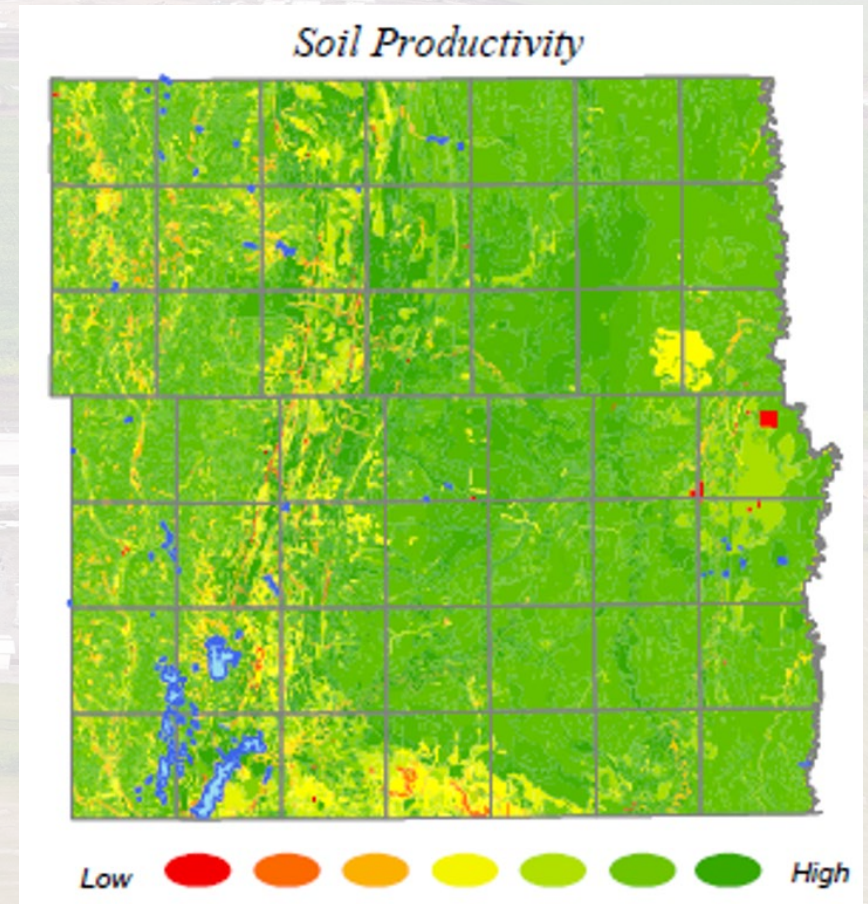
Cass County

- **Western Half:** Rolling hills and varied terrain
- **Eastern Half:** Very flat terrain with limited elevation change
- **Red River:** The border between ND & MN and flows north
- **Drainage:** Poor natural drainage, **2.5 ft of fall per mile**
- **Flooding:** Frequent flooding and drainage challenges



Cass County

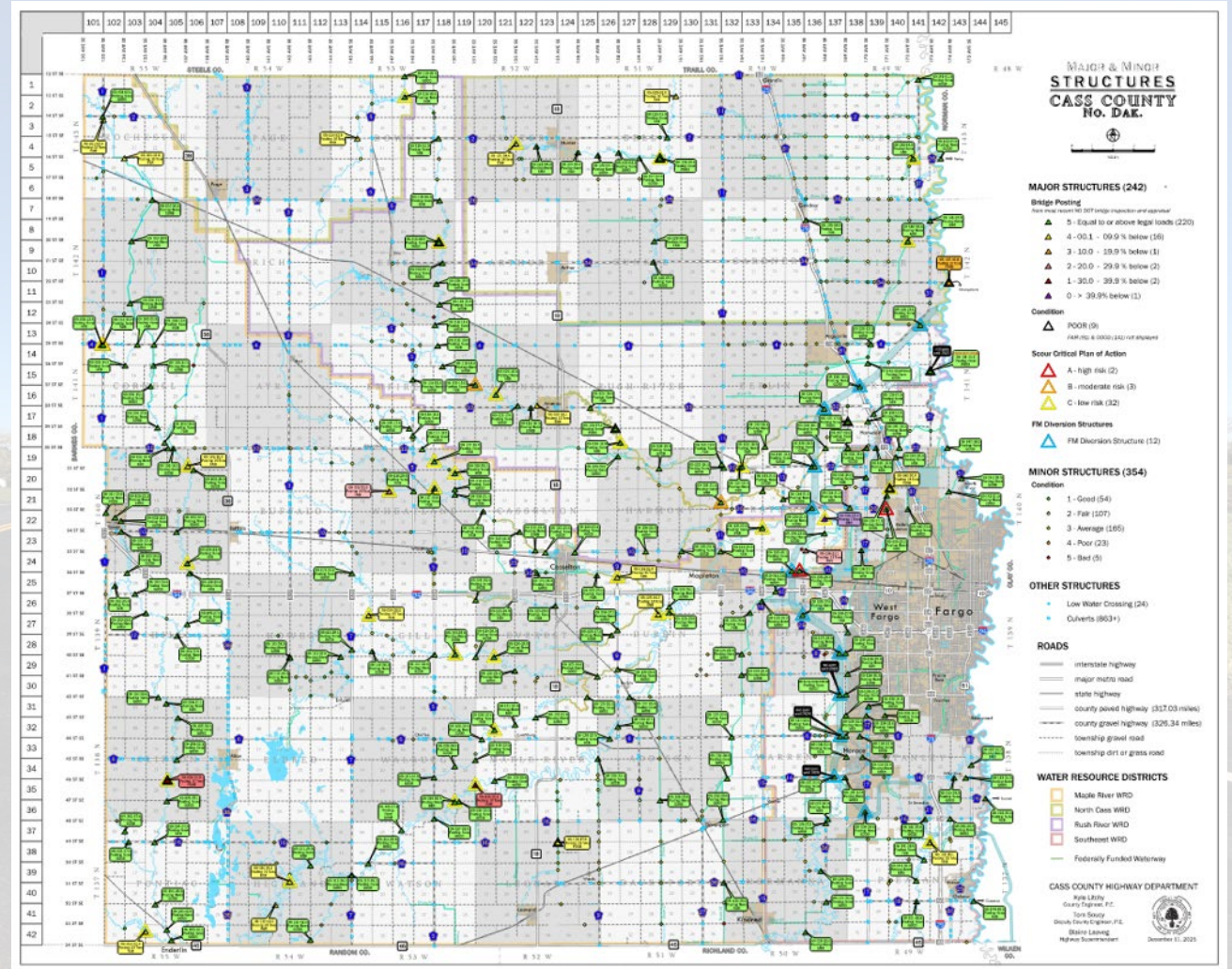
- **Soils:** Highly productive agricultural soils with high organic matter
- **Agriculture:** Excellent farmland with a wide variety of crops
- **Road Construction:** Agricultural soils are generally **not ideal for roadway construction**
- **Agricultural Equipment:** Increasingly larger and heavier farm equipment and trucks



Infrastructure

Roadway System

- 322 Miles of Paved Roads
- 321 Miles of Gravel Roads
- 643 Miles of Roads Total
- 1,768 Square Miles of County



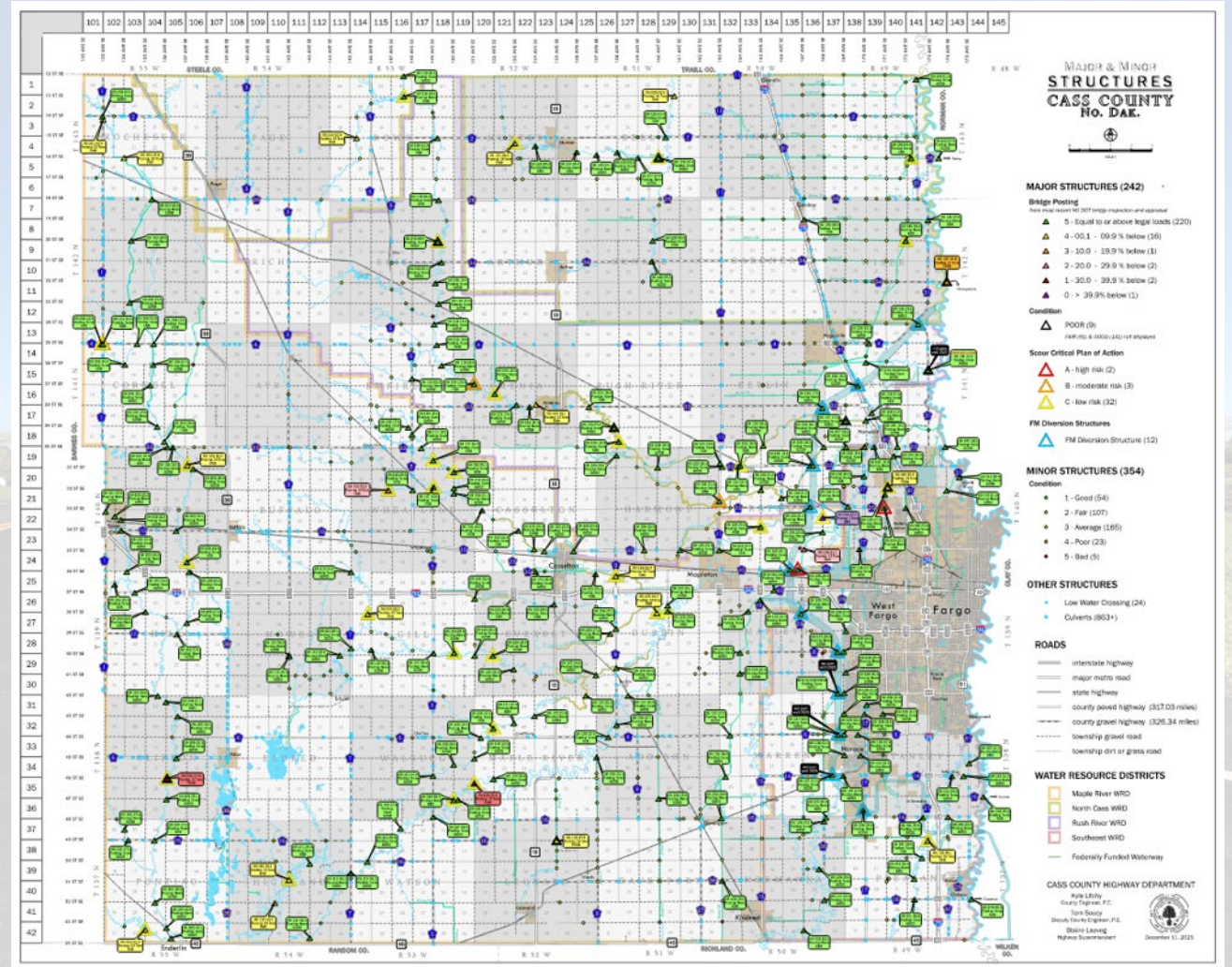
Infrastructure

Bridges

- 242 Bridges over 20 feet
- 354 Bridges under 20 feet
- 596 Bridges Total

Annual Transportation Budget

- \$25 Million for Roads & Bridges



Ultimate Goal - Perpetual Pavement

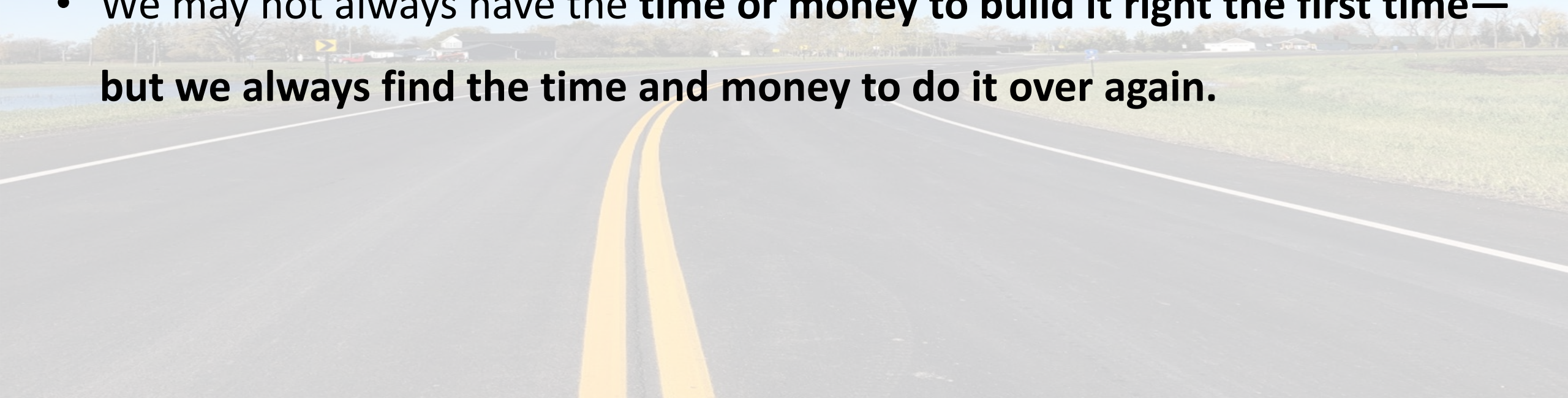
- Build a roadway system that can be **maintained and preserved indefinitely**—creating perpetual pavement.



Ultimate Goal - Perpetual Pavement

How Do We Get There?

- **Build Stronger Roads While Lowering Long-Term Costs**
- **We may not always have the time or money to build it right the first time—but we always find the time and money to do it over again.**



Ultimate Goal - Perpetual Pavement

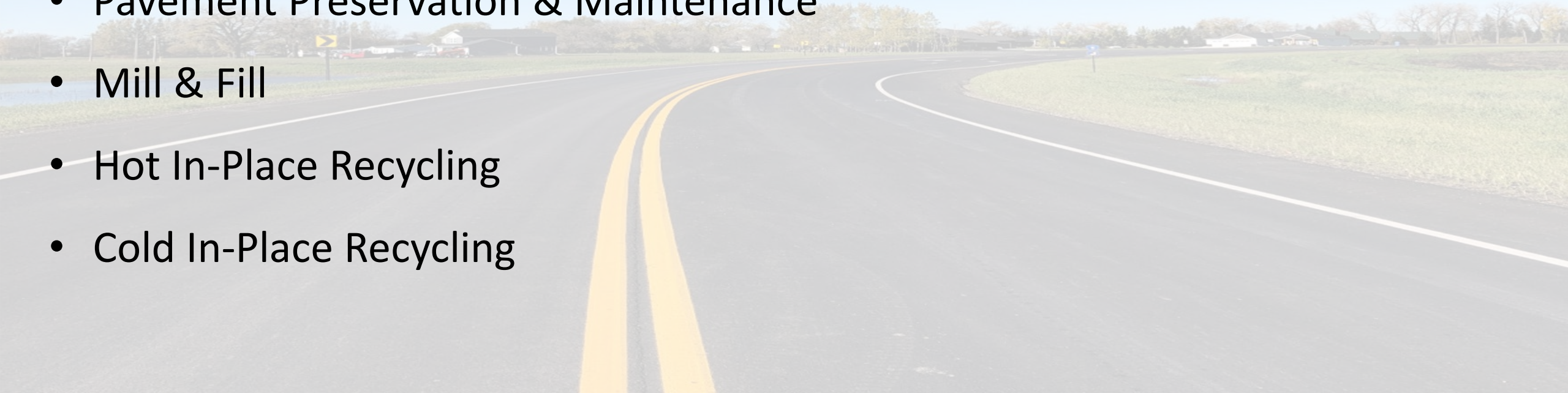
Our Long-Term Strategy

- Continue improving our existing system rather than building like in the past.
- **Goal:** Widen most of paved roads to a **36-foot top**
- With approximately **50+ years of future grading projects**, we may achieve this goal.

Ultimate Goal - Perpetual Pavement

Once a Road is Widened, the Focus Shifts to Preservation:

- Culvert Improvements
- Maintaining Drainage
- Pavement Preservation & Maintenance
- Mill & Fill
- Hot In-Place Recycling
- Cold In-Place Recycling



Where to start?

- Pavement Testing
- Traffic Counts

Pavement Testing

FWD – Falling Weight Deflectometer Testing

- **Every 5 years** since 1992 on all paved and **gravel roads CT Base**
- Test at **0.1-mile**
- **GPS coordinates used** so future tests are at the **same locations**
- Determines the **existing structural strength** of the roadway

Pavement Testing

Provides:

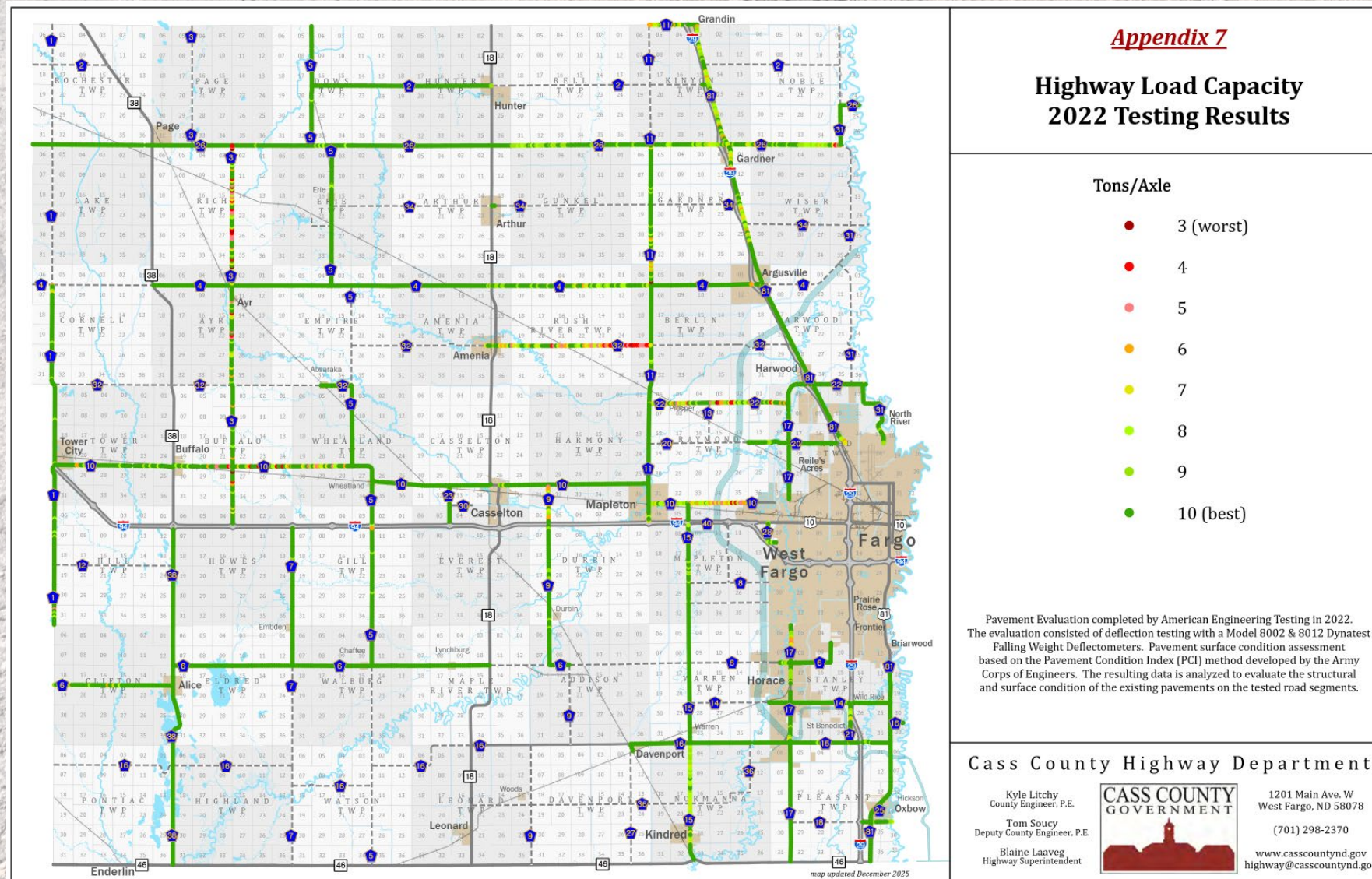
- California Bearing Ratio (CBR)
- Structural Number (SN)
- Roadway Capacity (Tons)

Pavement Testing

How We Use the Data:

- Verify projects achieved the **structural strength designed for**
- Design Tool for **asphalt overlay thickness (1–4 inches)** for a **10-ton roadway**
- If overlay exceeds **4 inches, Reconstruction or CIR might be more cost-effective**

Pavement Testing



Pavement Testing

PCI – Pavement Condition Index Testing

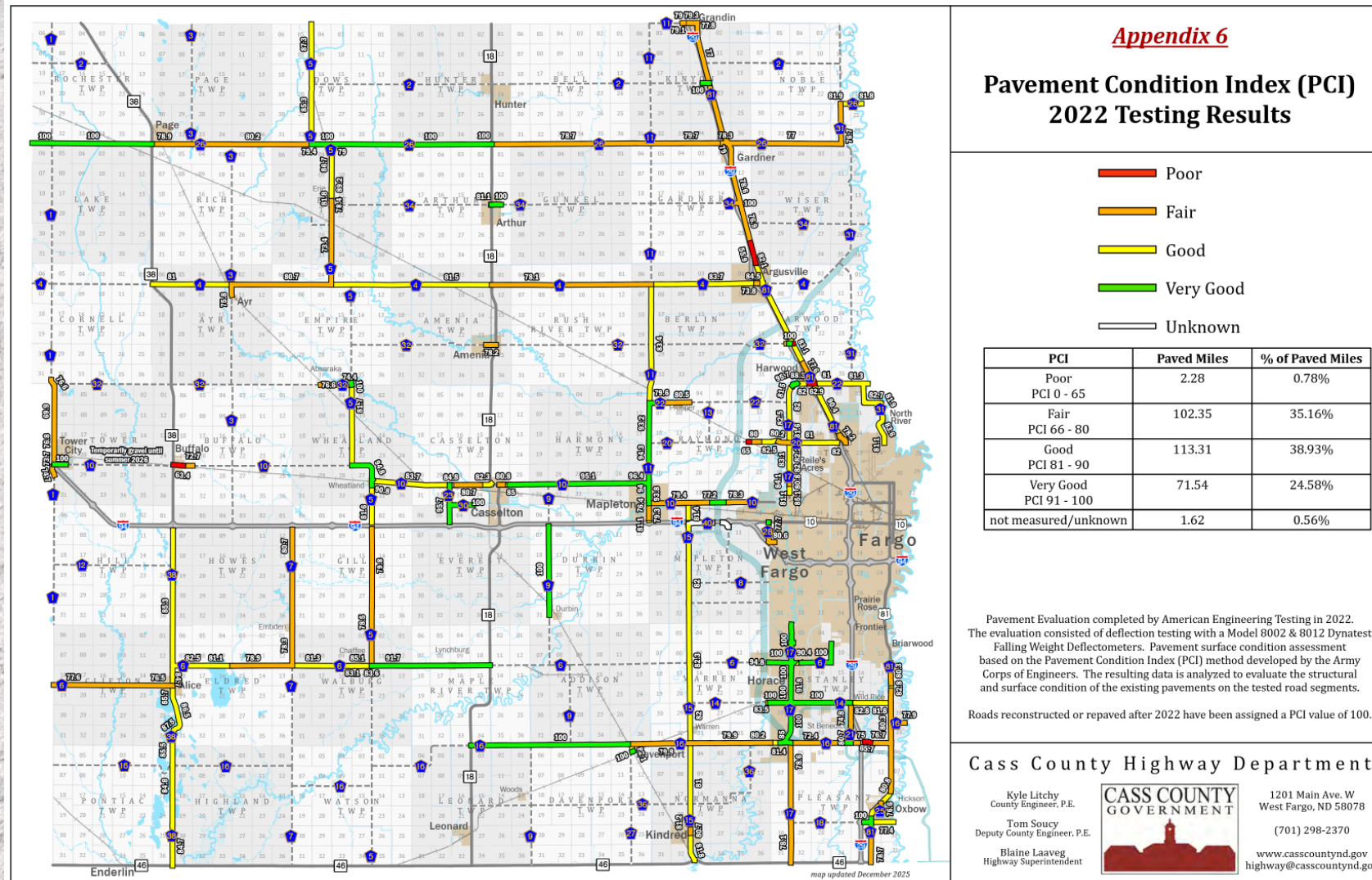
- Completed **every 5 years** on all paved road sections
- Measures the **existing surface condition**

Pavement Testing

PCI – Pavement Condition Index Testing

- Helps determine if a **chipseal or other surface treatment** is needed
- Roadway may have **adequate structural strength but still requires surface maintenance** to improve the ride and extend pavement life

Pavement Testing



Pavement Testing

Using Both Tests

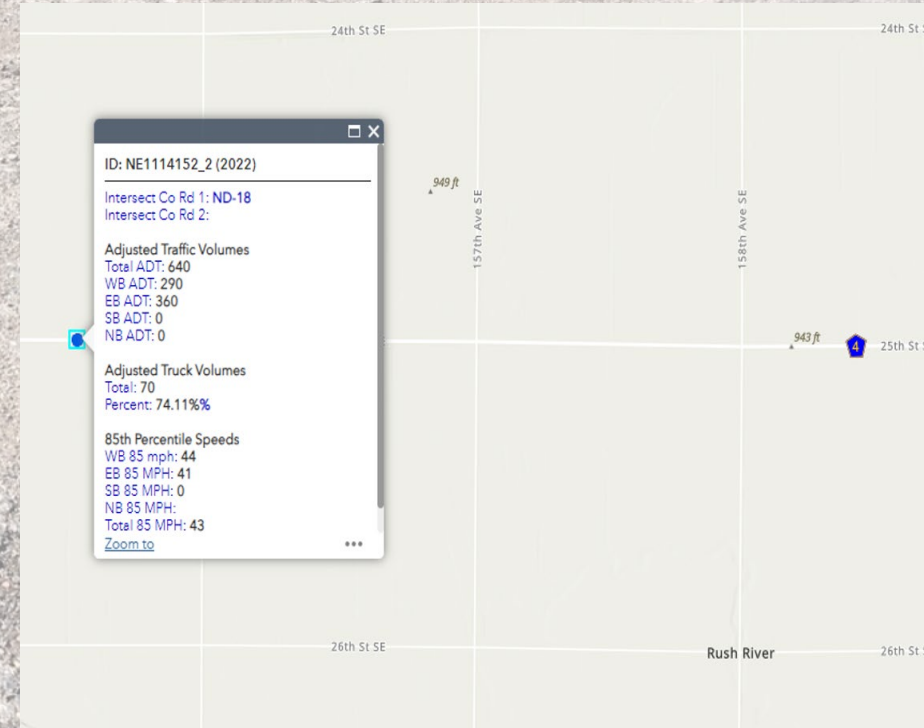
- **FWD** tells us: *How strong is the road?*
- **PCI** tells us: *How good is the surface?*
- Together, they help us determine **the right treatment at the right time**



Traffic Counts

Traffic Counts

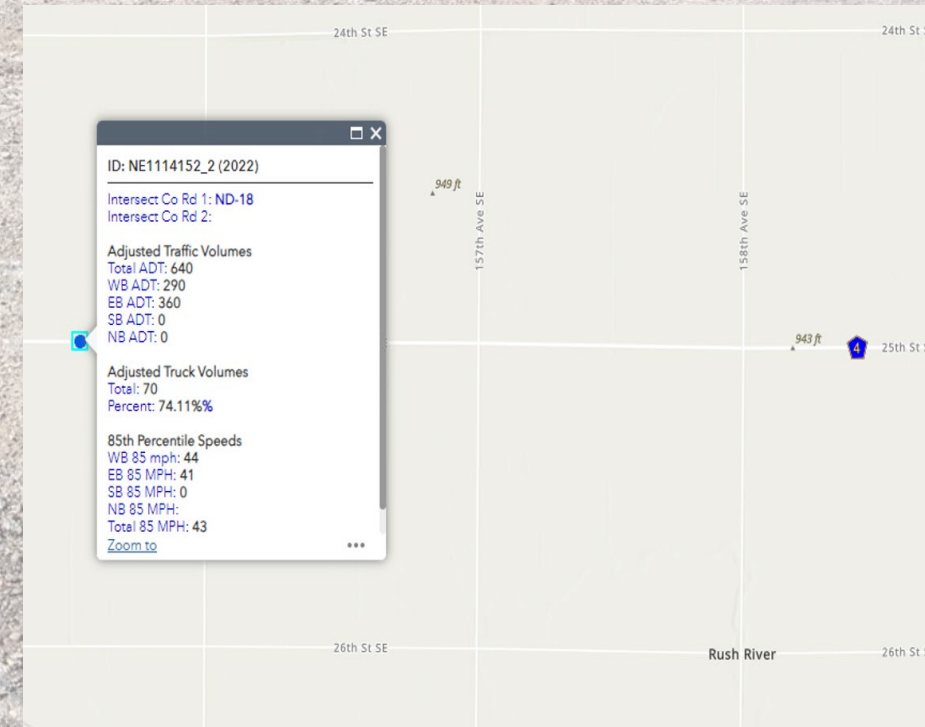
- **Every five years with pavement testing.**
- Counts help us understand **traffic volumes, travel patterns, and changes over time.**
- Identify routes experiencing the **highest volumes and trucks.**



Traffic Counts

Traffic Counts

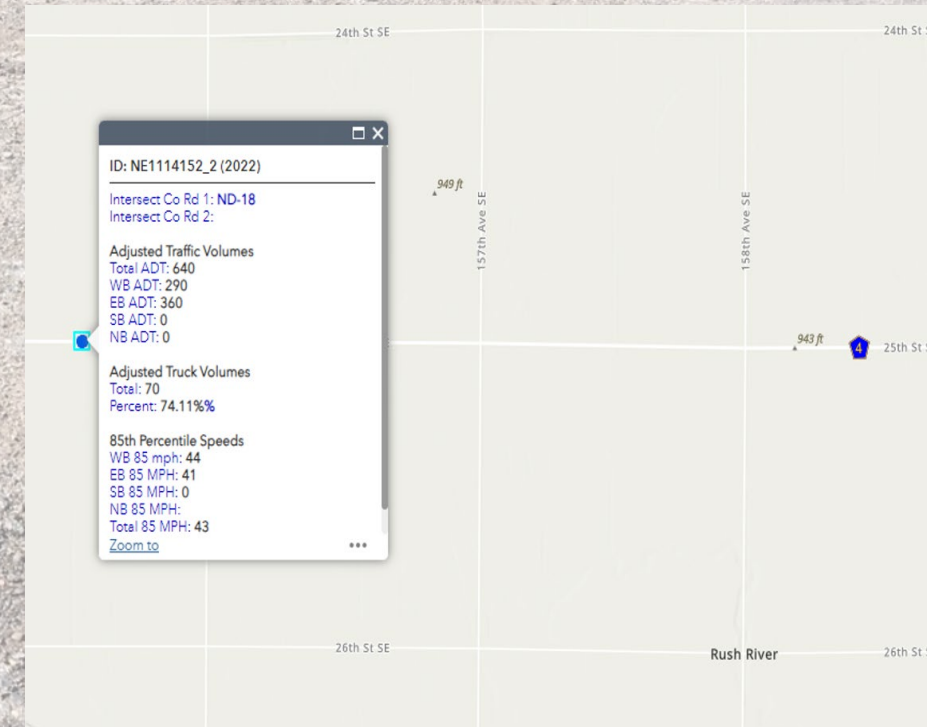
- Data is evaluated with **PCI and Structural testing**



Traffic Counts

Traffic Counts

- Combining traffic data with pavement testing helps us determine the **appropriate maintenance or rehabilitation strategy** for each roadway



Design

- Development of Pavement Sections
 - Mid 1980's and 1990's
 - 7" HBP & 3" Aggregate
 - SN 3.1
 - Subgrade
 - Subcut & Scarified
 - Test Roller
 - Salvaged Base
 - Imported Material 7,500 Ton

Design

- Development of Pavement Sections
 - 2000's
 - 7" HBP & 12" Aggregate
 - SN 4.0
 - Subgrade
 - Subcut & Scarified
 - Test Roller
 - Salvaged Base
 - R1 Fabric added on top of subgrade
 - Imported Material 15,500 Ton

Design

- Development of Pavement Sections
 - 2010's to current
 - 5"-7" HBP, 8" Salvaged Base, & 12" CT Subgrade - SN 5.0 - 5.8
 - Also use CT Salvaged Base on higher truck routes - SN 6.5+
 - Imported Material 6,500 Ton
 - Centerline Culverts - RCP

Design

Asphalt Binder

- We currently use **PG 58-34H** asphalt binder
- We feel it has provided **improved pavement performance**, possibly **reduced cracking and stripping**, issues

Design

Asphalt Binder

- We have also experimented with **asphalt fibers** to reduce cracking
- Not sure whether the fibers have provided a **measurable reduction in reflective cracking** – **Only Used with an Overlay to date**

Design

Special Provisions

- We use the following special provisions on **our paving projects**:
 - **Ride Specification**
 - **Longitudinal Joint Specification**
 - **Intelligent Compaction**
- Previously, traditional compaction specifications/**compaction incentives**.

Design

RAP (Reclaimed Asphalt Pavement)

- We typically use **15–20% RAP** our asphalt mix.
- We specify that millings be crushed to **5/8" or smaller** to provide a more consistent mix.
- We feel that **crushing the RAP material results in a tighter and more uniform asphalt mat.**

Design

Tack Coat

- **0.05 gal/SY** on non-milled surfaces
- **0.10 gal/SY** on milled surfaces
- **0.10 gal/SY** at the centerline joint

Design

Fog Seal

- We fog seal after the **final lift**, while pavement is still warm
- **0.05 gal/SY**, using a **50/50 mixture of water and emulsion**.
- We believe **fog sealing helps seal the surface, reduce early oxidation, and improve the durability of the new asphalt**.

5-year Road & Bridge Plan - Tools

Cores to determine if any delamination has occurred between layers.

Mill & Overlay

- Mill to **correct slope** and generate millings for **RAP mix**
- **Overlay thickness from testing**, to achieve a **10-ton roadway goal**
- **Min. Mill & Overlay Treatment:** 1.5" mill and 2" overlay

5-year Road & Bridge Plan - Tools

Hot In-Place Recycling (HIR)

- Recycle and reprocess the **existing asphalt pavement in place**
- A tool to **correct surface deficiencies and improve existing pavement** while reducing the need for new materials
- Can be followed by an **asphalt overlay** to add structural capacity is needed

5-year Road & Bridge Plan - Tools

Cold In-Place Recycling (CIR)

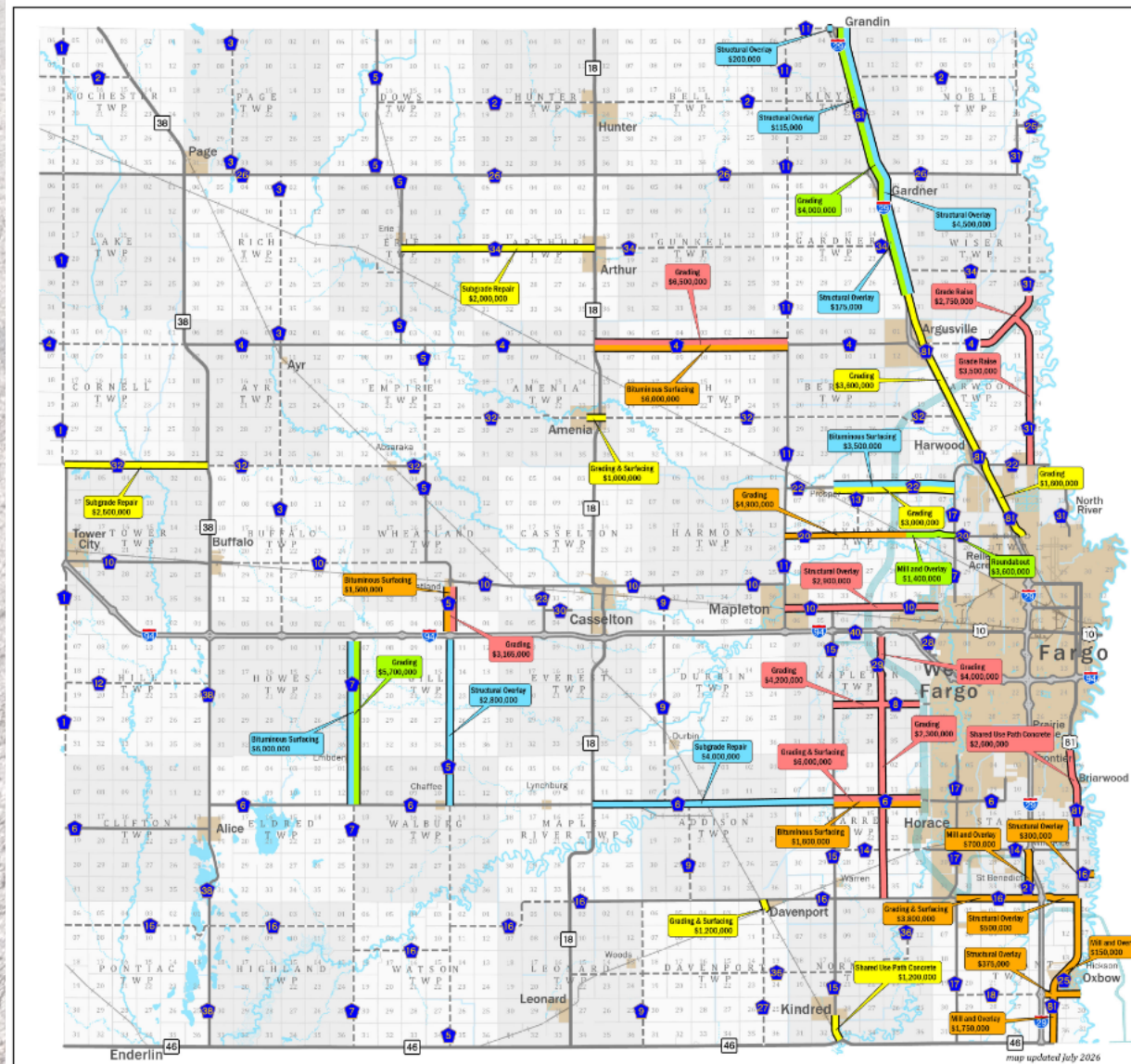
- Recycle **existing pavement in place** deeper than HIR
- Cost-effective Tool to **fix deeper pavement issues and extend pavement life**
- Typically followed by an **asphalt overlay** to provide additional structural capacity and a new riding surface

5-year Road & Bridge Plan

Reconstruction

- Reconstruct the roadway when rehabilitation is no longer feasible
- Consider reconstruction when asphalt overlay is **greater than 4 inches**
- Fix **subgrade, drainage, and structural issues**
- **Build to current design standards and desired structural capacity**

5-year Road & Bridge Plan



Appendix 1

2027 - 2031 5 Year Capital Improvement Plan Proposed Highway Projects

2027 2028 2029 2030 2031

HWY	PROJECT LOCATION	PROJECT TYPE	FUNDING	YEAR	COST
29	Hwy 10 to Hwy 11	Grading	Division	2027	\$4,000,000
8	Division to Hwy 15	Grading	Division	2027	\$4,200,000
3085 Dr	Hwy 8 to Hwy 16	Grading	Division	2027	\$2,500,000
5	State Hwy 18 to Hwy 11	Grading	Grant	2027	\$6,500,000
5	Sheyenne Diversion to Hwy 13	Grading & Surfacing	Local	2027	\$6,000,000
31	Hwy 22 to Hwy 4	Grade Raise	Division	2027	\$3,500,000
5	1 Mile N and S of Hwy 23	Grade Raise	Division	2027	\$2,750,000
81	5th Ave S to 8th Ave S	Shared Use Path Concrete	Grant	2027	\$2,600,000
10	Hwy 11 Mapleton to Sheyenne Diversion Bridge	Structural Overlay	Grant	2027	\$2,900,000
5	Wheeland to Hwy 4	Grading	Local	2027	\$3,165,000
16	Hwy 17 to Hwy 29	Grading & Surfacing	Local	2028	\$3,800,000
16	(29 to Hwy 81)	Structural Overlay	Local	2028	\$300,000
16	Hwy 81 to Red River	Structural Overlay	Local	2028	\$380,000
16	(29 to Red River)	Structural Overlay	Local	2028	\$375,000
25	Hwy 81 through Hickson	Mill and Overlay	Local	2028	\$150,000
81	Hwy 16 to State Hwy 46	Mill and Overlay	Local	2028	\$1,750,000
21	Hwy 14 to Hwy 14	Mill and Overlay	Local	2028	\$700,000
20	Hwy 11 to 5 Miles East	Grading	Local	2028	\$4,900,000
9	Sheyenne Diversion to Hwy 15	Brickpaving Surfacing	Local	2028	\$1,600,000
5	Wheeland to Hwy 4	Brickpaving Surfacing	Local	2028	\$1,500,000
4	State Hwy 16 to Hwy 11	Brickpaving Surfacing	Federal	2028	\$6,000,000
81	City of Fargo to Hwy 22	Grading	Local	2029	\$1,600,000
81	Hwy 22 to 1 Mile S of Hwy 38E	Grading	Local	2029	\$3,600,000
34	Hwy 5 to State Hwy 18	Subgrade Repair	Local	2029	\$2,000,000
32	State Hwy 38 to HWY 1	Subgrade Repair	Local	2029	\$2,500,000
22	Hwy 17 to 5 Miles W	Grading	Local	2029	\$3,000,000
22	Through Diversion	Grading & Surfacing	Local	2029	\$1,200,000
32	State Hwy 18 West U.S. Mile through Armons & East 0.25 Mile through Knudsen	Grading & Surfacing	Local	2029	\$1,800,000
15		Shared Use Path Concrete	Grant	2029	\$1,200,000
7	Hwy 4 to Hwy 6	Grading	Local	2030	\$5,750,000
20	Hwy 17 to 2 Miles W	Mill and Overlay	Local	2030	\$1,400,000
17A203	Intersection of C17 & C20	Roundabout	Local	2030	\$3,600,000
81	One Mile South of Hwy 34E to Tull County	Grading	Local	2030	\$4,000,000
81	One Mile South of Hwy 34E to Tull County	Structural Overlay	Local	2031	\$4,500,000
11	Through Grandin	Structural Overlay	Local	2031	\$280,000
2	Over 129	Structural Overlay	Local	2031	\$115,000
34	Over 129	Structural Overlay	Local	2031	\$175,000
22	Hwy 17 to 5 Miles West	Brickpaving Surfacing	Local	2031	\$3,500,000
6	Hwy 15 to 8th St	Subgrade Repair	Local	2031	\$6,000,000
7	Hwy 4 to Hwy 6	Brickpaving Surfacing	Local	2031	\$6,000,000
5	Hwy 6 to Hwy 4	Structural Overlay	Local	2031	\$2,800,000

Note: Items to be completed are illustrative and subject to change and approved annually and/or as necessary by the Road Advisory Committee.

Cass County Highway Department

Kyle Litchy
County Engineer, P.E.

Tom Soucy
Deputy County Engineer, P.E.

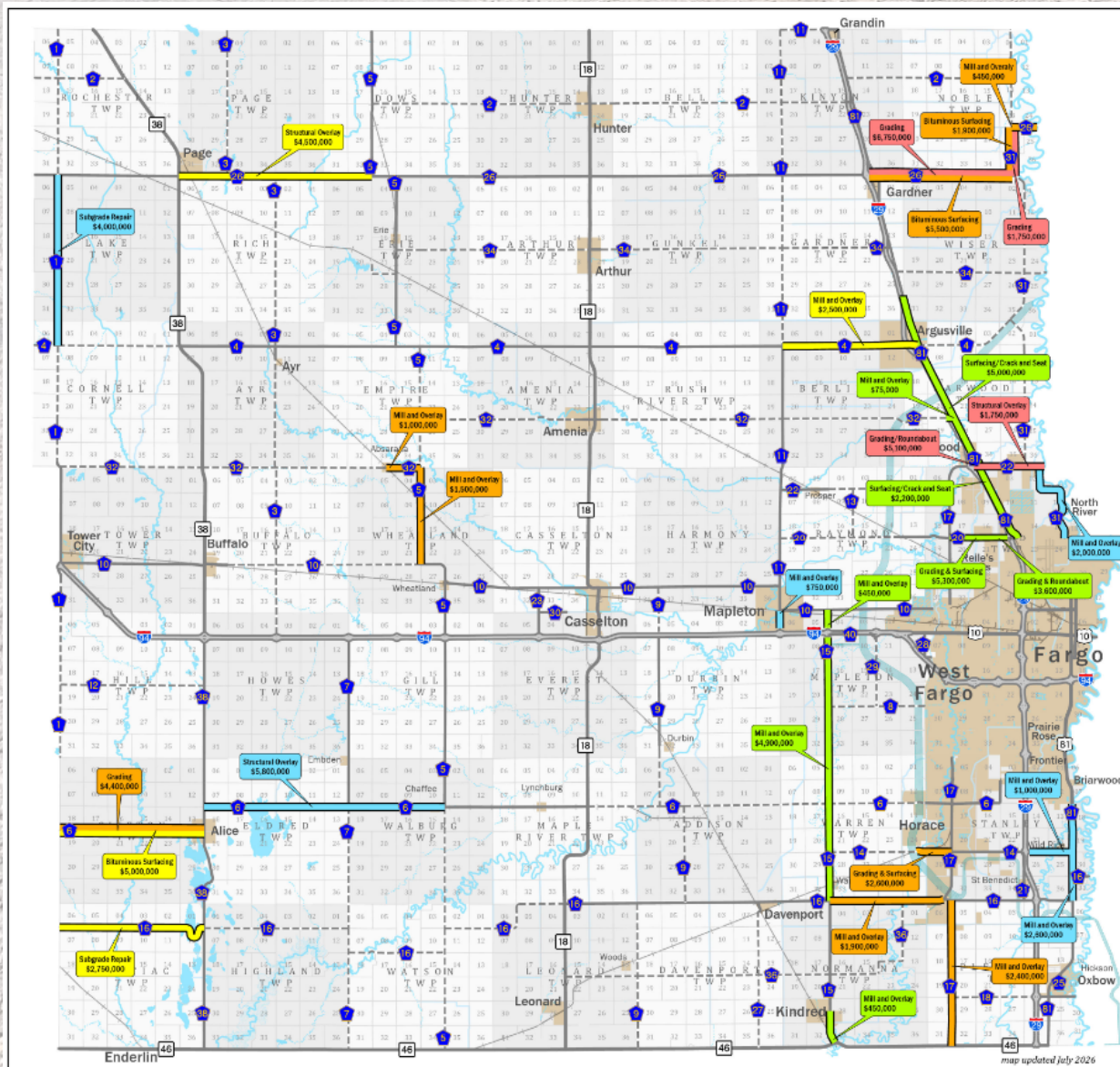
Blaine Laaveg
Highway Superintendent



1201 Main Ave. W
West Fargo, ND 58078
(701) 298-2370
www.casscountynd.gov
highway@casscountynd.gov

map updated July 2026

5-year Road & Bridge Plan



Appendix 2

2032 - 2036
6-10 Year Capital Improvement Plan
Proposed Highway Projects

2032 2033 2034 2035 2036

LONG RANGE PROPOSED HIGHWAY IMPROVEMENTS						
HWY	PROJECT LOCATION	PROJECT TYPE	FUNDING	YEAR	COST	
26	129 to C1	Graveling	Local	2012	\$67,500.00	
31	They 26 West to Hwy 20 East	Graveling	Local	2013	\$17,500.00	
22	129 to C1 (Through Harwood)	Graveling/Shoulderbuild	Local	2013	\$51,000.00	
22	Revised to Red River	Structural Overlay	Local	2032	\$17,500.00	
14	Donaventon to They 17	Graveling & Surfacing	Local	2033	\$2,000.00	
6	Hwy 30 to Barnes County	Graveling	Local	2033	\$4,000.00	
16	They 15 to Hwy 17	Mill and Overlay	Local	2033	\$19,000.00	
17	They 10 to RT 65	Mill and Overlay	Local	2033	\$24,000.00	
26	They 31 to Red River	Mill and Overlay	Federal	2033	\$431,000.00	
26	129 to C1	Bituminous Surfacing	Federal	2033	\$50,000.00	
31	They 26 West to Hwy 20 East	Bituminous Surfacing	Federal	2033	\$19,000.00	
32	Alumina to Hwy 5	Mill and Overlay	Local	2033	\$19,000.00	
5	They 10 to Hwy 30	Mill and Overlay	Local	2033	\$17,500.00	
26	57' South to Hwy 30	Structural Overlay	Local	2034	\$45,000.00	
16	State Hwy 31 to Barnes County Line	Subgrade Repair	Local	2034	\$27,500.00	
4	Hwy 11 to Hwy 31	Mill and Overlay	Local	2034	\$25,000.00	
6	Barnes Co Line to Hwy 31	Bituminous Surfacing	Local	2034	\$50,000.00	
32	C81 to West of 125	Mill and Overlay	Local	2035	\$75,000.00	
41	City of Fargo to Hwy 22	Surfacing/Crack and Seal	Federal	2035	\$42,000.00	
16	Hwy 22 to Mile 5 of Hwy 240	Surfacing/Crack and Seal	Federal	2035	\$61,000.00	
17	Through Kindred	Graveling	Local	2035	\$4,000.00	
16	194 to Hwy 16	Mill and Overlay	Local	2035	\$40,000.00	
16	194 to Hwy 16	Mill and Overlay	Local	2035	\$40,000.00	
20	120 to 44th Street	Graveling & House/should	Local	2035	\$33,000.00	
20	Hwy 17 to 2 Miles S	Graveling & Surfacing	Local	2035	\$5,000.00	
31	They 22 to 40th Ave N	Mill and Overlay	Local	2036	\$20,000.00	
14	125 to Hwy B1	Mill and Overlay	Local	2036	\$10,000.00	
01	70th Ave S to Hwy 16 W	Mill and Overlay	Local	2036	\$24,000.00	
13	Through Naphelen	Mill and Overlay	Local	2036	\$75,000.00	
1	They 1 to Hwy 26	Subgrade Repair	Local	2036	\$41,000.00	
1	They 30 to Hwy 1	Structural Overlay	Local	2036	\$5,000.00	

Note: There is to be completed an evaluation and review to change or approved annually and/or as necessary by the Board of Commissioners.

Note: Years to be completed are illustrative and subject to change as approved annually and/or as necessary by the Joint Advisory Committee.

Cass County Highway Department

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County Engineer, P.E.

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Deputy County Engineer, P.E.

Blaine Laaveg
Highway Superintendent

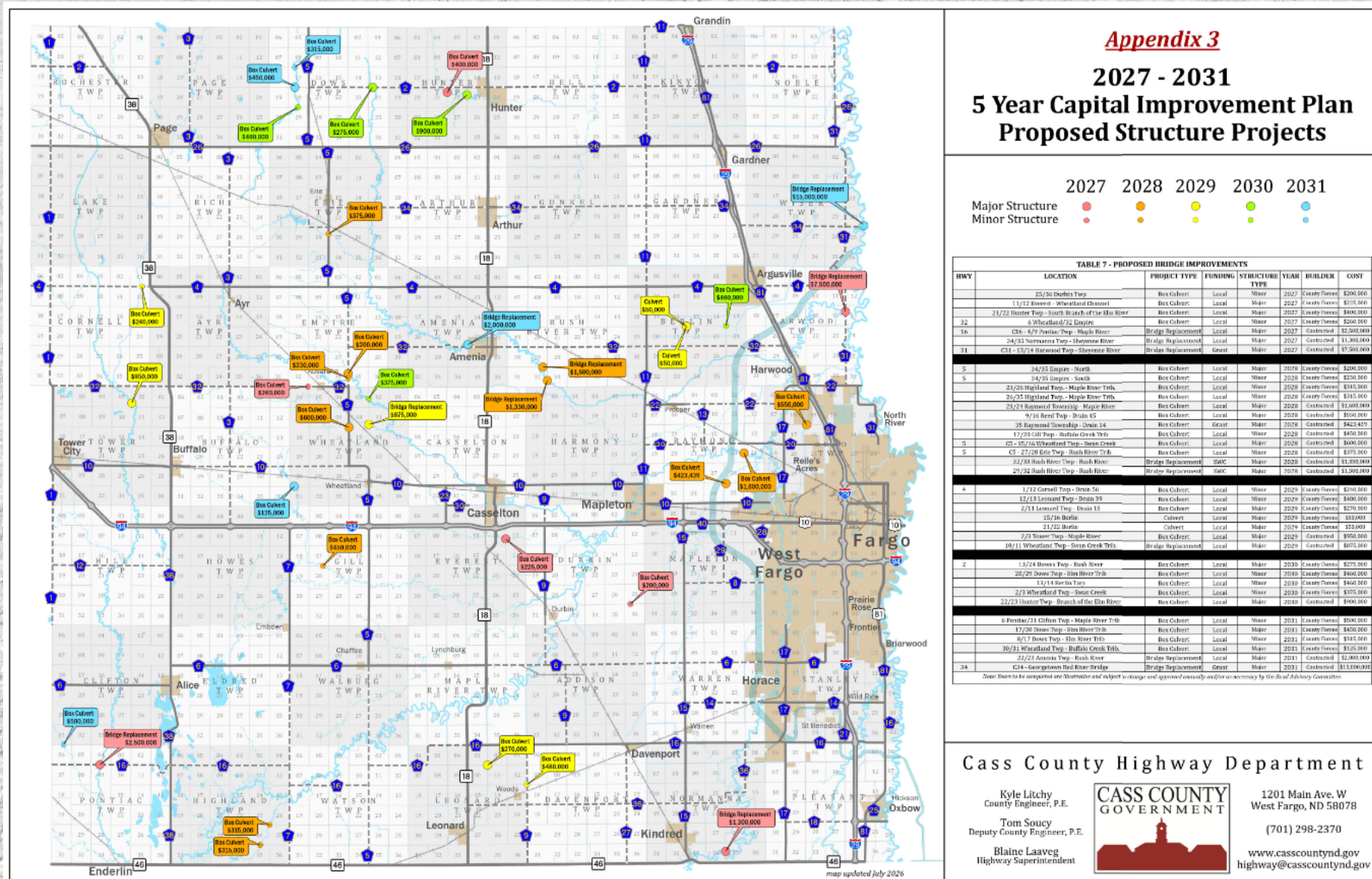


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5-year Road & Bridge Plan



Pavement Maintenance

- Crack Seal
- Chip Seal
- Striping
- Haven't to date completed any micro surfacing projects

Pavement Maintenance

Crack Seal

- **Year following new pavement** to help preserve it
- Seal approx. **every 5 years** or as needed
- Important **PM treatment** that helps extend pavement life

Crack Seal Specifications

- **Route all new cracks** to form a $\frac{3}{4}$ " $\times$ $\frac{3}{4}$ " **reservoir**.
 - Didn't have much luck without routing.
- **Blow and go** the existing previously routed and filled cracks
- **4" sealant band**
- Spec **ASTM D6690, Type IV**

Crack Seal Specifications

- Spec a **low-modulus, elastomeric sealant** to remain flexible and bonded
- Type IV good for **very cold climates -20°F with 200% extension.**
- **Resistance to high-temperature flow**
- **ND temperature swings and freeze/thaw cycles.**
 - 9 Months of Winter and 3 Months of poor skiing!

Pavement Maintenance

Chip Seal

- **Year following new pavement, or within 2 years if possible**
- **Second chip seal, if needed, approx. 10–15 years later**

Pavement Maintenance

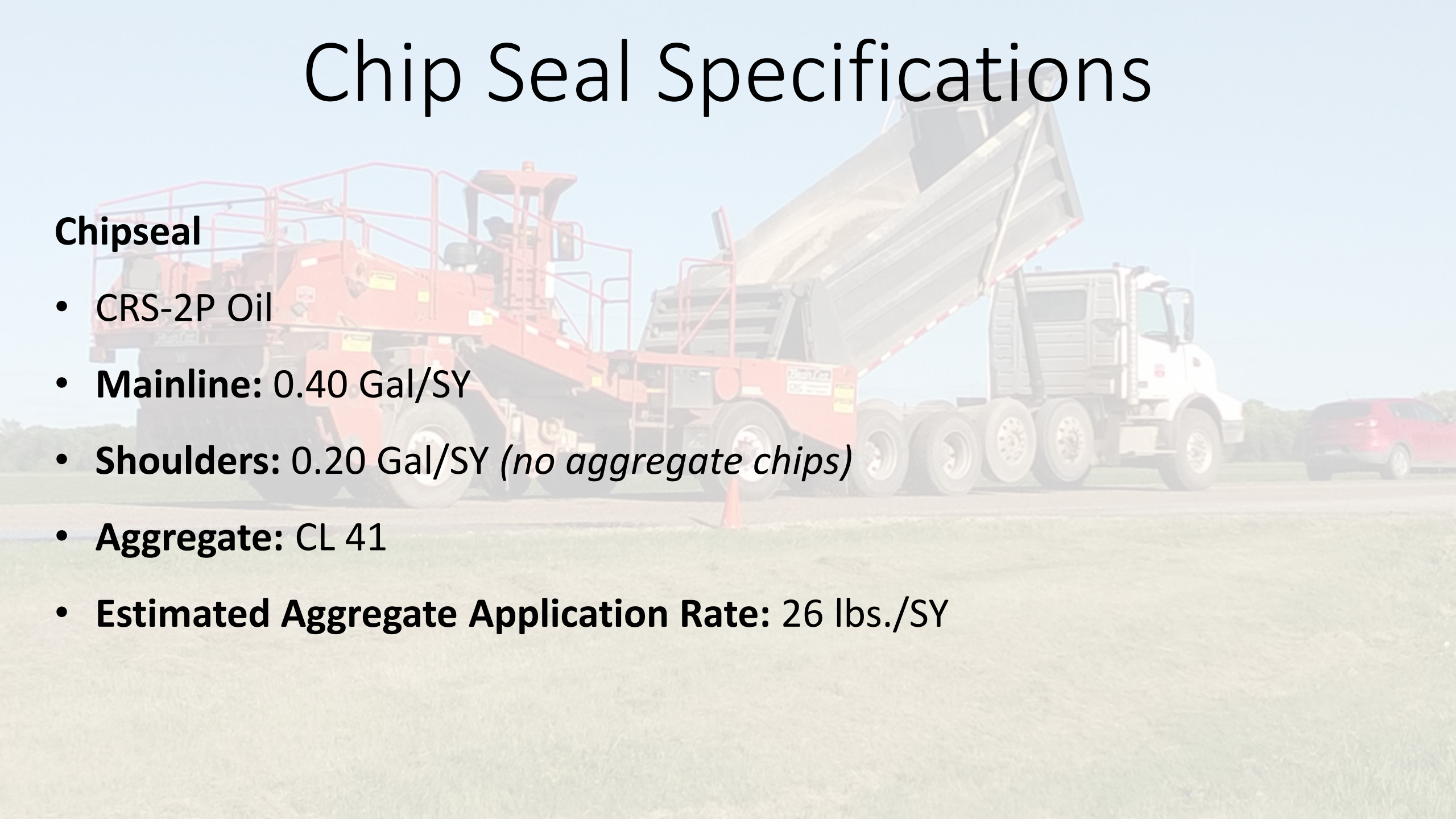
Chip Seal

- Use **PCI and Visual Inspections**
- Continue using **PM Treatments** as long as possible

Chip Seal Specifications

Chipseal

- CRS-2P Oil
- **Mainline:** 0.40 Gal/SY
- **Shoulders:** 0.20 Gal/SY (*no aggregate chips*)
- **Aggregate:** CL 41
- **Estimated Aggregate Application Rate:** 26 lbs./SY



Chip Seal Specifications

Chipseal

- Fog Seal
 - Typically fog chipseals
 - Overlap the centerline to improve chip retention
 - SS-1H or CSS-1H Emulsified Asphalt
 - 0.05 Gal/SY – Diluted 50-50 emulsion
 - **MN Detroit Lakes Area Chip Seal – Only Chipped the Driving area – No Chips placed on the Gore and Striping.**

Pavement Maintenance/Specifications

Striping

- **Water-Based Paint** – Spring & Fall
- **4" Lines: 55 MPH**
- **6" Lines: 65 MPH**
- **Messages:** Water-Based Paint or Grooved Tape
- **All roads get striped each year:**
 - Paving, Chip Seal or Striping Project



Questions