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MEMORANDUM

CASS COUNTY COMMISSION

**Highway  
Department**

Jason Benson, P.E.  
County Engineer

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Superintendent

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Design and Construction  
Engineer

TO: Cass County Commission

FROM: Jason Benson, County Engineer *JBS*

DATE: September 6, 2013

SUBJECT: Agenda topic for September 16, 2012 Commission Meeting:  
Adoption of the 2014-2018 Comprehensive Highway Plan

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In an effort to increase efficiency and maintain a high level of transparency, a Cass County Comprehensive Highway Plan has been developed.

The Comprehensive Highway Plan acts as a document that more efficiently displays our highway and bridge data and serves as a 5 year Capital Improvement Plan (CIP). This plan is anticipated to be revisited annually. Included in the plan is a discussion of land use, highway safety, maintenance, and construction. A large amount of data is used for preparing the plan, but rather than displaying this data, maps are used to display what is most pertinent in an effort to make the plan more user-friendly and easier to update.

The Comprehensive Highway Plan was presented in draft form to the Cass County Commission on July 15, 2015 and the 2014 Highway and Bridge projects were approved by the commission during the budget hearing.

**SUGGESTED MOTION:**

Adopt the 2014-2018 Comprehensive Highway Plan as an illustrative plan that provides future guidance for project planning and for this plan to be reviewed and updated annually.

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# ***Cass County Comprehensive Highway Plan***

***2014-2018***



***Cass County Highway Department***

***Cass County, North Dakota***

**Draft**

This document was prepared pursuant to NDCC 11-31-03(2) and is intended to be used for internal planning purposes. Data used herein is deemed to be accurate; however is not all-encompassing. Maps within are graphical displays of conditions at the time of preparation and are not to be used as a substitute for an accurate field survey.

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## *Plan Purpose*

Cass County operates and maintains a highway system, which in conjunction with local, regional, and state systems, helps to serve the transportation needs of its residents and businesses. The Cass County Comprehensive Highway Plan provides the framework for development of the long range highway and bridge planning guidance for 2014-2018. The Plan describes system principals and standards, evaluates the existing County transportation system, identifies future system needs, develops a maintenance plan, identifies funding sources, and outlines strategies to implement the Plan. The Plan provides the framework for decisions regarding the roadway and bridge infrastructure improvements necessary to develop a safe and efficient highway system.

**Note: Due to increased transportation funding from the ND Legislature, Cass County will receive an additional \$12.5 million over the 2013-2014 biennium. To ensure adequate planning and project design, this comprehensive plan assumes continued state revenue stream that includes an additional \$6 million per year from 2014 to 2018. This is the most proactive approach and will ensure we have adequate highway and bridge projects designed and ready for bidding and construction. If we see reductions in state funding, these projects may be moved into future calendar years.**

## *Plan Updates and Proponent for Changes in this Plan*

The Cass County Engineer is the chief proponent for updates to the Cass County Comprehensive Highway Plan. Working in conjunction with the Cass County Engineering Supervisor and County Planner, updates will be approved through the Road Advisory Committee and the Cass County Commission.

The five year plan will serve as a living document that will be updated annually to maintain a long range focus while allowing for flexibility due to flooding, changes in construction costs, and other considerations. The plan will be reviewed and updated in June of each year. The updated plan will be forwarded to the Road Advisory Committee for approval during the July rotational meeting. The plan will then be sent to the County Commission for final approval. The plan will provide the future project costs and will serve as the basis for the Highway Department's annual highway and bridge budget line items.

## *Vision and Mission*

**Vision** - To be recognized as a premiere county road program in the Northern Plains states.

**Mission** - To provide and maintain an efficient, safe, environmentally sensitive, and cost effective county road system that effectively meets the citizen's needs for personal mobility and the movement of freight consistent with the importance of the economy.

## *Summary*

The 2014-2018 Cass County Comprehensive Highway Plan was prepared to assist staff and decision makers in planning for maintenance and capital improvements to the County Highway System. The plan addresses both funding and project planning, so resources are used carefully to ensure the highest



return to taxpayers. The Cass County highway system consists of 628 miles of roadway covering more than 1,700 square miles and 518 bridges of which 241 span a distance of 20 feet in length or greater.

Safe, efficient, and responsive transportation infrastructure is necessary to the incidents of commerce, public safety, recreation, and education. Two goals in the 2005 Cass County Comprehensive Plan describe Cass County's commitment to transportation:

**2005 Cass County Comprehensive Plan Goal Two:** *"To provide the citizens of Cass County with essential public facilities, services, and infrastructure."*

**2005 Cass County Comprehensive Plan Goal Three:** *"To provide an efficient, safe, environmentally sensitive, and cost effective county transportation system to effectively meet citizen's current and future needs for personal mobility and movement of goods."*

This plan has been developed through compiling data from multiple sources including:

- State of North Dakota Department of Transportation (NDDOT)
- Fargo-Moorhead Metropolitan Council of Governments (FM Metro COG)
- Pavement Testing from Consultant Engineers
- Cass County Highway Department
- Cass County Planning Department
- Cass County GIS Department
- Cass County Tax Equalization

The Highway Department is continuing to develop its inventory of data including an analysis of structures under 20 feet in length, inventory of signage on County Highways, geo-locating culverts and approaches on County Highways, inventory of ditch grades of all County Highways, and continued development of characteristics of each road segment. Collecting this data will further improve the County's asset management program.

Further, the plan works in concert with various regional plans and corridor studies. Staff works closely with FM Metro COG, NDDOT, and other entities of the County in planning and programming new projects. The Metropolitan Long-Range Transportation Plan guides development of the transportation system in the Fargo Moorhead Metropolitan Area. Along with this larger plan, FM Metro COG has completed a number of complimentary studies that offer guidance to programming.

The development of a Regionally Significant Transportation Infrastructure in the Traffic Operations Incident Management Strategy identifies the importance of moving traffic quickly in times of disaster. Some County Highways have been identified in this strategic plan and are noted as new projects are programmed. FM Metro COG, through the Metro Bike/Ped Committee, also creates a Bicycle and



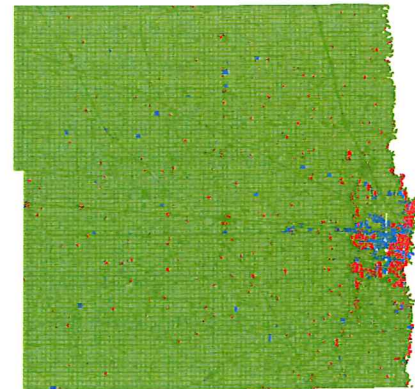
Pedestrian Master Plan every five years which helps identify needs in the system for accommodating alternate modes of traffic. Along with these plans, specific corridor studies assist Cass County highways in the Metro area anticipate or respond to necessary improvements to the system.

**Existing and Future Land Use**

The Fargo Moorhead metropolitan area has seen tremendous growth in recent years. The economic prosperity of the metro area has contributed to the growth in the surrounding communities. According to the 1990 Census, Cass County population was 102,874 and grew to 123,138 in 2000 and increased 21.6% to 149,778 in 2010. In addition to utilizing Census data to project growth, Cass County participates with the Fargo-Moorhead Metropolitan Council of Governments in researching demographic trends as part of its long range transportation planning and modeling. It is anticipated that by the year 2030 population in Cass County could grow to over 200,000. Table 1 illustrates population in the County’s largest cities.

Table 1 - Population - US Census			
City	1990 Census	2000 Census	2010 Census
Fargo	75,111	90,559	105,549
West Fargo	12,287	14,940	25,830
Horace	662	915	2,430
Casselton	1,602	1,855	2,329
Mapleton	682	606	762
Harwood	590	607	718
Kindred	569	614	692

Despite the growth and importance of the metro area, the County as a whole remains primarily agricultural. Ninety-seven percent of the approximately 1.13 million acres of land in Cass County are used for agricultural purposes. Map 1 illustrates this by showing agricultural land uses in green, commercial in blue, and residential in red. It becomes evident that the County’s land use is predominately agricultural.



Map 1: Existing Land Use

Further, the County has committed to promote development only in areas that can adequately accommodate it. Goal One of the Cass County Comprehensive Plan: *“To achieve orderly, balanced, and sensible development”* includes objectives that pursue this goal and prevent incompatible land uses thus preventing a need for large infrastructure improvements in areas that currently are rural in nature. Goal Five: *“To preserve and maintain Cass County’s rural heritage”* further emphasizes the desire of the County to continue its existing land use.



## Highway Safety

Cass County and its agents have committed to maintaining the safest network of roads possible. The planning process takes into account road safety by implementing the most effective practices available.

Commitment to educating the public, roadway safety improvements, sign maintenance and improved signing, routine road maintenance, and operational safety are all components of each project.



All new construction and maintenance overlays include the use of rumble strip installation to separate the roadway from the shoulder while leaving on-off gaps for bicycle safety. This method can help reduce accidents that occur from running off the road. As of 2013, nearly all asphalt County highways north of I-94 have rumble strips and nearly 30% of highways south of I-94 have rumble strips. Intersection improvements and safety enhancements also are implemented where collisions have historically happened or where it may be likely. Improvements such as flashing signals and stop signs, rumble strips, and improved signage have proven successful in past projects. Striping is performed annually on all paved County Highways.

Highway Access Ordinance #2007-1 was developed to reduce the amount of access points to County Highways for more efficient and safe operation. With design speeds on County Highways at 55 mph, the reduction of access to one per ¼ mile, a County Highway is able to operate with less interruption and more predictable intersections. In addition, the Ordinance regulates the design of the approach by increasing the slope of the approach to reduce severity in off road crashes.

Cass County uses crash data provided by the NDDOT in planning and implementing safety enhancements. When significant crashes occur on Cass County Roads, a general reconnaissance is performed by the County Engineer or Highway Superintendent to assess the road condition and variables that may be present.

## Signs and Traffic Control Devices

Cass County utilizes the 2009 Edition of the Manual on Uniform Traffic Control Devices (MUTCD) from the US Department of Transportation, Federal Highway Administration. The MUTCD is the standard for traffic control devices and has been adopted by the NDDOT. Cass County maintains an inventory of their signs indicating condition and location in a geo-database.

## Permitting

Related to safety and maintenance, the County relies on various permitting procedures to uphold the mission of the Department. Ordinance #2005-2 regulates over dimension vehicles to ensure the safe practices and avoidance of damage to County Highways. Similarly the County annually enacts Spring Load Restrictions to avoid damage to the road surface and subgrade during the wet months of Spring. The County also permits use of its right of way for utilities which includes provisions to ensure safe operation during construction activities on or near the roadway. There is also a permitting process for

ditch cleaning to better inventory what is being done and to ensure that the water resource district is adequately notified.

The County Planning Office also administers the Subdivision Ordinance which regulates growth in the County and efficiently accommodates for new roads and land use changes that may affect the County Highway System. The County Engineer reviews all new developments and assists in advising the Planning Commission. As previously discussed, the County actively permits any new access to County Highways through the Highway Access Ordinance #2007-1.

### *Valuation of Highway and Bridge Assets*

Cass County has invested a significant amount of funding in developing and maintaining its transportation network. Since 2000 we have spent \$68 million in projects and maintenance on both our highways and bridges.

The current average cost to totally rebuild a paved highway is \$1.4 million. To rebuild our 316 miles of paved highway to a width of 32 feet would cost over \$442 million.

With 518 structures, our bridges and large box culverts also have a significant asset value. Of the 241 major structures (20 feet in length or greater), the average structure length is 94 feet with an average width of 28 feet. Replacement values for these 241 structures, at a cost of \$205 per square foot (cost based on the Upper Great Plains Transportation Institute study) would be just over \$140 million.

When factoring the cost to replace the 277 minor structures, the replacement cost of our highway and bridge infrastructure is nearly 2/3 of a billion dollars. While no local government can bear the replacement cost of this large amount of infrastructure, it emphasizes the importance of funding and sustaining an effective maintenance program. The organized and well planned maintenance and replacement program will keep replacement costs down, efficiently spend the County's resources, extend the life of our infrastructure, and ensure the long term viability of our highway system.

### *Funding Maintenance and Construction*

The County relies upon a combination of the 23 cent state fuel tax, state motor vehicle license fees, federal road and bridge funds, and local property tax. Other items such as permit fees make up a very small portion of the budget. Cass County also continually pursues grant funding opportunities as they become available.

The cost of rebuilding roads continues to increase. Rebuilding just one mile of road can cost up to \$1 million. In light of this reality it is important to maintain a road maintenance policy to reduce the need for reconstruction.

An asphalt highway generally requires a maintenance overlay every 15-20 years. Current costs of a typical asphalt overlay in Cass County can range from \$200,000-\$450,000 per mile depending on road width and thickness of the asphalt overlay, with the most frequent 36' Top 2.5" overlay being



approximately \$300,000 per mile. Under the desired maintenance schedule an overlay would occur every 17½ years. Given the current inventory in Cass County we could schedule approximately 17 miles of asphalt overlay per year. Using the rate of \$300,000 per mile we can estimate a cost of \$5.1 million per year. If pavements are not overlaid with a new asphalt surface before they deteriorate, they will require full reconstruction.

Table 2 shows the estimated revenue for the Cass County Highway Department from 2013 through 2017. The estimate is based on a 2% increase in annual revenues. **It includes projections for special Legislative funding similar to what Cass County received in the 2013-2014 biennium.** Estimated annual Federal Aid Highway funding is \$900,000. The chart also includes the additional Federal Aid Funding for Bridge projects. Federal Aid Bridge funding is based on need as the NDDOT has \$5 million allocated state wide for county bridges (Cass County competes for these funds based on other county needs throughout the state). Federal Aid Bridge Funding for 2014-2015 is allocated. Funding for 2016-2018 is estimated and not allocated.

<i>Table 2 - Estimated Revenue</i>					
Revenue Description	2014	2015	2016	2017	2018
Property Tax	\$4,318,239	\$4,404,604	\$4,492,696	\$4,582,550	\$4,674,201
Highway Distribution Tax	\$13,960,029	\$14,239,230	\$14,524,014	\$14,814,494	\$15,110,784
Other	\$121,775	\$124,211	\$126,695	\$129,229	\$131,813
Total Revenues	\$18,400,043	\$18,768,044	\$19,143,405	\$19,526,273	\$19,916,798
Federal Aid Highway Funding	\$1,800,000	\$1,800,000	\$0	\$0	\$1,800,000
Federal Aid Bridge Funding	\$560,000	\$660,000	\$715,000	\$810,000	\$545,000
Total Revenues & Federal Aid	\$20,760,043	\$21,228,044	\$19,858,405	\$20,336,273	\$22,261,798
Total Operating Cost (not including Road/Bridge Projects)	\$6,900,000	\$7,245,000	\$7,607,250	\$7,987,613	\$8,386,993
Total Available for Road/Bridge Projects	\$13,860,043	\$13,983,044	\$12,251,155	\$12,348,660	\$13,874,805

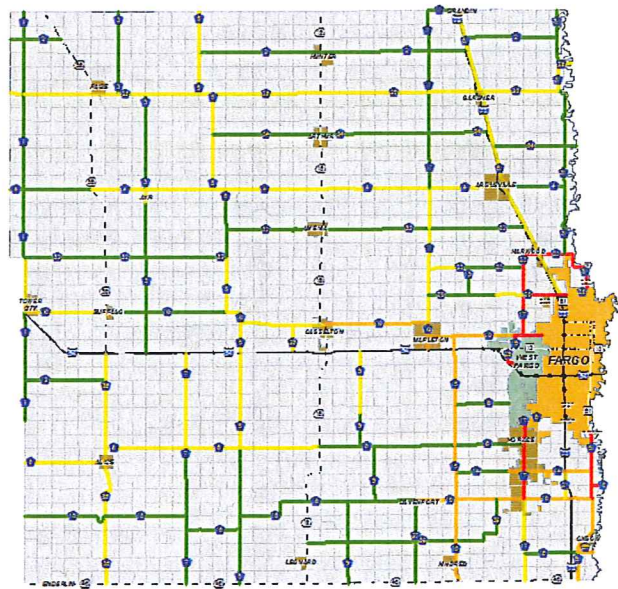
### *Cass County Highways: Design Standards for New or Reconstruction of Existing Facilities*

The typical section of a County Highway is rural in nature with two lanes, either paved or gravel surface. Different modes of travel and location of roadways to population centers, agricultural points of traffic, or schools sometimes require different needs. Further drainage needs may vary from roadway to roadway. Table 3 summarizes the Design Standards for New or Reconstruction of Existing Cass County Highways.

Table 3 - Minimum Design Standards for New or Reconstruction of Existing Infrastructure							
Typical Section	Design Speed	Right of Way	Road Width	Turn Lanes	Min. Section Thickness	Access Controls	Bike/Ped Facilities
Two-Lane Township Gravel Section	55 mph	66 feet	28 ft	no	4" Gravel	1/4 mile spacing	N/A
Two-Lane Rural Gravel Section	55 mph	200 feet	28 ft	no	6" Gravel	1/4 mile spacing	N/A
Two-Lane Rural Paved Section	55 mph	200 feet	32 ft	no	12" Base + HBP	1/4 mile spacing	4 ft paved shoulder
Two-Lane Village Paved Section	25 mph	200 feet	32 ft	no	12" Base + HBP	Varies	4 ft paved shoulder
Two-Lane City Paved Section	25 mph	200 feet	36 ft	no	12" Base + HBP	Varies	6 ft paved shoulder
Two-Lane Metro Paved Section	40-55 mph	200 feet	36 ft	no	12" Base + HBP	1/4 mile spacing	6 ft paved shoulder
Three-Lane Metro Paved Section	40-55 mph	200 feet	50 ft	1/4 mile spacing	12" Base + HBP	1/4 mile spacing	6 ft paved shoulder and separated path

\*Note: 4:1 minimum inslope, 3:1 minimum backslope, 0.05% ditch grade, 24" minimum culvert, 8' minimum ditch bottom width on all rural highway sections; minimum HS-25 design load, 5 year storm design on all bridges.

Cass County has prioritized roads to assist in such issues as maintenance, striping, and snow removal. Priorities are used to determine which roads are plowed first and the schedule for which maintenance or construction projects will be completed. Priorities are developed by the County Engineer by considering average daily traffic volumes, pavement condition, as well as important points of need such as schools, cities, and commerce. Map 2 displays these priorities in a color code; red is priority 1, orange is priority 2, yellow is priority 3, and green is priority 4.



Map 2: Road Priorities

### Cass County Highways: Current Status of Paved Highways

Cass County currently maintains 316 miles of paved highways along the rural portions of the county. These highways vary in age and building materials (See Appendix 5 for pavement age), and will deteriorate at varying rates due to these factors. To determine their condition, county roads are inspected every 5 years by an independent testing consultant using a "Falling Weight Deflectometer" and given a PCI (Pavement Condition Index) rating from the results of this test. These results are used by county engineers to help shape decisions for future roadway maintenance/rebuilding. The most recent PCI survey was completed in 2012 and results are shown in Appendix 3. Additionally, seal coats



are applied to asphalt highways 2 years after paving or overlaying has been completed to increase the life of the pavement to 15-20 years. A map showing the most recent seal coat for each highway is shown in Appendix 6.

### *Cass County Highways: Current Status of Gravel Highways*

Cass County currently maintains 312 miles of gravel highways within the rural portions of the county. These highways vary in age, and some have been widened for future paving. Currently, the roads are maintained with weekly or bi-weekly grading depending on usage. Additionally, a budget for road repairs is prepared every year and additional gravel is added to roads requiring repairs with the allotted funds on a priority system of damage and usage. A more uniform plan for gravel roads has been adopted for the future, where a general standard of 28' road tops with a 4% crown grade will be used for future gravel grading and reshaping projects. In addition to these dimensional standards, areas with weak subgrade are retrofitted with drain tile to remove excess moisture from the subgrade or cement reinforcement sections to increase the structural capacity of the road top. Gravel roads that have become widened or flatter over time from traffic will also be reshaped. Reshaping returns the roadway back to its designed width and crown.

### *Bridge Maintenance and Construction*

Cass County maintains 518 structures of which 241 span a distance of 20 feet in length or greater. Inevitably these bridges will deteriorate over time. Maintenance, reconstruction, replacement, and removal needs to and does occur. The NDDOT conducts bi-annual inspections of all structures greater than 20 feet in length giving County officials an accurate inventory of existing bridge conditions. This inventory is used to conduct planning for the most effective projects on bridges most in need. The inventory also includes structures that have been identified by inspectors with a "Code 3" status meaning that immediate attention is required.



### *Cass County Bridges: Current Status of 20 foot or longer Bridges on County Highways*

Appendix 7 shows bridges of 20 feet or longer on County Highways. On average, these bridges are in fair condition. Two bridges are posted for loads of 34 tons and below and are priorities for replacing to increase load capacity. The North Dakota Department of Transportation inspects all 20 foot or longer bridges on a 2 year cycle and rates each on a 0-100 scale. When this sufficiency rating falls below 50, the bridge is eligible for Federal funding. Currently, there are no bridges on County Highways that are below 50, however, there are 5 bridges in the 50-58 range. These would be potential sites for replacement in the near future as their rating falls below 50.

### *Cass County Bridges: Current Status of 20 foot or longer Bridges on Township Roads*

Appendix 8 shows bridges of 20 feet or longer on township highways. These structures vary in condition from poor and in need of replacement to very good. There are approximately 20 bridges with a sufficiency rating below 50. Several of these have a Code 3 rating which requires priority attention. These bridges are replaced or repaired on a priority basis with input from the township officials.

### *Cass County Bridges: Current Status of Bridges less than 20 feet in Length*

There are many minor structures that are less than 20 feet in length. The NDDOT no longer inspects these bridges. The Cass County Highway Department is in the process of developing a 5 year rotation for inspecting these structures.

### *Strategic Long Range 2040 Goals*

Now through the year 2040, Cass County will continue to aggressively design, build, and maintain our future highway network. Below are the goals listed by decade:

#### *Now through 2020:*

- Inventory, inspect, and develop a detailed maintenance/inspection program for Minor Structures (bridges/structures less than 20 feet in length).
- Design 75% of Highway and Bridge Projects at least two years prior to construction.

#### *2021 to 2030:*

- Reconstruct or regrade all paved County highways with inslopes less than 4:1 to a standard slope of 4:1 or flatter and a 32 foot wide paved surface.
- Construct a continuous paved highway running east-west across the County south of Interstate 94.
- All bridges/structures identified with a sufficiency rating less than 50 will be repaired, replaced, or removed within two years of its last inspection.



**2031 to 2040:**

- All gravel roads will be regraded or reshaped within the last 30 years to ensure we maintain a proper 28 foot wide surface, maintain 4:1 inslopes, and maintain ditch drainage and culverts.

**2014-2018 Paved Highway Improvement Plan**

There are numerous factors that can be and are used to make decisions regarding improvements and maintenance on the County Highway System. Many variables go into prioritizing future projects such as average daily traffic as obtained from the NDDOT and/or the Fargo-Moorhead Metropolitan Council of Governments, PCI ratings, asphalt thickness, last year paved, last year sealed, population within the proximity, and points of commerce or increased traffic. These variables are taken into consideration when scheduling the most efficient construction schedules in upcoming years. Table 4 illustrates the proposed highway projects for the next five years that are a result of these components.

Table 4 - Proposed Paved Highway Improvements					
Hwy	Project Location	Type of Project	Year to be Completed*	Funding Source (Local/Fed Aid)	Project Cost
20	C17 to I29	Bituminous Overlay	2014	Local	\$475,000
20	I29 to Unversity Dr (Fargo)	Bituminous Overlay & Turnlanes	2014	Local	\$2,500,000
22	C11 to Prosper	Bituminous Overlay	2014	Local	\$500,000
22	I29 to Red River	Bituminous Overlay	2014	Local	\$1,100,000
31	C22 to C20	Bituminous Overlay	2014	Local	\$1,100,000
81	C20 North 0.4 Miles	Bituminous Overlay	2014	Local	\$120,000
14	I29 to C81	Bituminous Overlay	2014	Federal	\$125,000
81	64th Ave S (Fargo City Limits) to C16 W	Bituminous Overlay	2014	Federal	\$425,000
15	I94 to C10	Grading & Surfacing	2014	Local	\$560,000
10	C19 to City of Fargo Limits (12th Ave N.)	Grading & Surfacing	2015	Local	\$1,000,000
38	C6 E to State Hwy 46	Grading	2015	Local	\$7,000,000
3, 4 & 5	Ayr to Erie	Bituminous Overlay	2015	Federal	\$510,000
19	12th Ave N to Main Ave (West Fargo)	Bituminous Overlay	2015	Local	\$220,000
38	I94 to C6E	Grading	2016	Local	\$4,900,000
38	C16 to State Hwy 46	Bituminous Surfacing	2016	Local	\$4,200,000
38	I94 to C16	Bituminous Surfacing	2017	Local	\$5,600,000
1	I94 to C32	Bituminous Overlay	2017	Local	\$860,000
10	Wheatland to Casselton	Bituminous Overlay	2018	Federal	\$540,000
9	I94 to Durbin	Grading	2018	Local	\$3,150,000
6	C38 to C5	Bituminous Overlay	2018	Local	\$2,000,000
21	C14 to C16	Bituminous Overlay	2018	Local	\$450,000
20	C17 to 2 Miles West	Bituminous Overlay	2018	Local	\$585,000
11	I94 to Mapleton	Bituminous Overlay	2018	Local	\$165,000
15, 16 & 27	Davenport to Kindred	Bituminous Overlay	2018	Local	\$2,500,000

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

**2014-2018 Gravel Road Improvement Plan**

Many factors are used to make decisions regarding improvements and maintenance of our gravel road system. Routine maintenance, motor grader operations, and annual gravelling programs are sufficient in maintaining a consistent, high quality gravel road. However, there are times where excessive moisture, poor drainage, soft subgrade, and other issues must be addressed. In addition, there are

times when major reshaping or regrading of gravel roads must occur. Cass County is proactively working to reduce soft roadbeds through drain tile and subgrade repair/cement stabilization. In addition, Cass County will address significant soft spots and subgrade issues through near term drain tile and subgrade repair projects. Long term work will be done to reshape gravel roads that have become widened or flattened over time from traffic, and up to 15 miles of gravel road will be reshaped annually. This reshaping will save money over time by reducing the width of the roadway back to County design standards, which in turn reduces the overall gravel required to resurface the roadway. Table 5 illustrates the proposed gravel highway improvements.

<i>Table 5 - Proposed Gravel Highway Improvements</i>					
Hwy	Project Location	Type of Project	Year to be Completed*	Funding Source (Local/Fed Aid)	Project Cost
32	State Hwy 18 to C11	Drain Tile	2014	Local	\$400,000
UNK	To Be Determined	Drain Tile	2015	Local	
UNK	To Be Determined	Drain Tile	2016	Local	
UNK	To Be Determined	Drain Tile	2017	Local	
UNK	To Be Determined	Drain Tile	2018	Local	
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3	C26 to C4	Subgrade Repair	2014	Local	\$1,000,000
3	Ayr to C32	Subgrade Repair	2015	Local	\$700,000
UNK	To Be Determined	Subgrade Repair	2016	Local	
UNK	To Be Determined	Subgrade Repair	2017	Local	\$1,600,000
UNK	To Be Determined	Subgrade Repair	2018	Local	\$800,000
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16 & 36	C16 Curves & C36 From C15 TO C16	Reshaping	2014	Local	\$400,000
UNK	To Be Determined	Reshaping	2015	Local	
34	C5 to State Hwy 18	Reshaping	2016	Local	\$500,000
UNK	To Be Determined	Reshaping	2017	Local	
UNK	To Be Determined	Reshaping	2018	Local	

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

### **2014-2018 Bridge Improvement Plan**

The County utilizes bi-annual inspection reports provided by the North Dakota Department of Transportation to identify necessary improvements to County and township structures. \$1 million is allocated annually to account for these necessary improvements. In addition to these improvements the County includes, in the construction schedule, necessary flood repairs which combine local and federal funds. There are approximately 30 bridges currently slated for improvements. Table 6 illustrates the proposed bridge improvements for 2014-2018.



Table 6 - Proposed Bridge Improvements					
Hwy/Twp	Project Location	Type of Project	Year to be	Funding	BUDGET
Hill	5/8 Hill Township - Tributary of Maple River	Box Culvert	2014	Local	\$180,000
Hill & Clifton	33 Hill/4 Clifton Township - Maple River	Bridge Replacement	2014	Local	\$450,000
Pontiac	34 Pontiac Township - Maple River	Bridge Replacement	2014	Federal	\$140,000
Empire	28/33 Empire Township - Tributary of Swan Creek	Bridge Replacement	2014	Local	\$150,000
32	C32 - 27/28 Amenia Twp - Rush River	Bridge Replacement	2014	Local	\$500,000
Durbin	10 Durbin Township - Maple River	Bridge Replacement	2014	Federal	\$150,000
36	C36 - 1/2 Normanna Township - Sheyenne River	Bridge Replacement	2014	Local	\$700,000
Highland	31/32 Highland - Tributary of Maple River	Bridge Removal	2014	Local	\$50,000
Reed	16/17 Reed Township - Lake Shure	Bridge Replacement	2014	Local	\$200,000
Gill & Everest	12 Gill/7 Everest Townships	Bridge Replacement	2014	Local	\$100,000
Highland	34/35 Highland Township - Tributary of Maple River	Bridge Replacement	2014	Local	\$50,000
6	10/15 Warren Township	Bridge Replacement	2014	Local	\$50,000
			Major Structures		\$2,520,000
			Minor Structures		\$200,000
Hill	15-16 Hill Township - Tributary of Maple River	LWC	2014	Local	\$125,000
Casselton	35 Casselton Township - Swan Creek	Culvert	2015	Local	\$100,000
Hill	28/33 Hill Township - Maple River	Bridge Replacement	2015	Federal	\$75,000
Tower	2/11 Tower Township - Maple River	Bridge Replacement	2015	Federal	\$90,000
Buffalo & Wheatland	36 Buffalo/31 Wheatland Townships - Tributary of Buffalo Creek	Box Culvert	2015	Local	\$175,000
Empire	11/12 Empire Township - Tributary of Rush River	Box Culvert	2015	Local	\$250,000
Gill	19/20 Gill Township - Tributary of Buffalo Creek	Bridge Replacement	2015	Local	\$225,000
Noble	29/30 Noble Township - North Cass WRD Drain 19	Culverts	2015	Local	\$225,000
Lake	9/16 Lake Township - Maple River	Bridge Repair - Abut - Rip Rap	2015	Local	\$82,000
Pontiac	31/32 Pontiac Township on Branch of Maple River	Box Culvert	2015	Local	\$150,000
Highland	15/16 Highland Township - Tributary of Maple River	Bridge Replacement	2015	Local	\$100,000
			Major Structures		\$1,347,000
			Minor Structures		\$250,000
Dows	3 Dows Township - Tributary of Elm River	Bridge Replacement	2016	Federal	\$60,000
Davenport	28/33 Davenport Township - Maple River WRD Drain 37	Box Culvert	2016	Local	\$175,000
Everest & Durbin	1 Everest/6 Davenport Townships - Swan Creek	Box Culvert	2016	Local	\$250,000
Maple River	3/4 Maple River Township - Tributary of Buffalo Creel	Box Culvert	2016	Local	\$175,000
Howes	24/25 Howes Township - Tributary of Buffalo Creek	Bridge Replacement	2016	Local	\$200,000
Walburg & Maple River	25 Walburg/30 Maple River - Maple River	Bridge Replacement	2016	Federal	\$130,000
Gill & Everest	25 Gill/30 Everest Township - Buffalo Creek	Bridge Replacement	2016	Local	\$250,000
Durbin	28/33 Durbin Township on Maple River	Bridge Replacement	2016	Local	\$150,000
Mapleton	29/32 Mapleton Township - Maple River WRD Drain 14	Bridge Replacement	2016	Local	\$50,000
			Major Structures		\$1,240,000
			Minor Structures		\$200,000
Cornell	27/34 Cornell Township - Maple River	Bridge Replacement	2017	Local	\$350,000
Walburg	26/35 Walburg Township - Maple River	Bridge Replacement	2017	Federal	\$110,000
6	C6 - 15/22 Clifton Township - Maple River	Bridge Replacement	2017	Federal	\$100,000
Erie & Empire	1 Empire/36 Erie Townships - Tributary of Rush River	Box Culvert	2017	Local	\$175,000
9	17/18 Durbin Township - Tributary of Swan Creek	Box Culvert	2017	Local	\$200,000
Wiser	28/29 Wiser Township - North Cass WRD - Drain 26	Box Culvert	2017	Local	\$200,000
6	7/18 Addison Township - Maple River	Bridge Repair	2017	Local	\$100,000
16	C16 - 31 Warren & 6 Normanna - Drain 34	Bridge Replacement	2017	Local	\$175,000
9	28/29 of Addison Township	Culvert Replacement	2017	Local	\$50,000
			Major Structures		\$1,235,000
			Minor Structures		\$225,000
16	C16 - 33 Addison/2 Davenport Township - Maple River WRD - Drain 37	Bridge Replacement	2018	Local	\$175,000
Tower & Hill	32 Tower/5 Hill Townships - Tributary of Maple River	Bridge Replacement	2018	Local	\$150,000
Raymond	6/7 Raymond Township - Rush River	Bridge Replacement	2018	Federal	\$70,000
Erie	25/36 Erie Township - Tributary of Rush River	Bridge Replacement	2018	Local	\$250,000
Durbin	18/19 Durbin Township - Tributary of Swan Creek	Bridge Replacement	2018	Local	\$150,000
10	C10 - 27/34 Casselton Township - Swan Creek	Bridge Replacement	2018	Federal	\$70,000
Tower	34/35 Tower Township on Maple River	Bridge Replacement	2018	Local	\$250,000
15	C15 - 8/9 Mapleton Township on Drain 14	Bridge Replacement	2018	Local	\$400,000
Everest	11/12 Everest Township - Wheatland Channel	Bridge Replacement	2018	Local	\$100,000
2	C2 - 8/17 Rochester Township	Culvert Replacement	2018	Local	\$25,000
			Major Structures		\$1,515,000
			Minor Structures		\$125,000
			5 Year Major Structures Total		\$7,857,000
			5 Year Minor Structures Total		\$1,000,000

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

## 2014-2018 Revenues vs Project Costs

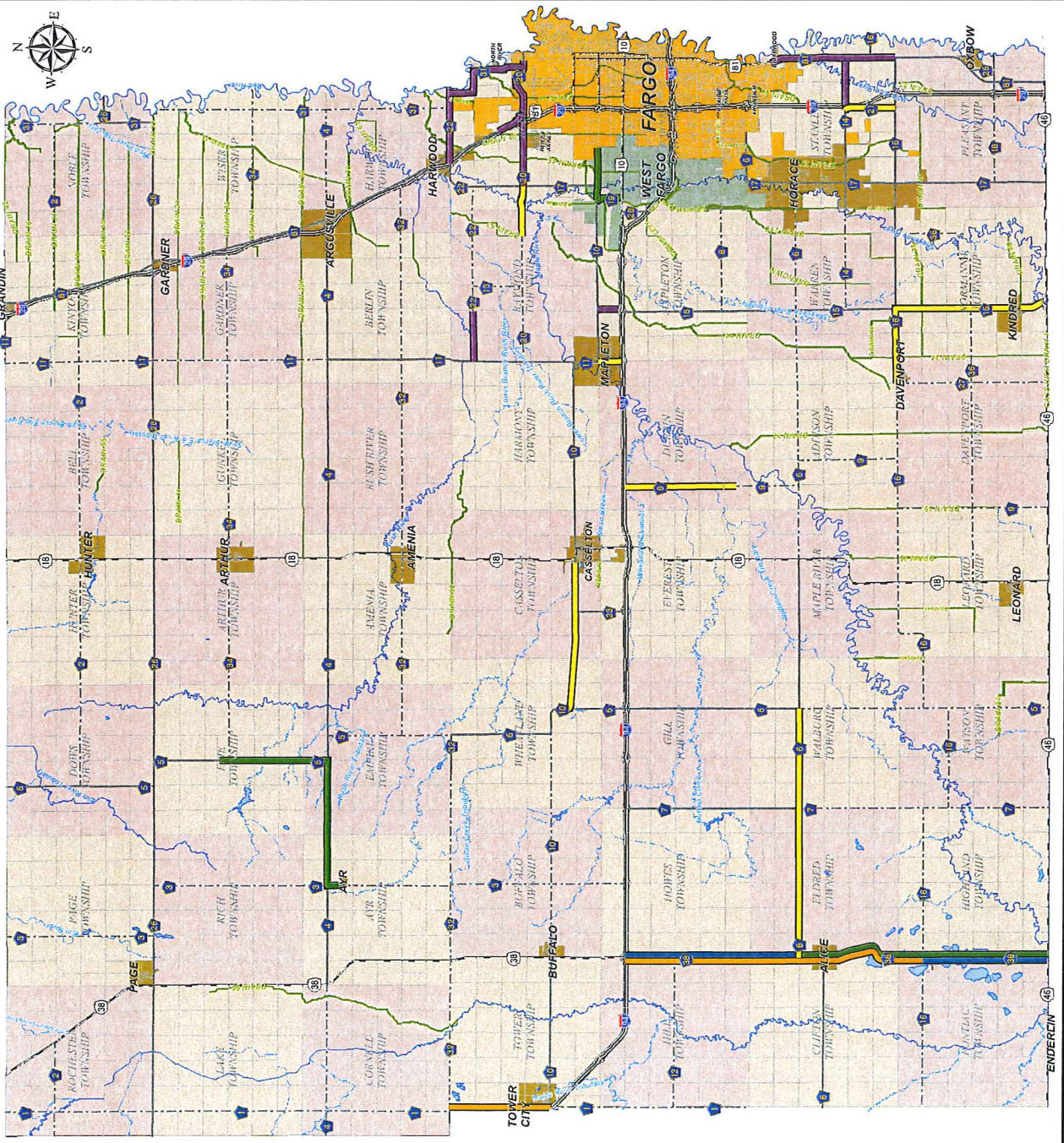
Table 7 illustrates the revenue stream and estimated costs of the 2014-2018 Plan. Appendix 2 illustrates the proposed capital improvements over the 2014-2018 time period.

<i>Table 7 - Revenue vs. Project Costs</i>					
Revenue Description	2014	2015	2016	2017	2018
Property Tax	\$4,318,239	\$4,404,604	\$4,492,696	\$4,582,550	\$4,674,201
Highway Distribution Tax	\$13,960,029	\$14,239,230	\$14,524,014	\$14,814,494	\$15,110,784
Other	\$121,775	\$124,211	\$126,695	\$129,229	\$131,813
<b>Total Revenues</b>	<b>\$18,400,043</b>	<b>\$18,768,044</b>	<b>\$19,143,405</b>	<b>\$19,526,273</b>	<b>\$19,916,798</b>
Federal Aid Highway Funding	\$1,800,000	\$1,800,000	\$0	\$0	\$1,800,000
Federal Aid Bridge Funding	\$560,000	\$660,000	\$715,000	\$810,000	\$545,000
Total Revenues & Federal Aid	\$20,760,043	\$21,228,044	\$19,858,405	\$20,336,273	\$22,261,798
Total Operating Cost (not including Road/Bridge Projects)	\$6,900,000	\$7,245,000	\$7,607,250	\$7,987,613	\$8,386,993
<b>Total Available for Road/Bridge Projects</b>	<b>\$13,860,043</b>	<b>\$13,983,044</b>	<b>\$12,251,155</b>	<b>\$12,348,660</b>	<b>\$13,874,805</b>
Total Paved Highway Project Costs	\$6,905,000	\$9,290,000	\$9,100,000	\$6,460,000	\$9,390,000
Total Gravel Highway Costs	\$800,000	\$800,000	\$800,000	\$800,000	\$800,000
County Bridge Project Costs	\$2,720,000	\$1,597,000	\$1,440,000	\$1,460,000	\$1,640,000
Chipseal, Crackseal, Striping, Reshaping, Subgrade Repair & Draintile	\$3,130,000	\$1,930,000	\$830,000	\$3,530,000	\$1,930,000
<b>Total Project Costs</b>	<b>\$13,555,000</b>	<b>\$13,617,000</b>	<b>\$12,170,000</b>	<b>\$12,250,000</b>	<b>\$13,760,000</b>
<b>Differences (Revenues-Costs)</b>	<b>\$305,043</b>	<b>\$366,044</b>	<b>\$81,155</b>	<b>\$98,660</b>	<b>\$114,805</b>

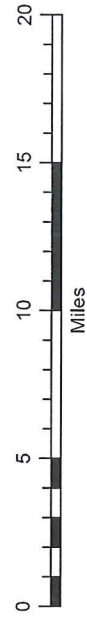


Appendix 1

# Cass County Highway Department 2014-2018 5 Year Capital Improvement Plan Proposed Highway Projects



Hwy	Project Location	Type of Project	Year to be Completed	Funding Source (Local/Fed/Std)	Project Cost
20	C17 to I29 (Fargo)	Blumhouse Overlay	2014	Local	\$475,000
20	I29 to University Dr	Blumhouse Overlay & Turnlans	2014	Local	\$2,500,000
22	C11 to Prosper	Blumhouse Overlay	2014	Local	\$500,000
22	I29 to Red River	Blumhouse Overlay	2014	Local	\$1,100,000
31	C22 to C20	Blumhouse Overlay	2014	Local	\$1,100,000
81	C20 North 0.4 Miles	Blumhouse Overlay	2014	Local	\$1,200,000
14	I29 to C31	Blumhouse Overlay	2014	Federal	\$125,000
81	64th Ave S (Fargo City Limits) to C16 W	Blumhouse Overlay	2014	Federal	\$495,000
15	I94 to C10	Grading & Surfacing	2014	Local	\$1,120,000
10	C19 to City of Fargo Limits (12th Ave N)	Grading & Surfacing	2015	Local	\$1,000,000
38	C5 E to State Hwy 46	Grading	2015	Local	\$2,000,000
3, 4 & 5	Apr to Erie	Blumhouse Overlay	2015	Federal	\$510,000
19	12th Ave N to Main Ave (West Fargo)	Blumhouse Overlay	2015	Local	\$230,000
38	I94 to C6E	Grading	2016	Local	\$4,900,000
38	C16 to State Hwy 46	Blumhouse Surfacing	2016	Local	\$4,200,000
38	I94 to C12	Blumhouse Surfacing	2017	Local	\$5,600,000
1	I94 to C12	Blumhouse Overlay	2017	Local	\$860,000
10	Wheeland to Casselton	Blumhouse Overlay	2018	Federal	\$540,000
9	I94 to Durin	Grading	2018	Local	\$3,150,000
6	C38 to C5	Blumhouse Overlay	2018	Local	\$2,000,000
21	C14 to C16	Blumhouse Overlay	2018	Local	\$450,000
20	C17 to 2 Miles West	Blumhouse Overlay	2018	Local	\$585,000
11	I94 to Mapleton	Blumhouse Overlay	2018	Local	\$185,000
15, 16 & 27	Davenport to 61rd	Blumhouse Overlay	2018	Local	\$2,900,000



Jason Benson  
County Engineer, P.E.

Richard Sieg  
Highway Superintendent

DATE: September, 2013

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Appendix 3.

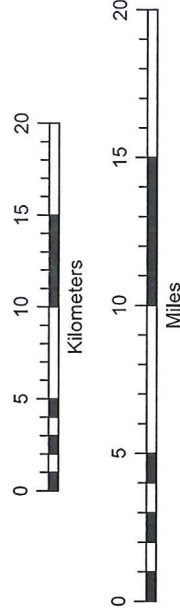
# Cass County Highway Department Pavement Condition Index (PCI) \*

- Poor
- Very Good
- Fair
- Excellent
- Good
- - - - Gravel

\*based on PCI Scale

	Poor 0-40	Fair 41-55	Good 56-70	Very Good 71-85	Excellent 86-100
Miles	0	8.62	16.44	109.15	181.47
Average PCI	0	49	65	79	95
High PCI	0	52	70	85	100
Low PCI	0	45	56	71	86

\*Pavement Evaluation completed by American Engineering Testing in 2012. The evaluation consisted of deflection testing with a Model 8002E Dynatest Falling Weight Deflectometer. Pavement surface condition assessment based on the Pavement Condition Index (PCI) method developed by the Army Corps of Engineers. The resulting data is analyzed to evaluate the structural and surface condition of the existing pavements on the tested road segments.



Jason Benson  
County Engineer, P.E.

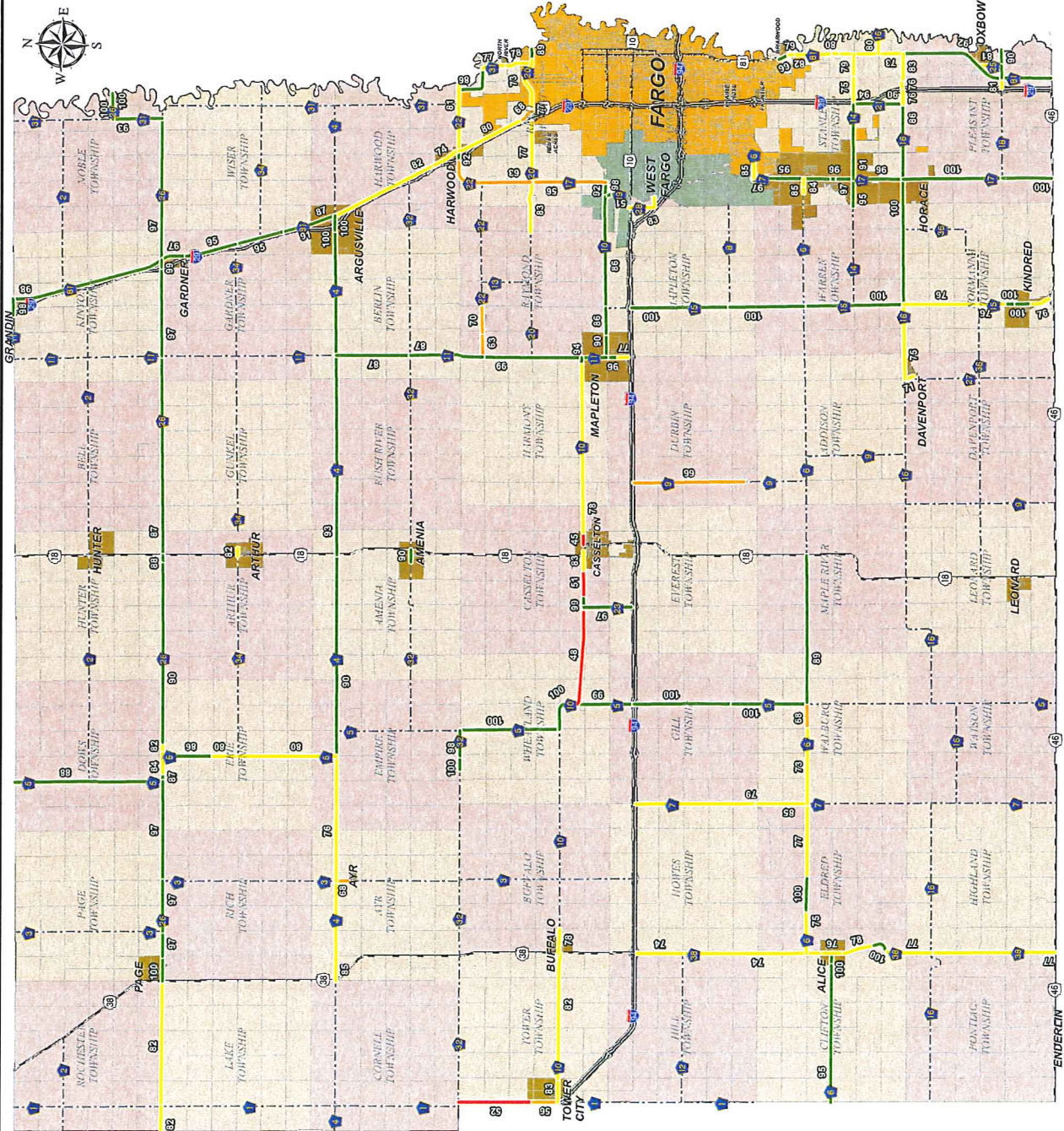
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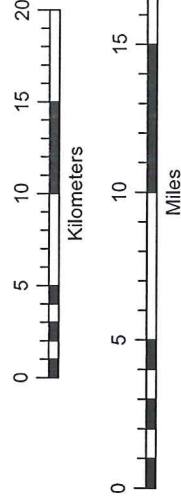




Appendix 4.

# Cass County Highway Department Highway Load Capacity

- 4 Tons/Axle
- 5 Tons/Axle
- 6 Tons/Axle
- 7 Tons/Axle
- 8 Tons/Axle
- 9 Tons/Axle
- 10 Tons/Axle



Jason Benson  
County Engineer, P.E.

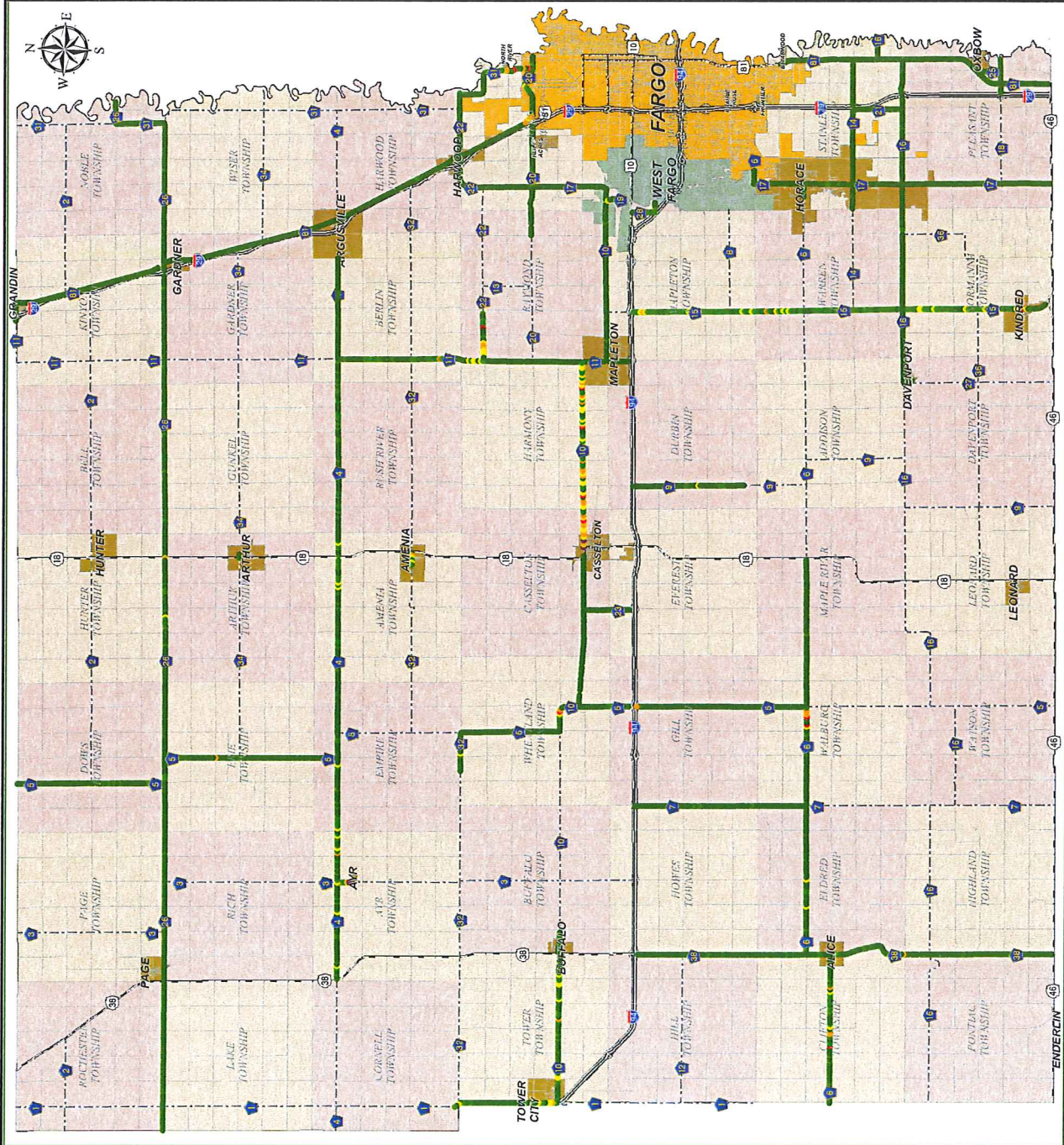
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Appendix 5.

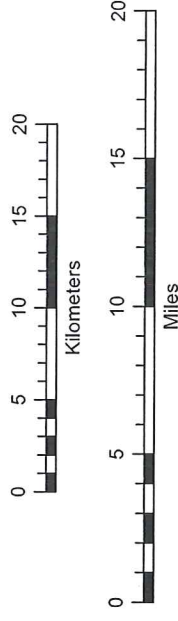
# Cass County Highway Department Paving Projects

Year of Last Paving Project

- 1949 - 1974
- 1975 - 1996
- 1997 - 2001
- 2002 - 2006
- 2007 - 2013
- Gravel

	1949-1979	1980-1989	1990-1999	2000-2005	2006-2013
Miles	23.29	4.46	64.6	75.82	146.01
Average PCI*	71	77	74	83	95

\*Pavement Evaluation completed by American Engineering Testing in 2012. The evaluation consisted of deflection testing with a Model 8002E Dynafest Falling Weight Deflectometer. Pavement surface condition assessment based on the Pavement Condition Index (PCI) method developed by the Army Corps of Engineers. The resulting data is analyzed to evaluate the structural and surface condition of the existing pavements on the tested road segments.

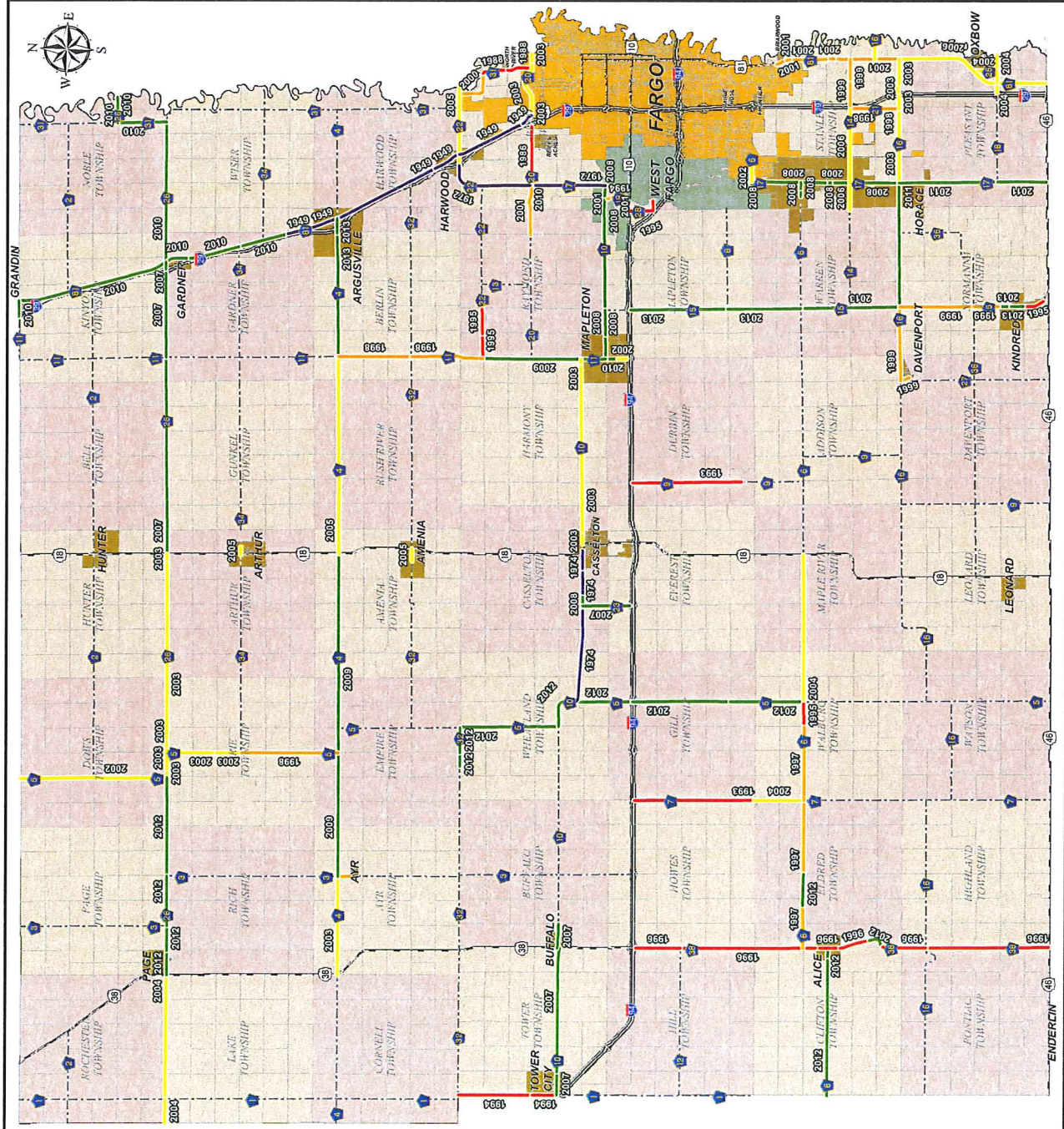


Jason Benson  
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Richard Sieg  
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Appendix 6.

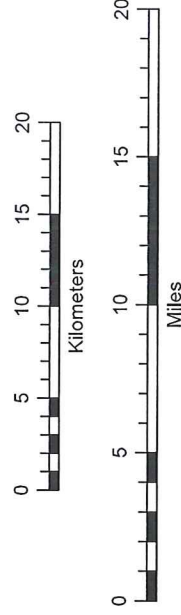
# Cass County Highway Department Seal Coat Projects

Year of Last Seal Coat

- 1993 - 1998 Asphalt - No Seal Coat
- 1999 - 2002 Concrete Surface
- 2003 - 2007 Gravel
- 2008 - 2013

Category	Miles	Average PCI*
1993-1998	4.04	54
1999-2002	31.13	73
2003-2007	97.3	83
2008-2013	112.97	88
Asphalt - No Seal Coat	41.61	91
Concrete Surface	37.88	80

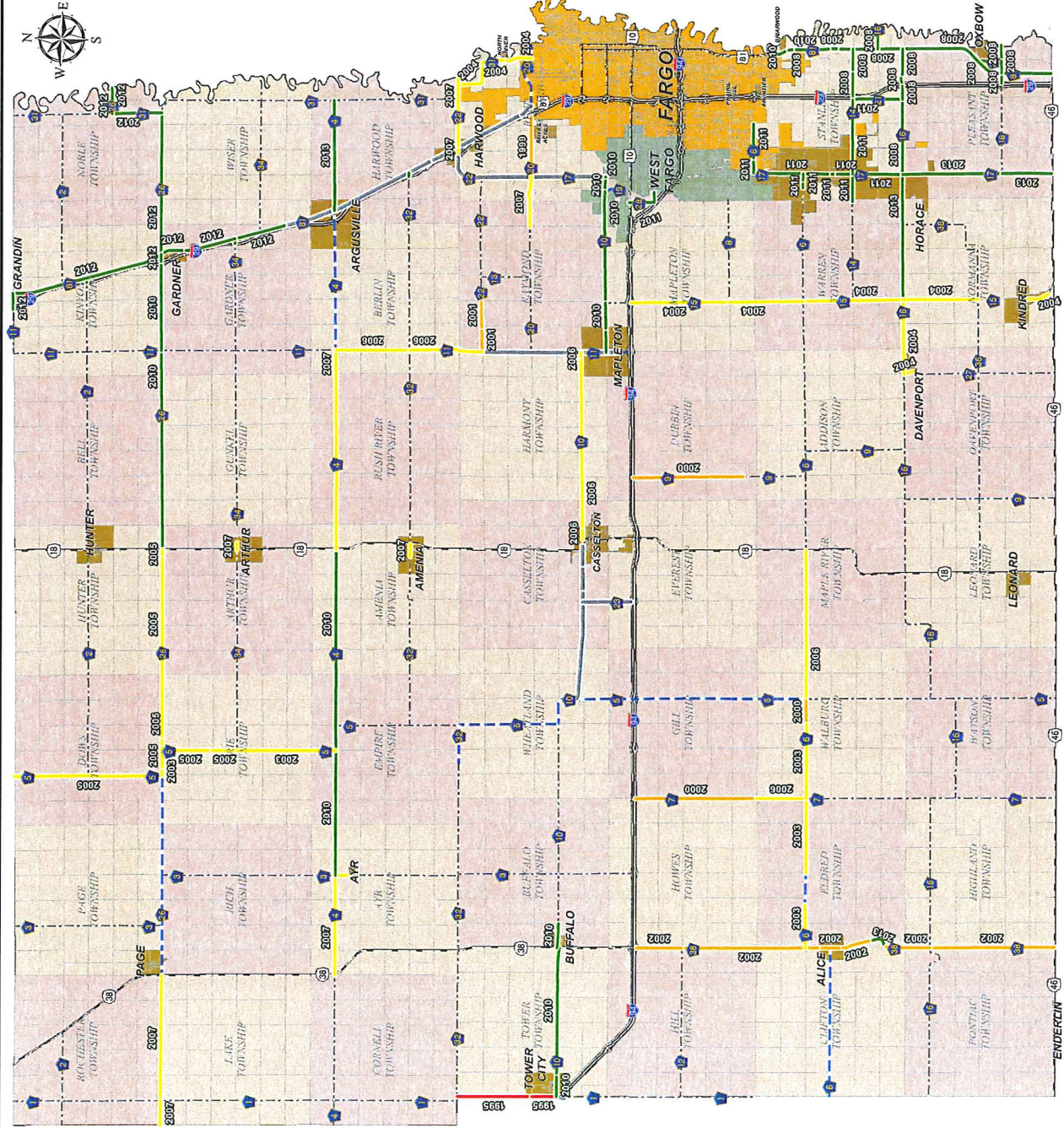
\*Pavement Evaluation completed by American Engineering Testing in 2012. The evaluation consisted of deflection testing with a Model 8002E Dynatest Falling Weight Deflectometer. Pavement surface condition assessment based on the Pavement Condition Index (PCI) method developed by the Army Corps of Engineers. The resulting data is analyzed to evaluate the structural and surface condition of the existing pavements on the tested road segments.



Jason Benson  
County Engineer, P.E.  
Richard Sieg  
Highway Superintendent  
DATE: July, 2013



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Appendix Z

# Cass County Highway Department

## ND DOT 2011/2012

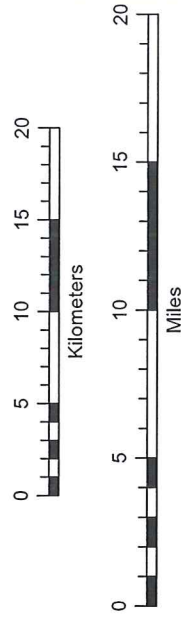
### Bridge Inspection and Appraisal

#### Bridges on County Roads

#### Bridge Sufficiency Rating Categories

- ▲ 0-49.9 Sufficiency
- ▲ 50-79.9 Sufficiency
- ▲ 80+ Sufficiency
- ★ Code Three Structure

	80+	50-79.9	0-49.9	Code 3
Total	61	23	0	0
Average	94.84	66.98	N/A	N/A
Low	81.8	50.8	N/A	N/A
High	100	78.7	N/A	N/A



Jason Benson  
County Engineer, P.E.

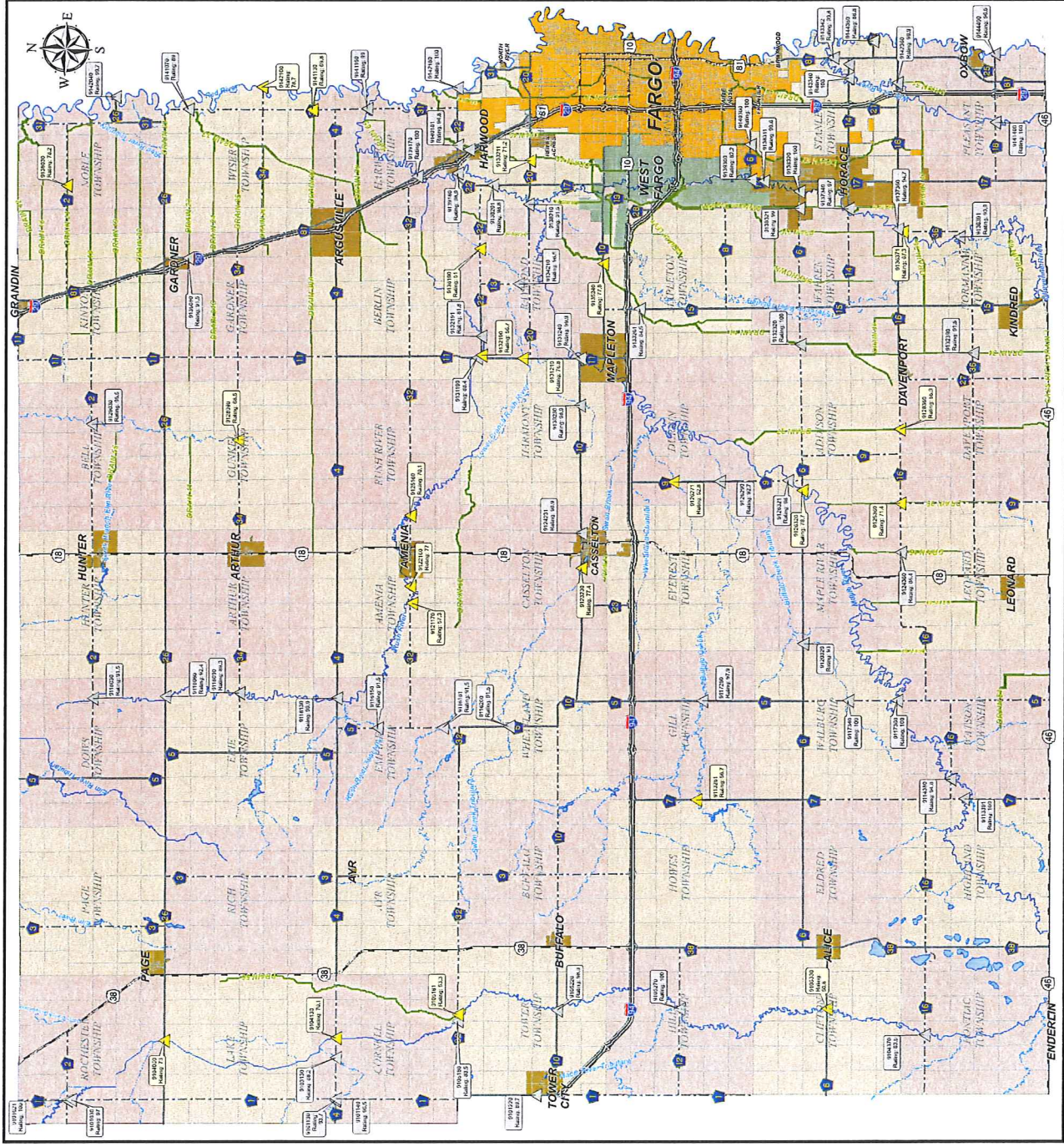
Richard Sieg  
Highway Superintendent

DATE: July, 2013

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Appendix B.

# Cass County Highway Department

## ND DOT 2011/2012

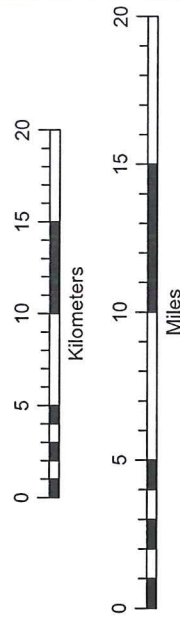
### Bridge Inspection and Appraisal

### Bridges on Township Roads

#### Bridge Sufficiency Rating Categories

- ▲ 0-49.9 Sufficiency
- ▲ 50-79.9 Sufficiency
- ▲ 80+ Sufficiency
- ★ Code Three Structure

	80+	50-79.9	0-49.9	Code 3
Total	79	32	22	17
Average	73.44	66.75	40.39	45.78
Low	80.4	50.2	36	33
High	100	79.9	46.9	70



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