



MEMORANDUM

**Highway
Department**

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County Engineer

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Superintendent

TO: Cass County Commission

FROM: Jason Benson, County Engineer *JB*

DATE: November 28, 2022

SUBJECT: Consent Agenda topic for December 5th, 2022, Commission Meeting: Adoption of the 2023-2027 Comprehensive Highway & Bridge 5 Year Plan.

To increase efficiency and maintain a high level of transparency, the Cass County Comprehensive Highway & Bridge 5 Year Plan has been developed.

This document 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.

This plan was presented in draft form to the Cass County Road Advisory Committee at the July meeting and approved at the November meeting.

SUGGESTED MOTION:

Adopt the 2023-2027 Comprehensive Highway & Bridge 5 Year 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 & BRIDGE 5 YEAR PLAN



2023-2027

Cass County Highway Department Cass County, North Dakota

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 2023-2027. 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 on plan priorities and funding uncertainties: Cass County has received an additional transportation funding over the last 10 years. This funding has been greatly appreciated, but because of the unreliable nature of the funding, this Plan sets priorities for how to best spend those funds if they become available. Over the 2013-2014 and 2015-2016 biennium, Cass County received one-time funding from the Legislature. However, due to state revenue reductions, Cass County did not receive any additional funding for the 2017-2018 biennium. The 2019 Legislature pass the “Operation Prairie Dog” infrastructure bill which was projected to add approximately \$7 Million to the county per biennium. Unfortunately, 2021-2022 Prairie Dog funding was not available due to reduced oil prices and activity. Based on the current ND state revenue forecast, this plan does assume “Prairie Dog” funding will be available in 2023. We will continue to be proactive in identifying future projects and will be prepared if state revenues increase. We will also update this plan as other funding becomes available from ARPA, ND State Funding, or new Federal Funding. Cass County will seek to maximize this funding and have projects designed and construction ready.

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 Deputy Cass County Engineer 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 changes in construction costs, revenues, flooding, 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 after budget 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 responsible, 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.

Commitment - We are committed to community service and providing quality, low cost project construction, engineering, and administration. Through public involvement, working with landowners, townships, and the travelling public, we strive to deliver effective highway and bridge maintenance, rehabilitation, and new construction. Safety is paramount in everything we do. Whether plowing snow, maintaining traffic signs, graveling rural roads, or building a new bridge, the safety of our employees and the travelling public always comes first. Our commitment has been validated in the awards received by the Cass County Highway Department to including:

- NDDOT's inaugural Vision Zero Safety Program Award in 2019
- National Association of Counties Achievement Award for Cass County's Highway Recycling and Reconstruction Program to reconstruct County Highways at a cheaper, more environmentally friendly method, all while providing a high-quality road for the travelling public. Between 2017 and 2020 this program saved Cass County nearly \$12 million.

Goals

Cass County's transportation goals are interdependent, mutually supportive, and apply to our transportation system's infrastructure and services. Our goals are nested with both the NDDOT and FM Metro COG transportation priorities. Cass County's transportation goals are:

1. Safe and secure transportation.
2. Sustainable and reliable mobility through planning and maintenance.
3. Communication and cooperation with landowners, townships, cities, NDDOT, and other stakeholders.
4. Transportation supports economic growth with consideration of environmental, cultural, and social impacts.
5. Cost effective construction with diversified and sufficient funding.

Summary

The 2023-2027 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 640.7 miles of roadway covering more than 1,768 square miles and 567 bridges of which 230 span 20 feet in length or greater.

Safe, efficient, and responsive transportation infrastructure is necessary to the incidents of commerce, public safety, recreation, and education. The 2018 Cass County Comprehensive and Transportation Plan describes Cass County's commitment to transportation and can be found at: <https://www.casscountynd.gov/our-county/planning/cass-county-comprehensive-and-transportation-plan/comprehensive-plan-current-documents>. The 2018 Cass County Comprehensive and Transportation Plan focuses on the Guiding Principles of "Regionalism, Resilience, and Livability". It also emphasizes the need to "Manage the County Highway System and collaborating with federal, state, and local officials to provide and maintain appropriate transportation systems."

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

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

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 several 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 and 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 in the metro area assist Cass County Highway anticipate or respond to necessary improvements to the system.

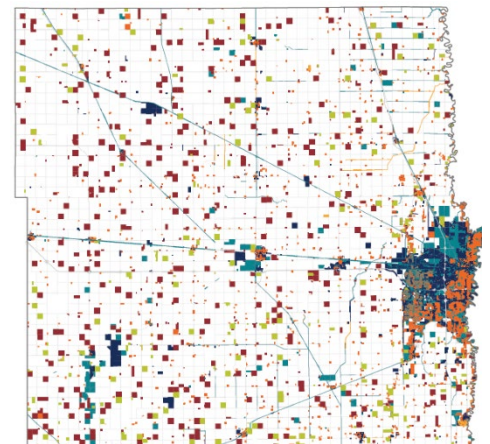


Existing and Future Land Use

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, grew to 123,138 in 2000, then increased 21.6% to 149,778 in 2010 and then increased 23.2% to 184,525 in 2020. With significant growth in commercial and residential building permits, Cass County can expect continued growth. In addition to utilizing Census data to project growth, Cass County participates with the FM Metro COG 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.

<i>Table 1 - Population - US Census</i>				
City	1990 Census	2000 Census	2010 Census	2020 Census
Fargo	75,111	90,559	105,549	125,990
West Fargo	12,287	14,940	25,830	38,626
Horace	662	915	2,430	3,085
Casselton	1,602	1,855	2,329	2,479
Mapleton	682	606	762	1320
Harwood	590	607	718	794
Kindred	569	614	692	889

Despite the growth and importance of the metro area, the County remains primarily agricultural. Ninety-Five 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 white, green, and rust orange, commercial in dark blue, and residential in orange. 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. The 2018 Cass County Comprehensive and Transportation Plan describe Cass County’s commitment to achieve orderly development that maintains Cass County’s rural heritage. The plan can be found at: <https://www.casscountynd.gov/our-county/planning/cass-county-comprehensive-and-transportation-plan/comprehensive-plan-current-documents>.

Highway Safety

Cass County and its agents have committed to maintaining the safest network of roads possible. The planning process considers 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. Cass County is a member of the NDDOT Vision Zero partnership and was awarded the NDDOT's inaugural Vision Zero Safety Program Award in 2019.

Cass County uses the systemic approach to highway safety. All new construction and maintenance overlays include the use of edge line 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 (roadway departures). Nearly all asphalt County Highways have rumble strips, with the only remaining roads without rumble strips being those with a projected paving project within the next few years and our older concrete roads. Intersection improvements and safety enhancements are implemented where collisions have historically happened or where collisions may be likely. Using a systemic approach, improvements such as flashing signals on stop and stop ahead signs, rumble strips, and improved signage have proven successful in past projects. Striping is performed annually on all paved County Highways.

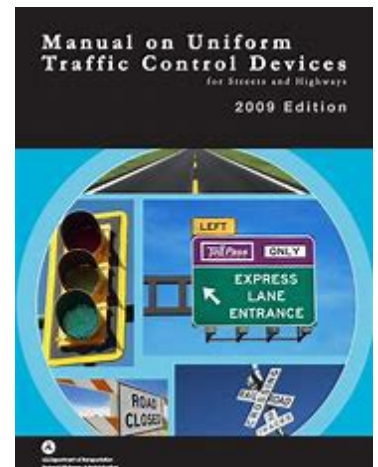
These systemic safety improvements have reduced crashes over the last 12 years when comparing the six years before the safety improvements and the six years after. From 2008-2013 the County total crashes were 447 and between 2014 and 2019 the average went down to 324. This represents a decrease of 27% between the two six-year periods before and after the implementation of these systemic safety improvements.

Highway Access Ordinance #2007-1 was developed to reduce the number of access points on County Highways for more efficient and safe operation. With design speeds on County Highways at 55 – 65 mph and the reduction of accesses to one per ¼ mile, a County Highway can 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 Highways, 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.



Local Road Safety Plan

In 2014 the NDDOT sponsored a statewide Local Road Safety Plan (LRSP) for counties. The purpose of this plan was to develop the following:

1. Establish safety emphasis areas
2. High priority safety strategies
3. Identify at-risk locations
4. Develop safety investment options
5. Identify high priority safety projects, both proactive and reactive
6. Position local agencies to compete for safety funds
7. Foster safety culture among local stakeholders

One of the critical issues identified was the higher crash rate on rural paved roads. While gravel roads make up approximately 93% of North Dakota's 97,600 miles of rural local road system, approximately half of the severe crashes are on the paved roads that make up 7% of the rural system.

The LRSP therefore focused on the Cass County paved road network and a Risk Rating Criteria was developed for the paved roads based on: Density of Road Departure Crashes; Traffic Volume; Curve (Critical Radius) Density; Access Density; and Road Edge Risk Assessment.

To develop a comprehensive LRSP, a public workshop was held with an emphasis on the 4 E's: Engineering, Enforcement, Education, and Emergency Medical Services. Through group discussion and review of crash data, participants worked to address severe crashes on the County roadways. Critical emphasis areas discussed were: Unbelted Vehicle Occupants; Lane Departure Crashes; Alcohol Related Crashes; Excessive Speed or Aggressive Driving; Intersection Crashes; and Crashes Involving Drivers Under Age 21.

Crash data from 2008 to 2012 was used for the countywide crash analysis. For Cass County, there were not enough crashes to be statistically reliable; therefore, decisions were based on the crashes for all cities, statewide data, or national research. The safety emphasis areas for Cass County are consistent with the state's emphasis areas. This process revealed where crashes were overrepresented based on a comparison to statewide averages or where a large enough number of crashes represented an opportunity to substantially reduce crashes. As a result, the following safety emphasis areas were identified as priorities for safety investments:

- Driver Behavior – Young drivers, aggressive drivers, alcohol-related, and unbelted vehicle occupants
- Highways – Lane departure and intersection crashes.

Cass County recently updated the County wide severe crash data to the most recent 5-year period from 2017 to 2021. Please see the chart below:

Safety Emphasis Areas	2017 to 2021 Severe Crashes							
	Statewide (% of Total)		Cass County		State Roads		Local System	
	%	#	%	#	%	#	%	#
Total Severe Crashes	2,113		61		27		34	
Involving Drivers Under Age 21	17%	355	16%	10	19%	5	15%	5
Involving Drivers Over Age 64	11%	226	13%	8	11%	3	15%	5
Excessive Speed or Aggressive	36%	759	39%	24	48%	13	32%	11
Alcohol-Related	27%	571	31%	19	22%	6	38%	13
Distracted, Asleep, or Fatigued	2%	41	3%	2	7%	2	0%	0
Unbelted Vehicle Occupants	37%	774	23%	14	15%	4	29%	10
Pedestrian Crashes	5%	111	2%	1	4%	1	0%	0
Bicycle Crashes	2%	34	2%	1	0%	0	3%	1
Motorcycle Crashes	14%	296	5%	3	4%	1	6%	2
Heavy Vehicle Crashes	7%	155	7%	4	11%	3	3%	1
Train-Vehicle Collisions	1%	11	0%	0	0%	0	0%	0
Lane-Departure (Run-Off-the-Road and Head-On) Crashes	55%	1152	48%	29	52%	14	44%	15
<i>Head-On</i>	6%	130	7%	4	11%	3	3%	1
<i>Run-off-the-Road Crashes</i>	48%	1022	41%	25	41%	11	41%	14
Intersection Crashes	31%	657	28%	17	22%	6	32%	11
Work Zone Crashes	0%	2	0%	0	0%	0	0%	0
Deer Collisions	1%	30	0%	0	0%	0	0%	0
Adverse (Winter) Weather Related	13%	270	10%	6	11%	3	9%	3

Source: NDDOT Crash Records, per UGPTI, NDSU.

Cass County is doing quite well regarding roadway safety. This is due to Cass County's existing safety strategies including rumble strips, pavement markings, pavement safety edges, and improved signing. Another factor is the low number of curves in our roadways as this reduces the number of roadway departures and other safety issues experienced in other counties in our region with winding roads. Our biggest safety issue involves our intersections. Because of adequate signing and lower traffic volumes, many of our intersections are safe and do not require any improvements. However, several of our intersections along ND 18, ND 38, and ND 46, as well as some intersections of two County Highways could be improved. Overall, the biggest safety recommendation includes evaluating streetlights, signage, pavement markings, and dynamic warning signs. We have worked with the NDDOT to determine the best safety options at the intersections of state highways. For these critical intersections, safety funding was used for intersection destination lighting and School Zone signs. Local funding was used to replace the remaining School Zone signs and flashing lights so that all rural school locations on the Cass County Highway system have been replaced since 2017. Finally, local funding was also used to install red LED flashing beacons on the top of stop signs located at critical road intersections to alert drivers of these stop conditions.

At this time projects have been completed or developed for Destination Lighting, Radial T Intersection Improvement at Cass 5/10, chevron signing on curves, rumble strips/stripes, and flashing red beacons on stop signs at critical intersections.

In 2011 edge-line rubble strips were installed on nearly all the counties paved highways. It is difficult to determine if this was a factor in the reduction of crashes since that time. But it is encouraging to see the decrease of 27% between the two six-year periods before and after the implementation of these systemic safety improvements. See Appendix 18 that summarizes all types of crashes from 2006 to 2021 on the Cass County Highway network.

Permitting

Related to safety and maintenance, the County relies on various permitting procedures to uphold the mission of the Department. Significant permits include:

1. Over Dimension Vehicles Permits: 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.
2. Utility Permits: 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.
3. Ditch Cleaning/Drainage Permits: 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.
4. Access Permits: The County actively permits any new access to County Highways through the Highway Access Ordinance #2007-1.
5. Subdivision Platting: The County Planning Office 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.

Valuation of Highway and Bridge Assets

Cass County has invested a significant amount of funding in developing and maintaining its transportation network. Since 2000 around \$212 million was spent on both our highway and bridge projects. See appendices 19a – 19d

The current average cost to completely rebuild a paved highway is \$1.5 million. To rebuild our 309.2 miles of paved highway to a width of 32 feet would cost over \$467 million.

With 567 structures, our bridges and large box culverts also have a significant asset value. Of the 230 major structures (20 feet in length or greater), the average structure length is 100 feet with an average width of 28 feet. Replacement values for these 230 structures, at a cost of \$275 per square foot would be approximately \$177 million.

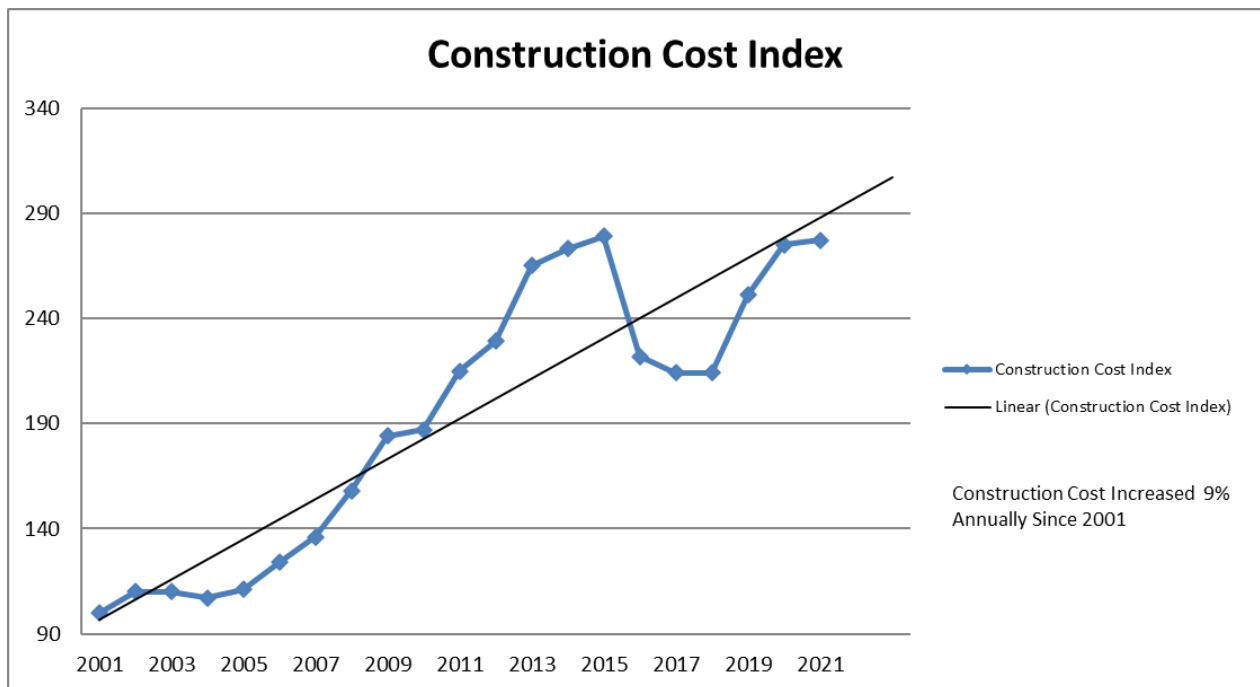
When factoring the additional cost to replace the 337 minor structures, the total replacement cost of our highway and bridge infrastructure is nearly \$700 million. While no local government can bear the replacement cost of this large amount of infrastructure, it emphasizes the importance of funding and sustaining an effective maintenance program. An 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.

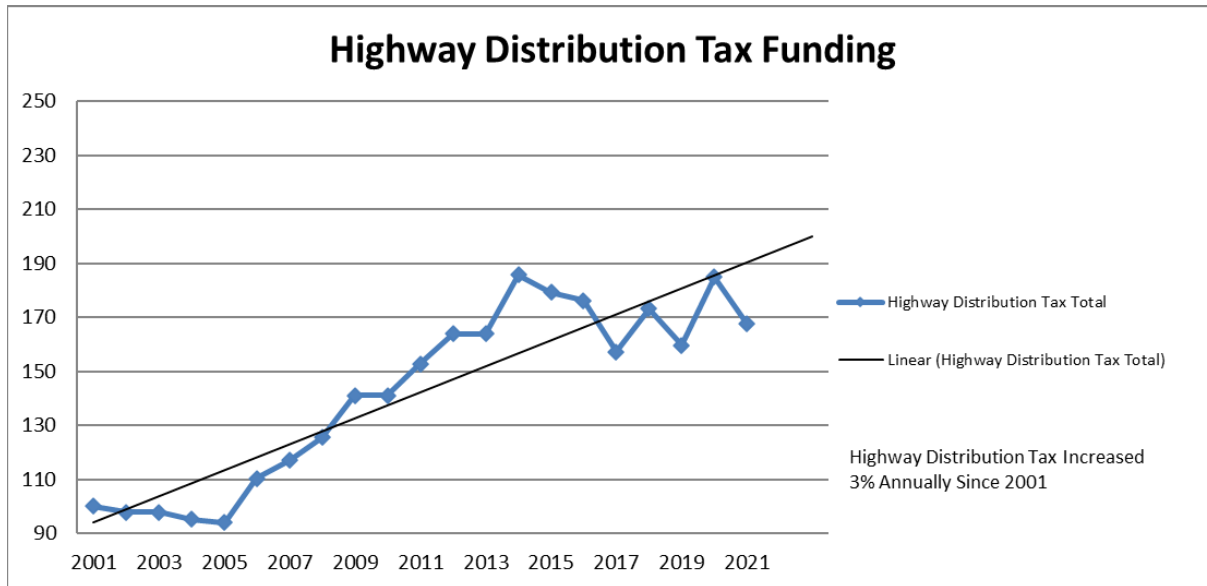
Funding Maintenance and Construction

The County relies upon a combination of the 23-cent state fuel tax that was last updated in 2005, state motor vehicle license fees, federal road and bridge funds, local property tax, and when available, one-time state funding. 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.

Influencing the cost of construction is the significant rise in the ND Construction Cost Index. From 2001 to 2021, ND’s overall Construction Cost Index increased annually an average of 9%. *We are still feeling economic challenges of the COVID pandemic and price increases in construction materials and other construction costs.* Rebuilding just one mile of road can cost up to \$1.5 million. Considering this reality, it is important to maintain a road maintenance policy to reduce the need for reconstruction.

While Construction Costs have increased annually an average of 9% since 2001, Cass County’s Highway Distribution Tax Funding (without One Time Funding) has only increased 3%. North Dakota has a state tax that currently collects 23 cents per gallon of gasoline. This tax was last increased in 2005.





Federal funding comes from the federal gas tax of 18.4 cents, last increased in 1993. In 2000, Cass County received \$1.25 million in Federal Aid Highway Funds. With the changes from federal Fixing America’s Surface Transportation Act (FAST Act), we receive approximately \$1 Million in Federal Aid Highway Funds, which equates to a 20% decrease. The 2023 projection is \$1.3 Million near the year 2000 level once again. To keep up with the 9% construction cost index, Federal Aid Highway Funds should be approximately \$2 million a year. Since 2000 we have continued to receive between \$400 to \$700k in Federal Aid Bridge Funds every year on average. Federal Aid as a percentage of the County’s total revenues has continued to decrease. In 2000, Federal Aid made up 21% of Cass County’s revenues. From 2000-2005 Federal Aid averaged 19% of our total funding and from 2006-2012 it averaged 13% of our total funding. Now Federal Aid only makes up 8% of our county revenues. While our costs have increased 9% annually since 2000, our Federal Aid has decreased. Over that same time, local and state funding increased from \$7.4 million to \$17.9 million. If it were not for the growth in local and state funding, we would not be able to maintain our existing highway and bridge network. Federal Aid has become a very small component of our overall revenues and can no longer be counted on to fund major projects. *The new Federal Transportation Funding was approved in November 2021 and has increased the level of Federal Funding that the County receives. The Federal Aid Highway Funds are now back to the year 2000 level.*

Regarding our asphalt highways, they generally require a maintenance overlay every 15-20 years. Current costs of a typical asphalt overlay in Cass County can range from \$200,000-\$525,000 per mile, depending on road width and thickness of the asphalt overlay, with the most frequent 36’ wide, 2.5” thick overlay being approximately \$325,000 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 \$325,000 per mile we can estimate a cost of \$5.5 million per year. If pavements are not overlaid with a new asphalt surface before they deteriorate, they will require full reconstruction.

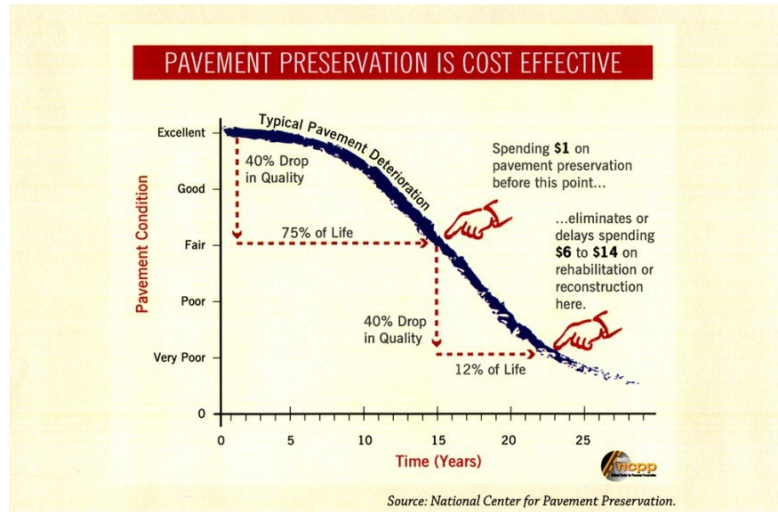


Table 2 shows the estimated revenue for the Cass County Highway Department over the planning years. These estimates use revenue inflation rates of 1.5% for

Federal Funding, 3% for State Funding, and 6% for Local Funding. These inflation rates were developed by Metro COG. In addition, the Operation Cost inflation rate use was 4%. The Highway Distribution Tax totals are an estimate based on past funding. Estimated annual Federal Aid Highway funding is \$1,000,000. The chart also includes the additional Federal Aid Funding for Bridge projects. Federal Aid Bridge funding is based on need as the NDDOT had \$5 million allocated statewide for county bridges and inspections. Due to increase costs of bi-annual bridge inspections, the NDDOT only have \$3 million allocated statewide for annual county bridge construction (Cass County competes for these funds based on other county needs throughout the state).

Revenue Description	2023	2024	2025	2026	2027
Property Tax	\$10,800,000	\$11,448,000	\$12,134,880	\$12,862,973	\$13,634,751
Highway Distribution Tax and Additional State Funding	\$9,600,000	\$9,888,000	\$10,184,640	\$10,490,179	\$10,804,885
Prairie Dog Funding Bill	\$6,534,486	\$0	\$7,000,000	\$0	\$7,000,000
Other - Grants	\$300,000	\$0	\$0	\$0	\$0
Total Revenues	\$27,234,486	\$21,336,000	\$29,319,520	\$23,353,152	\$31,439,636
Federal Aid Highway Funding	\$0	\$0	\$6,700,000		
Federal Aid Bridge Funding	\$0	\$1,600,000	\$0	\$0	\$0
Total Revenues & Federal Aid	\$27,234,486	\$22,936,000	\$36,019,520	\$23,353,152	\$31,439,636
Total Operating Cost (not including Road/Bridge Projects)	\$6,000,000	\$6,120,000	\$6,242,400	\$6,367,248	\$6,494,593
Total Available for Road/Bridge Projects	\$21,234,486	\$16,816,000	\$29,777,120	\$16,985,904	\$24,945,043

Long Range Funding Estimates

In 2018-2019, Metro COG updated its Long-Range Transportation Plan – Metro 2045 ([Metropolitan Transportation Plan :: Fargo-Moorhead Metro COG \(fmmetrocog.org\)](https://www.metrocog.org/transportation-plan)). This plan contains Short-Range, Mid-Range, and Long-Range revenue estimates. These estimates also use revenue inflation rates of 1.5% for Federal Funding, 3% for State Funding, 6% for Local Funding, and an Operation Cost inflation rate of 2%. Table 3 uses the Metro 2040 revenue estimates. These estimates use standard Highway Distribution Tax funding and do not include additional one-time State funding. With the continued support of one-time funding from the ND

Legislature, Cass County could have an additional \$7 million per biennium and more than \$105 million over the next 30 years. When looking out to 2045, additional one-time state funding only keeps up with maintaining our highway system. Continued funding based on the 2021 “Prairie Dog Fund” rate will allow us to annually overlay 18 miles, reconstruct 3.5 miles, replace 3-4 bridges, and complete seven miles of gravel road construction.

Revenue Description	Short-Range 2023-2030	Mid-Range 2031-2040	Long-Range 2041-2050	Total
Property Tax	\$106,892,653	\$226,888,394	\$406,322,558	\$740,103,605
Highway Distribution Tax	\$85,366,426	\$139,412,154	\$187,358,277	\$412,136,856
Prairie Dog Funding Bill	\$27,534,486	\$35,000,000	\$35,000,000	\$97,534,486
Other - Grants	\$300,000	\$0	\$0	\$300,000
Total Revenues	\$220,093,565	\$401,300,548	\$628,680,835	\$1,250,074,948
Federal Aid Highway Funding	\$10,658,793	\$14,549,086	\$16,884,808	\$42,092,687
Federal Aid Bridge Funding	\$3,731,658	\$7,834,123	\$9,091,820	\$20,657,601
Total Revenues & Federal Aid	\$234,484,015	\$423,683,757	\$654,657,463	\$1,312,825,235
Total Operating Cost (not including Road/Bridge Projects)	\$51,497,814	\$85,381,503	\$104,933,921	\$241,813,238
Total Available for Road/Bridge Projects	\$182,986,201	\$338,302,254	\$549,723,541	\$1,071,011,997

Cass County Highways: Design Standards

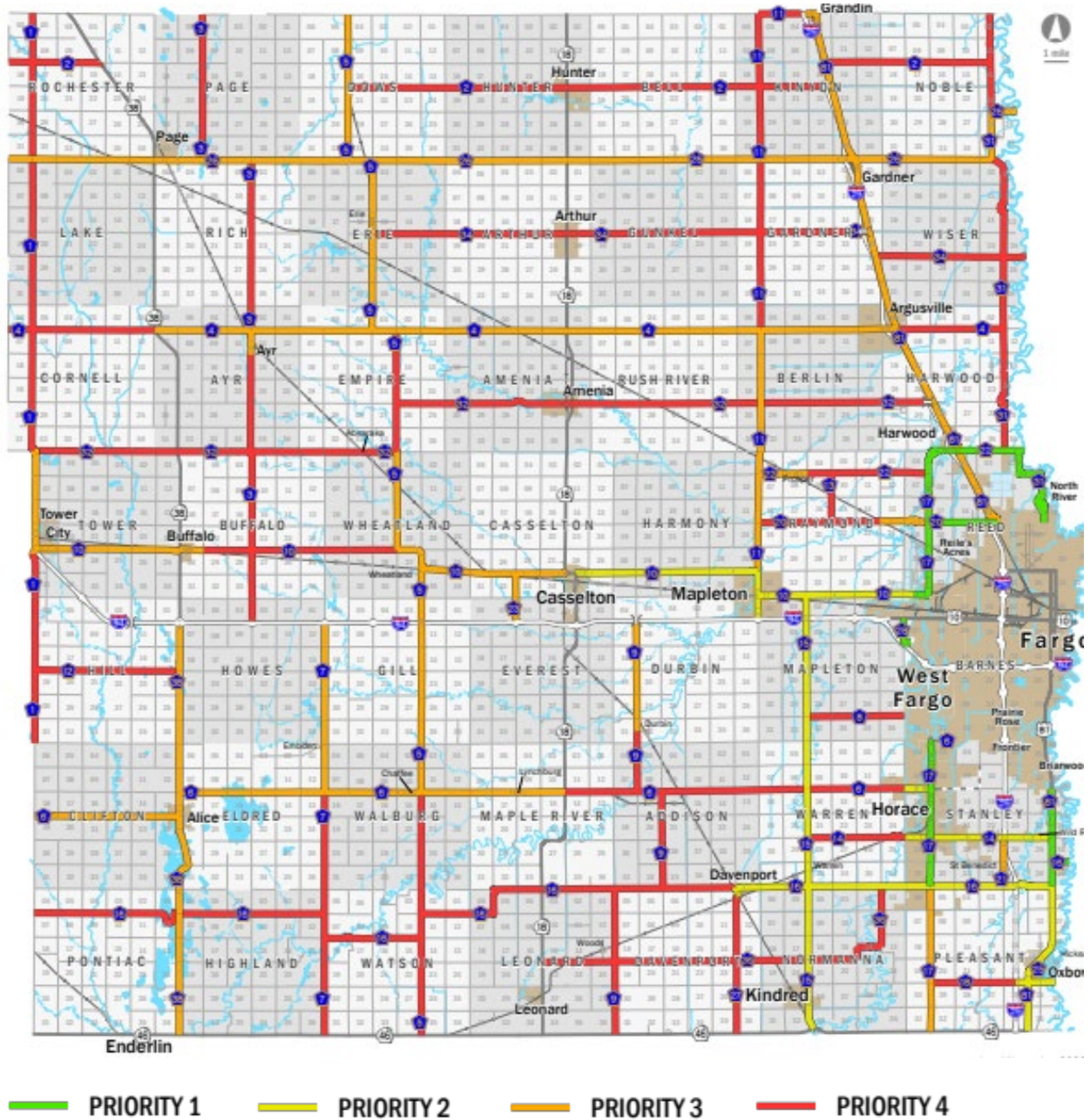
The typical section of a County Highway is rural in nature with two lanes, either paved or gravel surface. Different modes of travel and location of roadways to population centers, agricultural points of traffic, or schools sometimes require different needs. Further drainage needs may vary from roadway to roadway. Table 4 summarizes the Design Standards for New or Reconstruction of Existing Cass County Highways. Starting in the winter of 2021 select roads were increased to 65 mph, based on clear zone, vertical and horizontal curve data. See Appendix 20 for more details. CMC (County Major Collector) roads that federal funds can be used for reconstruction and paving projects. Off- System roads cannot utilize federal funding for road improvements but can use them for bridges over 20’ in length.

	County Major Collectors (CMC) "On System"	Local Roads (County) "Off-System"	Local Roads (Township) "Off-System"	Local Roads (Other) "Off-System"
Bridge Width (Clear Roadway) - Min. is 28 ft.	36' - 40'	28' - 30'	28' - 30'	28' - 30'
Storm Design Frequency (Bridges)*	25 yr min/100 yr preferred	25 yr min/100 yr preferred	15 yr	15 yr
Design Loading (Bridges) - Min is HL-93	HL-93	HL-93	HL-93	HL-93
Culvert Design Frequency*	25 yr min/100 yr preferred	25 yr	10 yr	10 yr
Graded Roadbed Width (sub-grade) - Paved Surface	34' min/36' preferred	34' min/36' preferred	34' min/36' preferred	34' min/36' preferred
- Minimum travel way width(both lanes + shoulders)	24' min/36' preferred	24' min/36' preferred	24' min/36' preferred	34' min/36' preferred
- Minimum pavement section (base and HBP)	12"	12"	12"	12"
Graded Roadbed Width (sub-grade) - Gravel Surface	32' - 16'	32' - 16'	28' - 32'	28' - 32'
- Minimum travel way width(both lanes + shoulders)	28' - 32'	28' - 32'	24' - 28'	24' - 28'
- Minimum gravel thickness	6"	6"	4"	4"
Design Speed	55 mph min/65 mph preferred	55 mph min/65 mph preferred	55 mph	50 mph
Right of Way Width	150' min/200' preferred	150' min/200' preferred	66'	66'
Inslope Ratio	4:1 min/5:1 preferred	4:1 min/5:1 preferred	4:1	4:1
Separation (Road top to Ditch Bottom)	4'	4'	4'	4'

* **Bridges** - For County Major Collectors (On-System); the design frequency is 25 years and other local roads (Off-System); the design frequency is 15 years. If an overflow section is provided, then the waterway opening plus the overflow section must pass the appropriate design frequency. **Culverts** - The same design frequencies are required for culverts as they are for bridges; except for Townships roads, the design frequency is 10 years. The requirements are required according to North Dakota Century Code.

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; green is priority 1, yellow is priority 2, orange is priority 3, and red is priority 4.

Map 2: Road Priorities



Cass County Highways: Current Status of Paved Highways

Cass County currently maintains 309.2 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 engineering staff to help shape decisions for future roadway maintenance/rebuilding. The most recent PCI survey was completed in 2017 and results are shown in Appendix 3 (next PCI testing occurred in 2022 and the results will be out in 2023). Cass County’s goal is to have an overall PCI of 90. Additionally, seal coats are applied to asphalt highways one year after paving or overlaying has been completed to increase the life of the pavement to 15-20 years. Our overall goal is to complete another chip seal around years 8-14 if needed to extend the life of the existing pavement before another overlay is necessary. 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 331.5 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. As gravel costs and traffic increase, gravel stabilization, dust control, and subgrade stabilization are becoming more important. Over the next several years we anticipate adding more miles of stabilized gravel and more miles of roads with dust control. This will help bridge the gap between gravel roads with 100 ADT or less and paved roads with more than 400 ADT. Our gravel roads with 100-400 ADT have a need for more enhanced gravel treatments, stabilization, and dust control to adequately manage the roadway conditions as traffic increases.

Bridge Maintenance and Construction

Cass County maintains 567 structures of which 230 span 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. In Cass County the average age of a bridge is 36 years old. Of the 567 structures, about 22% were built before 1960. Designed to the standards of their time, many of these bridges have reached the end of their design life or cannot handle the truck traffic of today. If we assumed a 70-year lifespan for our structures, we need to replace at least eight per year. Since so many bridges are now over



50 years old, over the next twenty years we will have a higher number of bridge replacements, further straining our finances.

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. Currently 6 bridges are required to be posted on County Roads. These bridges are planned to be replaced within the next 5 to 7 years. The NDDOT staff no longer inspects all 20 foot or longer bridges on a 2-year cycle and rates each on a 0-100 scale. Instead now this work is done by consultants. The old sufficiency rating system is now replaced with a health index between 0 and 100, along with placing bridges in Good, Fair and Poor categories. Now bridges need be in the Poor and Fair categories for potential federal funding for replacement or rehabilitation. These structures vary in condition from poor, fair and good. There are 2 poor, 39 fair and 49 good county bridges. These bridges are replaced or repaired on a priority basis.

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, fair and good. There are 10 poor, 60 fair and 70 good township bridges. 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 has developed a 5-year rotation for inspecting these structures.

Cass County: Future Staffing – Heavy Equipment – Facilities Needs

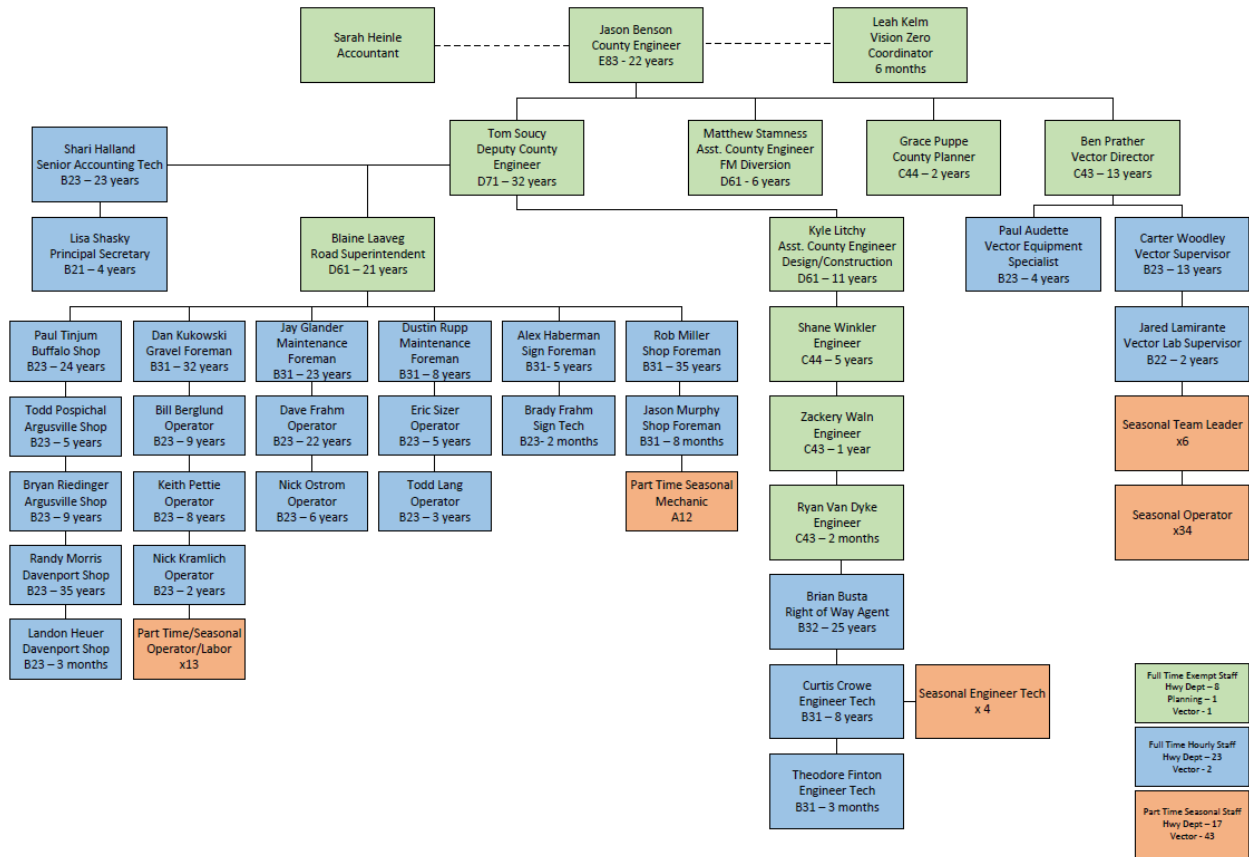
Highway & Vector Staffing

- **Current Staffing:** The Highway Department made up of 33 full time administrative, operations, and engineering staff. The County Engineer also supervises the County Planning and the County Vector Control Departments totaling five full time employees. The Highway Department currently has the County Engineer, a Deputy County Engineer, an Assistant County Engineer (FM Diversion), Assistant County Engineer (Design and Construction), a Road Superintendent, and two office administration staff. Under the Assistant County Engineer (Design and Construction) are six full time engineering staff and under the Road Superintendent are 18 full time operations staff. Then Highway Department also hires between 16-20 part time engineering and operations staff during the summer. The Vector Control Department has 4 full time employees and hires around 40-42 part time summer employees. Below is the current organizational chart.

- **Proposed Future Staffing over the Next Five Years:** The Highway Department looks to add one new staff position over the next five years. In addition to handling increases in workload, this one new position would help transition for potential retirements and changes.
 - A mechanic to work under our current Maintenance Foreman. This new staff member would be replacing a six-month part-time employee. The person would also add flexibility during the winter months for both equipment maintenance and assisting with snow plowing. This position has been approved and will be filled in the fall/winter of 2021-2022.

CASS COUNTY HIGHWAY DEPARTMENT ORGANIZATIONAL CHART

(as of 10-01-22)



Highway Heavy Equipment:

- Current Equipment:
Motorgraders, Trucks, Pickups, Loaders, Backhoes, Tractors and Trailers are replaced on a as needed to keep the fleet in working order.
- Five Year Projected Equipment Purchases:

2023	2024	2025	2026	2027
Shop P/U (2)	5 CY Wheel Loader	E145 Excavator	Ag Tractors	Tandem Trucks (2)
2.5 CY Loader	Shop P/U (3)	Shop P/U (2)	Shop P/U (2)	
Sign Trailer	Engr. P/U (2)	Engr. P/U (3)	Engr. P/U (4)	
Water Tank	Low boy Trailer	Excavator	Disc Mower	
Bobcat Angle Broom	Tri Axle Trailer			
Toolcat or Bobcat for Gravel				
Equipment and years listed subject to change.				

Highway Department Facilities:

- Current Facilities:
 - West Fargo Shop was built in 1969.
 - Office addition was built in 1970.
 - The roof was upgraded in 2018.
 - The main office was remodeled in 1997.
 - The Davenport rural shop was built in 1982.
 - The Argusville and Buffalo rural shops were built in 1988.
 - The service hoist main shop was removed, and a pit was installed for service work in 1998.
 - An asphalt curb and gutter parking lot for employees/visitors and fuel pumps are also moved to their current location in 2001.
 - The Vector/Weed Storage building was built in 2002/2003.
 - Sand/Salt Storage building was built in 2003.
 - The Vector addition was added to the west side of the office section in 2005. This year the vector chemical building was also constructed.
 - Concrete Paving East of the Main Shop was built in 2007.
 - East Storage Building was built in 2012
 - Concrete Paving West of the Main Shop was built in 2013.
 - Concrete Paving South of the Main Shop was built in 2014.
 - Concrete Paving west of the East storage building to the main entrance roadway. The wash bay drains, and old paint room concrete floor was replaced. The heated storage area of the main shop floor drains and concrete near the overhead shop doors was all built in 2015.
 - The asphalt curb and gutter Employee and Visitor parking lot was expanded to the north in 2017 and the remaining portion of the parking lot was overlaid with new asphalt in 2020.
 - 2021 we moved into a new facility for our Davenport Shop and sold the old shop to (KNDPA) Kindred, Normanna, Davenport, Pleasant, Addison Township's.

- Five Year Projected Facilities Remodel, Changes, or New Additions:
 - The Highway Department Office was last remodeled in 1997 and the current carpet was installed in 2005. With most of the office furnishings over 24 years old, a major remodel and addition space was approved by the County Commission for 2023 to include:

- Ten Year Projected Facilities Remodel, Changes, or New Additions:
 - 2028-2032 upgrade the West Fargo Sand/Salt storage building.

Vector Department Facilities:

- Current Facilities:
 - Vector Control Office was built in 2006
 - Presently housing Cass County Diversion Engineer
 - Cass County Planning Office located adjacent to Vector Control “wing”
 - Presently have two staff members stationed in the laboratory as a necessity to provide workstations
 - Locker room facilities built for approximate 25 men and 25 Women
 - Locker space is extremely tight. Future staffing growth could pose challenges

Vector vehicle storage building was built before 1995?

75ft Addition to the south end completed in Spring 2019 to meet demand of larger operation. Previous space was inadequate since 2015.

Conditioned space built into existing structure in 2020-2021 for cooling and heating
Minor improvements to further insulate garage doors and improve energy efficiency anticipated

Vector pesticide storage facility built in tandem with offices and locker rooms in 2006

Considerable repair and upgrade necessary

Loading pad concrete slab is subducting and in need of jacking

Soffit and siding have not withstood the winds and is in continuous need of repair.

Plan in 2023 to enclose the loading pad after requisite leveling of slab

Addition of 2 garage doors on north and south loading pad entrance.

Rain flooding of loading pad requires considerable expense and hazardous waste removal due to contamination concerns.

Strategic Long Range 2045 Goals

Now through the year 2045, Cass County will continue to aggressively design, build, and maintain our future highway network. Below are the goals listed by decade:

2026 to 2035

- 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.
- After completion of the FM Diversion Project, pave Cass 32 from I-29 to the FM Diversion, pave Cass 6, Cass 14, Cass 20, and Cass 22 from the FM Diversion west to Cass 11 or Cass 15.
- Repair, replace, or remove all bridges/structures identified as poor within five years of its last inspection.

2036 to 2045

- Implement a plan to regrade or reshape all gravel roads 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.

2023-2027 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 FM Metro COG, 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 5 illustrates the proposed highway projects for the next five years that are a result of these components.

Table 5 - Proposed Highway Improvements					
Hwy	Project Location	Type of Project	Funding Source (Local/Fed Aid)	Year to be Completed *	Project Cost
6	Hwy's 6 & 17 Roundabout & E 1,800' on Hwy 6	Grading & Surfacing	Local	2023	\$1,185,220
17	Hwy 17 to 68th Ave S	Grading & Surfacing	Local	2023	\$4,200,000
30	C30 - Soybean Crushing Plant - Access Road	Grading & Surfacing	Local	2023	\$500,000
6 & 9	C6 - I94 to Hwy 10, C9N to C9S & C9 2 Mi N of C6	Subgrade Repair & Grading	Local	2023	\$1,035,000
34	Hwy 11 to I29	Subgrade Repair & Grading	Local	2023	\$1,000,000
16	State Hwy 18 to Davenport	Subgrade Repair & Grading	Local	2023	\$2,400,000
	Brewer Lake Park Road	Subgrade Repair & Grading	Local	2023	\$400,000
				TOTAL =	\$10,720,220
4	State Hwy 18 to Hwy 11	Grading & Surfacing	Local	2024	\$10,000,000
23 & 30	Hwy 23 E 1.25 Miles	Grading & Surfacing	Local	2024	\$2,500,000
6	Sheyenne Diversion to Hwy 17	Mill and Overlay	Local	2024	\$150,000
14	Sheyenne River to I29	Mill and Overlay	Local	2024	\$1,300,000
17	68th Ave S to Horace & Horace to Hwy 16	Mill and Overlay	Local	2024	\$1,300,000
32	State Hwy 18 West 0.5 Mile through Amenia & East 0.25 Mile	Grading & Surfacing	Local	2024	\$1,050,000
34	State Hwy 18 to 0.5 Mile East	Grading & Surfacing	Local	2024	\$750,000
				TOTAL =	\$17,050,000
5	Wheatland to I94	Grading & Surfacing	Local	2025	\$2,200,000
16	State Hwy 18 to Davenport	Bituminous Surfacing	Local	2025	\$5,200,000
26	Barnes Co. Line to ST Hwy 38	Mill and Overlay	Federal	2025	\$1,800,000
26	Hwy 5 North to State Hwy 18	Mill and Overlay	Federal	2025	\$2,925,000
26	State Hwy 18 to I29	Mill and Overlay	Federal	2025	\$3,700,000
4	State Hwy 18 to Hwy 11	Overlay	Local	2025	\$4,800,000
34	Half a Mile East of State 18 to Hwy 11	Subgrade Repair & Grading	Local	2025	\$1,700,000
34	Hwy 5 to State Hwy 18	Subgrade Repair & Grading	Local	2025	\$1,800,000
				TOTAL =	\$24,125,000
5	Wheatland to I94	Overlay	Local	2026	\$1,200,000
10	Hwy 1 to State Hwy 38	Grading & Surfacing	Local	2026	\$6,600,000
10	State Hwy 38 through Buffalo 1 Mile East	Grading & Surfacing	Local	2026	\$1,800,000
				TOTAL =	\$9,600,000
	Brewer Lake Park Road	Bituminous Surfacing	Local	2027	\$700,000
6	Barnes Co Line to Hwy 38	Grading & Surfacing	Local	2027	\$6,000,000
1	Hwy 4 to Hwy 26	Subgrade Repair & Grading	Local	2027	\$1,575,000
11	Hwy 26 North 6 Miles	Subgrade Repair & Grading	Local	2027	\$1,350,000
81	76th Ave S to Hwy 16 W	Culvert Lining	Local	2027	\$400,000
16	Hwy 17 to I29	Bituminous Surfacing	Local	2027	\$3,500,000
16	I29 to Hwy 81	Mill and Overlay	Local	2027	\$455,000
16	Hwy 81 to Red River	Mill and Overlay	Local	2027	\$227,500
18	I29 to Red River	Mill and Overlay	Local	2027	\$300,000
21	Hwy 14 to Hwy 16	Mill and Overlay	Local	2027	\$600,000
25	Hwy 81 through Hickson	Mill and Overlay	Local	2027	\$120,000
81	Hwy 16 W to State Hwy 46	Mill and Overlay	Local	2027	\$2,112,500
10	Hwy 1 to State Hwy 38	Overlay	Local	2027	\$3,600,000
				TOTAL =	\$20,940,000

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

2023-2027 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.

Over the last 10 years Cass County has implemented a plan to stabilize and improve gravel road performance. This has been through completing road reconstruction, cement treated subgrade, and gravel stabilization with dust control. This has helped improve many roads, but additional work is needed on our gravel roads to replace culverts, regrade ditches, and improve the roadway. If additional funding becomes available it would be ideal to allocate a significant portion to improving the roadway, culverts, and ditches of our gravel roads.

Table 6 illustrates the proposed gravel highway improvements.

Hwy	Project Location	Length (Miles)	Type of Project	Year to be Completed	Funding Source (Local/Fed Aid)	Project Cost
34	C11 to I29	4.10	SGR & Reshaping	2023	Local	\$1,000,000
Brewer Lake Rd	C5 to Brewer Lake Campground	1.42	SGR & Reshaping	2023	Local	\$400,000
16	State Hwy 18 to Davenport	8.00	SGR & Reshaping	2023	Local	\$2,400,000
34	Half a Mile East of State 18 to C11	7.75	SGR & Reshaping	2025	Local	\$1,700,000
34	C5 to State Hwy 18	8.00	SGR & Reshaping	2025	Local	\$1,800,000
1	C4 to C26	7.00	SGR & Reshaping	2026	Local	\$1,575,000
11	C26 to Traill Co Line	6.00	SGR & Reshaping	2026	Local	\$1,350,000

2023-2027 Bridge Improvement Plan

The County utilizes bi-annual inspection reports provided by the NDDOT to identify necessary improvements to County and township structures. Funding 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 40 bridges currently slated for improvements with additional funding set aside for replacing minor structures. Table 7 illustrates the proposed bridge improvements for 2023-2027.

HWY	TWP	LOCATION	PROJECT TYPE	FUNDING	STRUCTURE TYPE	YEAR	TOTAL COST
	Empire	4/5 Empire Township on Tributary of the Rush River	Box Culvert	Local	Minor	2023	\$65,000
16	Pontiac	C16 - 5/8 Pontiac Twp - Tributary of the Maple River	Box Culvert	Local	Minor	2023	\$240,000
	Pontiac	5/6 Pontiac Twp - Tributary of the Maple River	Box Culvert	Local	Minor	2023	\$175,000
5	Gill	C5 - 34/35 Gill Twp	Box Culvert	Local	Minor	2023	\$250,000
							COUNTY FORCES STRUCTURES = \$730,000
	Clifton	3/10 Clifton Township on Maple River	Box Culvert	Local	Minor	2023	\$1,600,000
6	Stanley	C6 - 6 Stanley/32 Barnes Twps - Sheyenne River	Bridge Replacement	Local	Major	2023	\$2,463,067
	Everest & Durbin	1 Everest/6 Durbin Townships - Swan Creek	Box Culvert	Local	Major	2023	\$250,000
17	Stanley	C17 - 5/6 Stanley Twp - Sheyenne River	Box Culvert	Local	Major	2023	\$1,800,000
22	Raymond	C22 - 6/7 Raymond Twp - Rush River	Bridge Replacement	Local	Major	2023	\$1,000,000
							CONTRACTED STRUCTURES = \$7,113,067
							TOTAL STRUCTURES = \$7,843,067
	Howes	25/26 Howes Twp	Box Culvert	Local	Minor	2024	\$125,000
	Wheatland	11/12 N Wheatland Twp	Box Culvert	Local	Major	2024	\$250,000
	Wheatland	11/12 S Wheatland Twp	Box Culvert	Local	Major	2024	\$250,000
	Wheatland/Empire	3 Wheatland/35 Empire	Box Culvert	Local	Major	2024	\$300,000
							COUNTY FORCES STRUCTURES = \$925,000
	Normanna	34/35 Normanna Twp	Bridge Replacement	Local	Major	2024	\$1,800,000
6	Clifton	C6 - 15/22 Clifton Township - Maple River	Bridge Replacement	Federal	Major	2024	\$2,000,000
	Tower	34/35 Tower Township on Maple River	Box Culvert	Local	Major	2024	\$750,000
							CONTRACTED STRUCTURES = \$4,550,000
							TOTAL STRUCTURES = \$5,475,000
	Hunter	33/34 Hunter Twp - Elm River Trib.	Box Culvert	Local	Minor	2025	\$150,000
	Kinyon/Noble	1 Kinyon/6 Noble Drain 16	Box Culvert	Local	Minor	2025	\$125,000
	Hunter	21/22 Hunter	Box Culvert	Local	Major	2025	\$350,000
	Highland	23/26 Highland	Box Culvert	Local	Minor	2025	\$250,000
							COUNTY FORCES STRUCTURES = \$875,000
	Hunter	22/23 Hunter	Box Culvert	Local	Major	2025	\$500,000
	Rush River	29/32 Rush River	Bridge Replacement	Local	Major	2025	\$1,300,000
							CONTRACTED STRUCTURES = \$1,800,000
							TOTAL STRUCTURES = \$2,675,000
32	Cornell/Tower	C32 - 36 Cornell/2 Tower - East Structure - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
32	Cornell/Tower	C32 - 36 Cornell/2 Tower - West Structure - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
	Wheatland	30/31 Wheatland Twp - Buffalo Creek Trib.	Box Culvert	Local	Major	2026	\$100,000
	Howes	16/21 Howes - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
							COUNTY FORCES STRUCTURES = \$400,000
	Cornell	10/15 Cornell - Dr 46	Box Culvert	Local	Major	2026	\$450,000
	Cornell	15/22 Cornell - Dr. 46	Box Culvert	Local	Major	2026	\$450,000
	Tower	2/3 Tower Twp on Maple River	Box Culvert	Local	Major	2026	\$750,000
10	Raymond & Mapleton	C10 - 34 Raymond/3 Mapleton - Dr 14	Box Culvert	Local	Major	2026	\$400,000
	Harwood	29 Harwood Twp - Rush River	Box Culvert	Local	Major	2026	\$200,000
	Harwood	29/30 Harwood Twp - Rush River	Box Culvert	Local	Major	2026	\$200,000
							CONTRACTED STRUCTURES = \$2,450,000
							TOTAL STRUCTURES = \$2,850,000
5	Empire	34/35 Empire - South	Box Culvert	Local	Minor	2027	\$125,000
5	Empire	34/35 Empire - North	Box Culvert	Local	Minor	2027	\$125,000
34	Gardner & Wisner	25 Gardner/30 Wisner Twp - Dr 26	Box Culvert	Local	Minor	2027	\$100,000
	Durbin	25/36 Durbin	Box Culvert	Local	Minor	2027	\$100,000
	Everest	11/12 Everest	Box Culvert	Local	Major	2027	\$100,000
							COUNTY FORCES STRUCTURES = \$550,000
	Everest	28/29 Everest	Box Culvert	Local	Major	2027	\$250,000
	Rush River	32/33 Rush River	Bridge Replacement	Local	Major	2027	\$1,300,000
32	Amenia	C32 - 22/27 Amenias Twp - Rush River	Bridge Replacement	Local	Major	2027	\$1,600,000
5	Wheatland	15/16 Wheatland	Box Culvert	Local	Major	2027	\$250,000
5	Erie	27/28 Erie	Box Culvert	Local	Minor	2027	\$225,000
	Wheatland	10/11 Wheatland	Box Culvert	Local	Major	2027	\$225,000
							CONTRACTED STRUCTURES = \$3,850,000
							TOTAL STRUCTURES = \$4,400,000
							5 YEAR COUNTY FORCES STRUCTURES = \$3,480,000
							5 YEAR CONTRACTED STRUCTURE TOTAL = \$19,763,067
							5 YEAR STRUCTURE TOTAL = \$23,243,067

2023-2027 Revenues vs Project Costs

Table 8 illustrates the revenue stream and estimated costs of the 2023-2027 Plan. Appendix 2 and 3 illustrate the proposed capital improvements over the 2023-2027 period.

<i>Table 8 - Revenue vs. Project Costs</i>					
Revenue Description	2023	2024	2025	2026	2027
Property Tax	\$10,800,000	\$11,448,000	\$12,134,880	\$12,862,973	\$13,634,751
Highway Distribution Tax	\$9,600,000	\$9,888,000	\$10,184,640	\$10,490,179	\$10,804,885
Prairie Dog Funding Bill	\$6,534,486	\$0	\$6,534,486	\$0	\$6,534,486
Other	\$300,000	\$0	\$0	\$0	\$0
Total Revenues	\$27,234,486	\$21,336,000	\$28,854,006	\$23,353,152	\$30,974,122
Federal Aid Highway Funding	\$0	\$0	\$6,700,000	\$0	\$0
Federal Aid Bridge Funding	\$0	\$1,600,000	\$0	\$0	\$0
Total Revenues & Federal Aid	\$27,234,486	\$22,936,000	\$35,554,006	\$23,353,152	\$30,974,122
Total Operating Cost (not including Road/Bridge Projects)	\$6,000,000	\$6,120,000	\$6,242,400	\$6,367,248	\$6,494,593
Total Available for Road/Bridge Projects	\$21,234,486	\$16,816,000	\$29,311,606	\$16,985,904	\$24,479,529
Total Highway Project Costs	\$5,885,220	\$17,050,000	\$20,625,000	\$9,600,000	\$18,015,000
County Bridge Project Costs	\$7,843,067	\$5,475,000	\$2,675,000	\$2,850,000	\$4,400,000
Chipseal, Crackseal, Striping, Reshaping, Subgrade Repair & Drain tile	\$4,300,000	\$500,000	\$4,779,445	\$2,116,853	\$3,425,000
Total Project Costs	\$18,028,287	\$23,025,000	\$28,079,445	\$14,566,853	\$25,840,000
Differences (Revenues-Costs)	\$3,206,199	-\$6,209,000	\$1,232,161	\$2,419,051	-\$1,360,471

Appendix 1

**2023 - 2027
5 Year Capital Improvement Plan
Proposed Highway Projects**

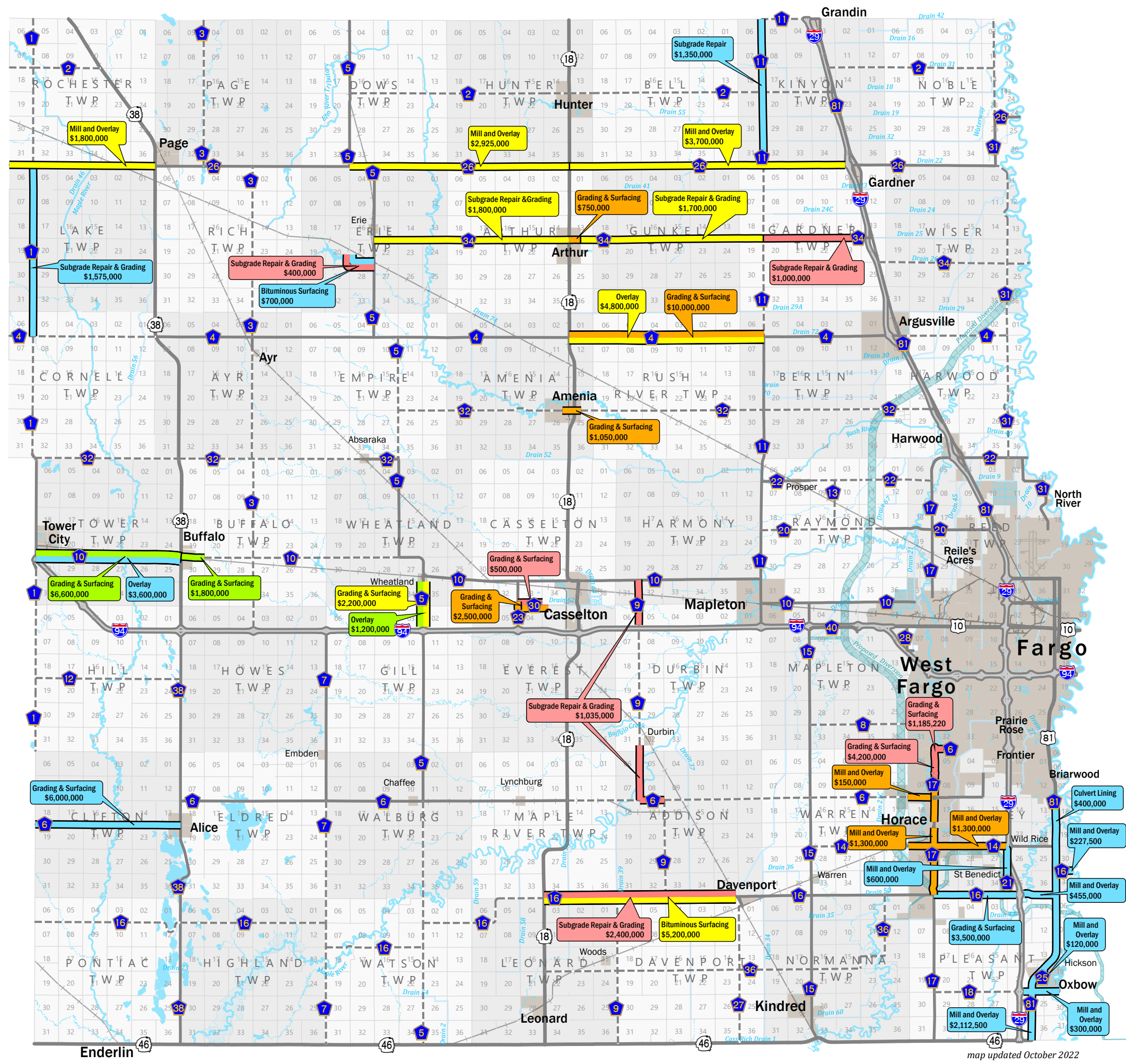
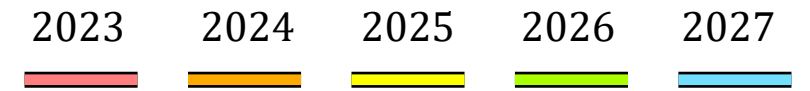


TABLE 5 - PROPOSED HIGHWAY IMPROVEMENTS

HWY	LOCATION	PROJECT TYPE	FUNDING	YEAR	COST
6	Hwys 6 & 17 Roundabout & E 1,800' on Hwy 6	Grading & Surfacing	Local	2023	\$1,185,220
17	52nd Ave S to 68th Ave S	Grading & Surfacing	Local	2023	\$4,200,000
30	C30 - Soybean Crushing Plant - Access Road	Grading & Surfacing	Local	2023	\$500,000
6 & 9	C6 - I94 to Hwy 10, C9N to C9S & C9 2 Mi N of C6	Subgrade Repair & Grading	Local	2023	\$1,035,000
34	Hwy 11 to I29	Subgrade Repair & Grading	Local	2023	\$1,000,000
16	State Hwy 18 to Davenport	Subgrade Repair & Grading	Local	2023	\$2,400,000
	Brewer Lake Park Road	Subgrade Repair & Grading	Local	2023	\$400,000
4	State Hwy 18 to Hwy 11	Grading & Surfacing	Local	2024	\$10,000,000
23 & 30	Hwy 11 E 1.25 Miles	Grading & Surfacing	Local	2024	\$2,500,000
6	Sheyenne Diversion to Hwy 17	Mill and Overlay	Local	2024	\$150,000
14	Sheyenne River to I29	Mill and Overlay	Local	2024	\$1,300,000
17	68th Ave S to Horace & Horace to Hwy 16	Mill and Overlay	Local	2024	\$1,300,000
32	State Hwy 18 West 0.5 Mile through Amenia & East 0.25 Mile	Grading & Surfacing	Local	2024	\$1,050,000
34	State Hwy 18 to 0.5 Mile East	Grading & Surfacing	Local	2024	\$750,000
5	Wheatland to I94	Grading & Surfacing	Local	2025	\$2,200,000
16	State Hwy 18 to Davenport	Bituminous Surfacing	Local	2025	\$5,200,000
26	Barnes Co. Line to ST Hwy 38	Mill and Overlay	Local	2025	\$1,800,000
26	Hwy 5 North to State Hwy 18	Mill and Overlay	Federal	2025	\$2,925,000
26	State Hwy 18 to I29	Mill and Overlay	Federal	2025	\$3,700,000
4	State Hwy 18 to Hwy 11	Overlay	Local	2025	\$4,800,000
34	Half a Mile East of State 18 to Hwy 11	Subgrade Repair & Grading	Local	2024	\$1,700,000
34	Hwy 5 to State Hwy 18	Subgrade Repair & Grading	Local	2025	\$1,800,000
5	Wheatland to I94	Overlay	Local	2026	\$1,200,000
10	Hwy 1 to State Hwy 38	Grading & Surfacing	Local	2026	\$6,600,000
10	State Hwy 38 through Buffalo 1 Mile East	Grading & Surfacing	Local	2026	\$1,800,000
	Brewer Lake Park Road	Bituminous Surfacing	Local	2027	\$700,000
6	Barnes Co Line to Hwy 38	Grading & Surfacing	Local	2027	\$6,000,000
1	Hwy 4 to Hwy 26	Subgrade Repair & Grading	Local	2027	\$1,575,000
11	Hwy 26 North 6 Miles	Subgrade Repair	Local	2027	\$1,350,000
81	76th Ave S to Hwy 16 W	Culvert Lining	Local	2027	\$400,000
16	Hwy 17 to I29	Grading & Surfacing	Local	2027	\$3,500,000
16	I29 to Hwy 81	Mill and Overlay	Local	2027	\$455,000
16	Hwy 81 to Red River	Mill and Overlay	Local	2027	\$227,500
18	I29 to Red River	Mill and Overlay	Local	2027	\$300,000
21	Hwy 14 to Hwy 16	Mill and Overlay	Local	2027	\$600,000
25	Hwy 81 through Hickson	Mill and Overlay	Local	2027	\$120,000
81	Hwy 16 W to State Hwy 46	Mill and Overlay	Local	2027	\$2,112,500
10	Hwy 1 to State Hwy 38	Overlay	Local	2027	\$3,600,000

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

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Appendix 2

**2023 - 2027
5 Year Capital Improvement Plan
Proposed Structure Projects**

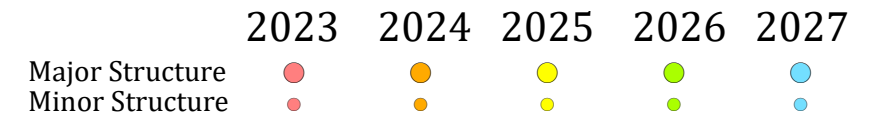
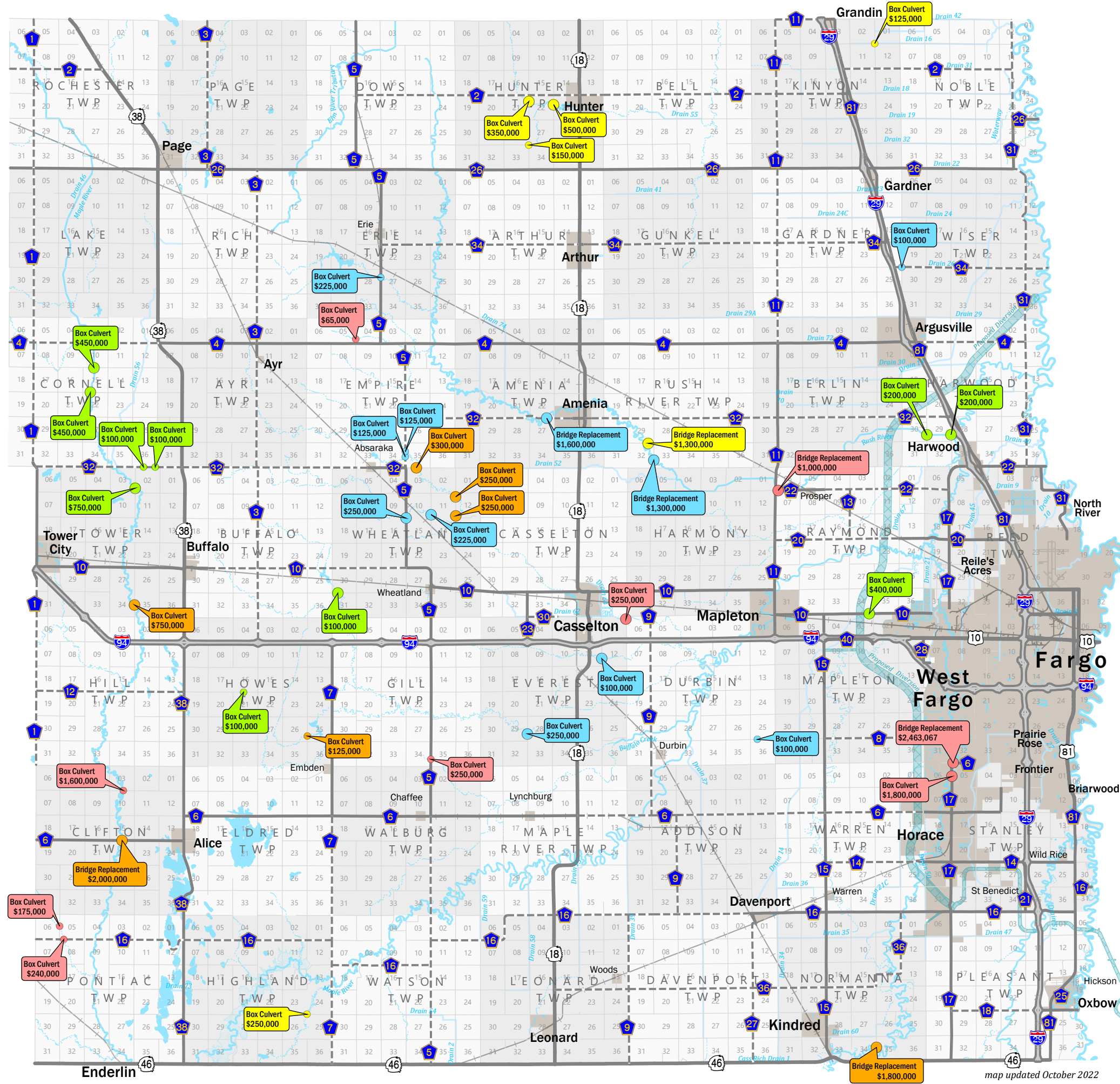


TABLE 7 - PROPOSED BRIDGE IMPROVEMENTS

HWY	LOCATION	PROJECT TYPE	FUNDING	STRUCTURE TYPE	YEAR	COST
	4/5 Empire Township on Tributary of the Rush River	Box Culvert	Local	Minor	2023	\$65,000
16	C16 - 5/8 Pontiac Twp - Tributary of the Maple River	Box Culvert	Local	Minor	2023	\$240,000
	5/6 Pontiac Twp - Tributary of the Maple River	Box Culvert	Local	Minor	2023	\$175,000
5	C5 - 34/35 Gill Twp	Box Culvert	Local	Minor	2023	\$250,000
	3/10 Clifton Township on Maple River	Box Culvert	Local	Minor	2023	\$1,600,000
6	C6 - 6 Stanley/32 Barnes Twps - Sheyenne River	Bridge Replacement	Local	Major	2023	\$2,463,067
	1 Everest/6 Durbin Townships - Swan Creek	Box Culvert	Local	Major	2023	\$250,000
17	C17 - 5/6 Stanley Twp - Sheyenne River	Box Culvert	Local	Major	2023	\$1,800,000
22	C22 - 6/7 Raymond Twp - Rush River	Bridge Replacement	Local	Major	2023	\$1,000,000
	25/26 Howes Twp	Box Culvert	Local	Minor	2024	\$125,000
	11/12 N Wheatland Twp	Box Culvert	Local	Major	2024	\$250,000
	11/12 S Wheatland Twp	Box Culvert	Local	Major	2024	\$250,000
	3 Wheatland/35 Empire	Box Culvert	Local	Major	2024	\$300,000
	34/35 Normanna Twp	Bridge Replacement	Local	Major	2024	\$1,800,000
6	C6 - 15/22 Clifton Township - Maple River	Bridge Replacement	Local	Major	2024	\$2,000,000
	34/35 Tower Township on Maple River	Box Culvert	Local	Major	2024	\$750,000
	33/34 Hunter Twp - Elm River Trib.	Box Culvert	Local	Minor	2025	\$150,000
	1/2 Kinyon Drain 16	Box Culvert	Local	Minor	2025	\$125,000
	21/22 Hunter	Box Culvert	Local	Major	2025	\$350,000
	23/26 Highland	Box Culvert	Local	Minor	2025	\$250,000
	22/23 Hunter	Box Culvert	Local	Major	2025	\$500,000
	29/32 Rush River	Bridge Replacement	Local	Major	2025	\$1,300,000
32	C32 - 36 Cornell/2 Tower - East Structure - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
32	C32 - 36 Cornell/2 Tower - West Structure - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
	30/31 Wheatland Twp - Buffalo Creek Trib.	Box Culvert	Local	Major	2026	\$100,000
	16/21 Howes - Maple R Branch	Box Culvert	Local	Minor	2026	\$100,000
	10/15 Cornell - Dr 46	Box Culvert	Local	Major	2026	\$450,000
	15/22 Cornell - Dr 46	Box Culvert	Local	Major	2026	\$450,000
	2/3 Tower Twp on Maple River	Box Culvert	Local	Major	2026	\$750,000
10	C10 - 34 Raymond/3 Mapleton - Dr 14	Box Culvert	Local	Major	2026	\$400,000
	29 Harwood Twp - Rush River	Box Culvert	Local	Major	2026	\$200,000
	29/30 Harwood Twp - Rush River	Box Culvert	Local	Major	2026	\$200,000
5	34/35 Empire - South	Box Culvert	Local	Minor	2027	\$125,000
5	34/35 Empire - North	Box Culvert	Local	Minor	2027	\$125,000
34	25 Gardner/30 Wiser Twp - Dr 26	Box Culvert	Local	Minor	2027	\$100,000
	25/36 Durbin	Box Culvert	Local	Minor	2027	\$100,000
	11/12 Everest	Box Culvert	Local	Major	2027	\$100,000
	28/29 Everest	Box Culvert	Local	Major	2027	\$250,000
	32/33 Rush River	Bridge Replacement	Local	Major	2027	\$1,300,000
32	C32 - 22/27 Amenia Twp - Rush River	Bridge Replacement	Local	Major	2027	\$1,600,000
5	15/16 Wheatland	Box Culvert	Local	Major	2027	\$250,000
5	27/28 Erie	Box Culvert	Local	Minor	2027	\$225,000
	10/11 Wheatland	Box Culvert	Local	Major	2027	\$225,000

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



map updated October 2022

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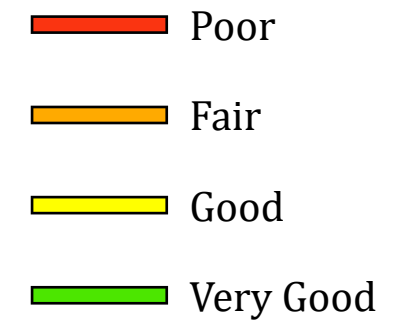
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Appendix 3

Pavement Condition Index (PCI) 2017 Testing Results



PCI	Paved Miles	% of Paved Miles
not measured/unknown	3.46	1.12%
Poor PCI 0 - 65	0	0%
Fair PCI 66 - 80	7	2.27%
Good PCI 81 - 90	145.5	47.06%
Very Good PCI 91 - 100	153.3	49.58%

Total Paved Miles: 309.2

Average PCI*: 91.37
**prorated per length*

Pavement Evaluation completed by American Engineering Testing in 2017. 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.

Roads reconstructed after 2017 have an assumed PCI value of 100.

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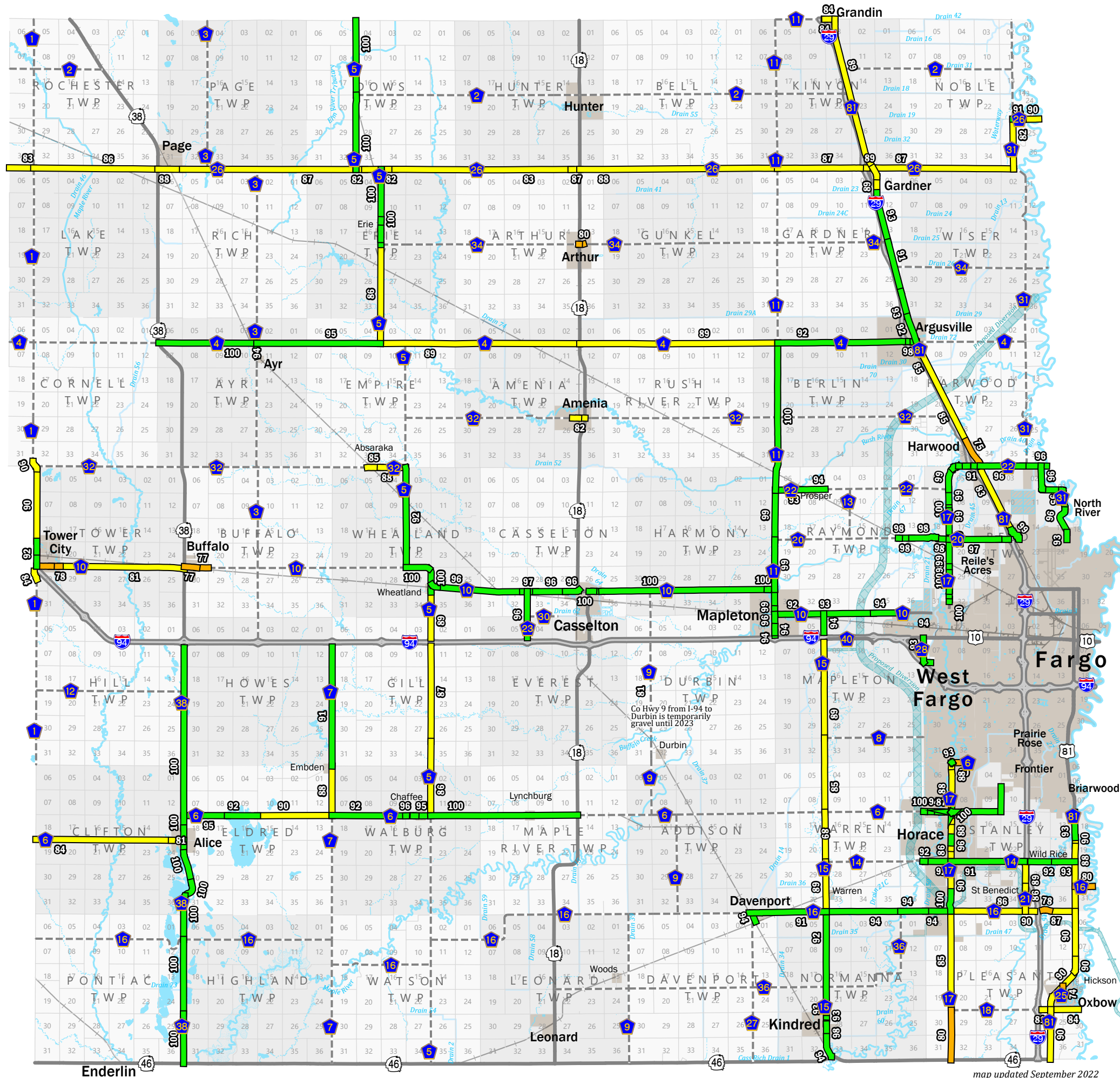
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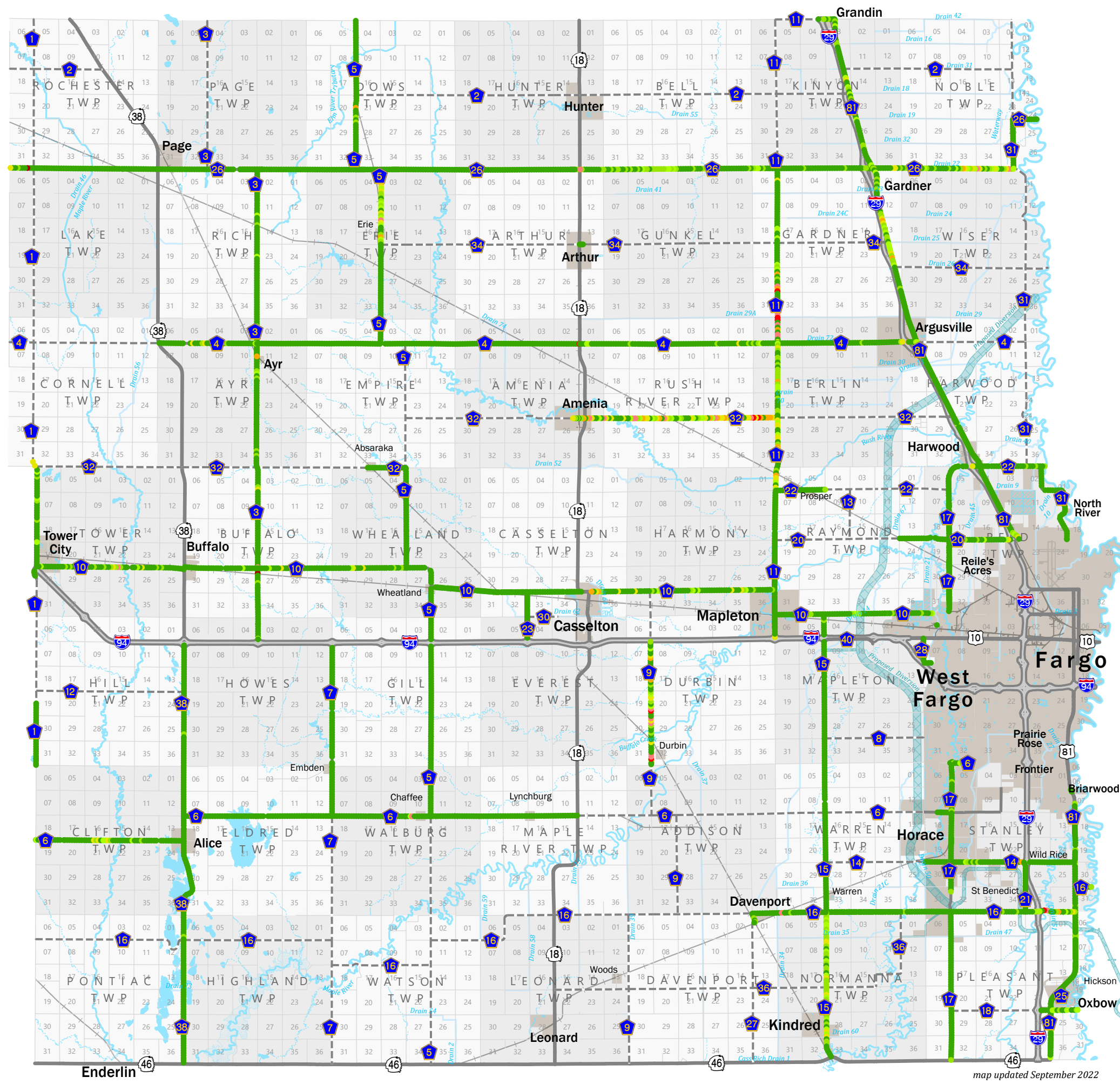
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Appendix 4

Highway Load Capacity 2017 Testing Results



Tons/Axle

- 3 (worst)
- 4
- 5
- 6
- 7
- 8
- 9
- 10 (best)

Pavement Evaluation completed by American Engineering Testing in 2017. 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.

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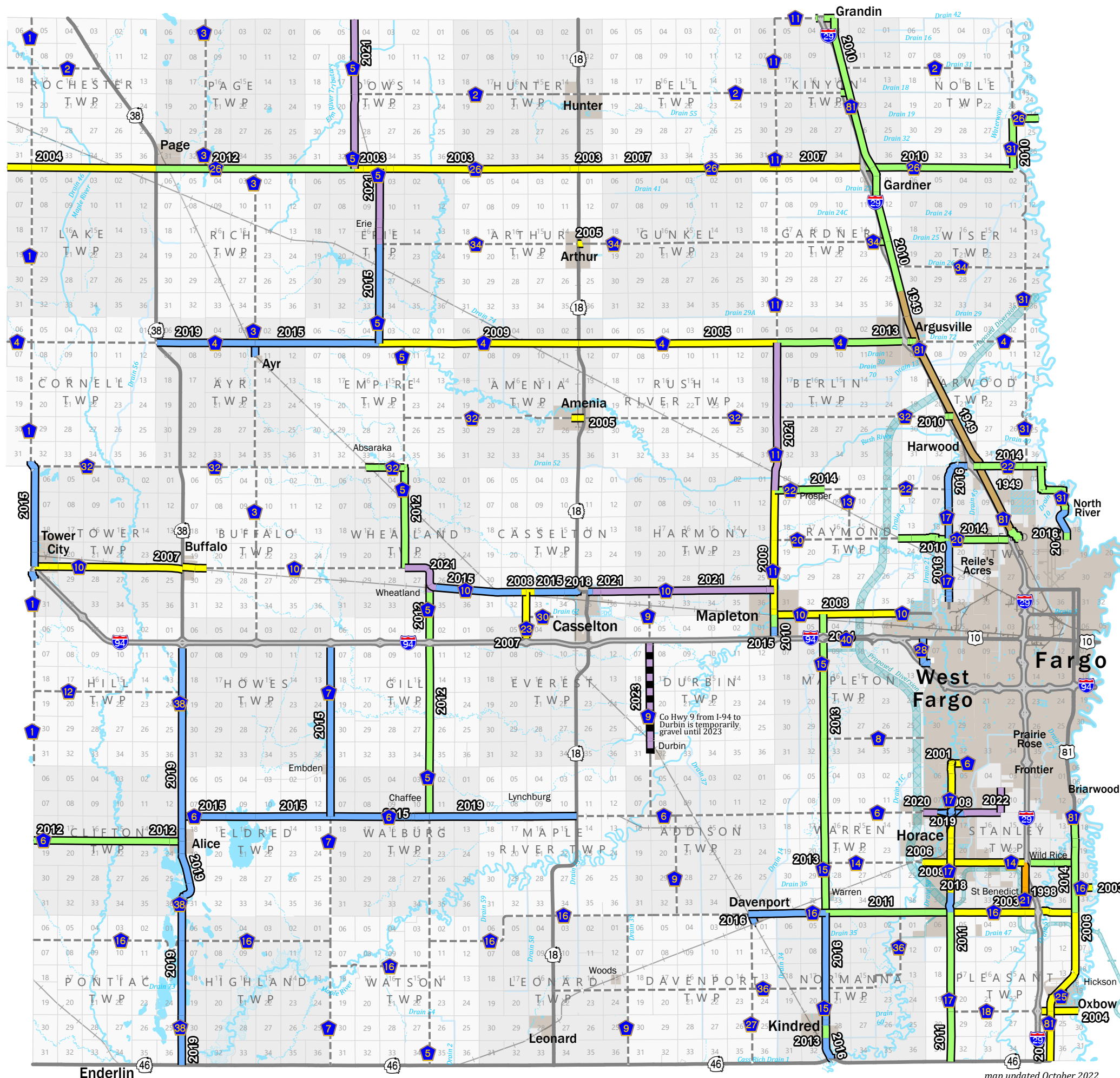
Appendix 5

Paving Projects

Year of Last Project

- 1949
- 1998
- 2000 - 2009
- 2010 - 2014
- 2015 - 2019
- 2020 - 2022
- 2023

Year	Miles	Average PCI per segment
1949	10.6	85.60
1998	2	87.50
2000 - 2009	86.2	87.70
2010 - 2014	97.9	91.50
2015 - 2019	82.7	96.30
2020 - 2022	27.5	100
2023	4.4	-



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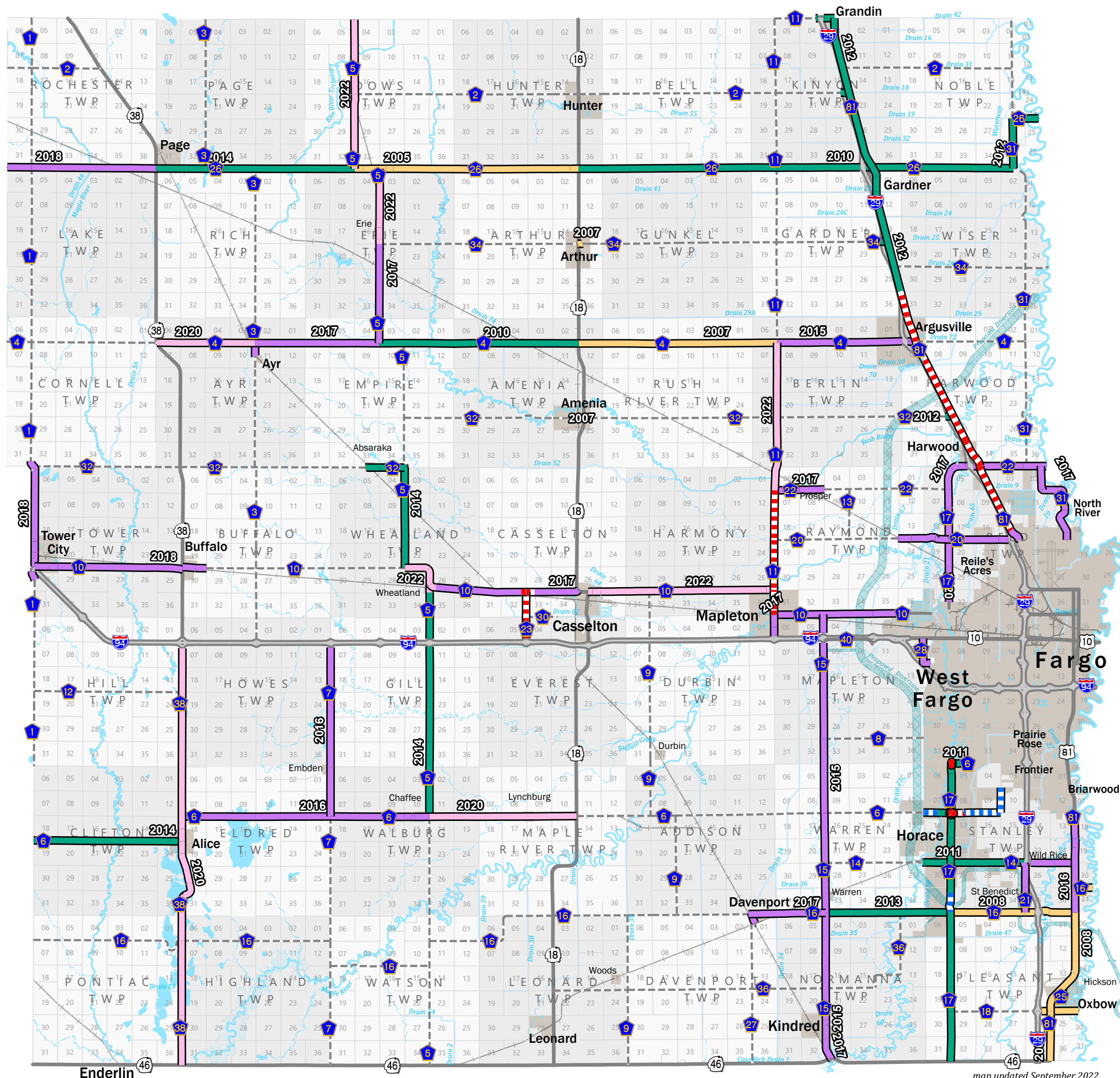
Appendix 6

Chip Seal Projects

Year of Last Project

- 2005 - 2009
- 2010 - 2014
- 2015 - 2019
- 2020 - 2022
- Asphalt - No Chip Seal
- Concrete - No Chip Seal

Year	Miles	Average PCI per segment
2005 - 2009	31.3	84.2
2010 - 2014	90.6	88.2
2015 - 2019	110.2	93.3
2020 - 2022	51.6	100
Asphalt - No Chip Seal	3.86	100
Concrete - No Chip Seal	19.6	94.8



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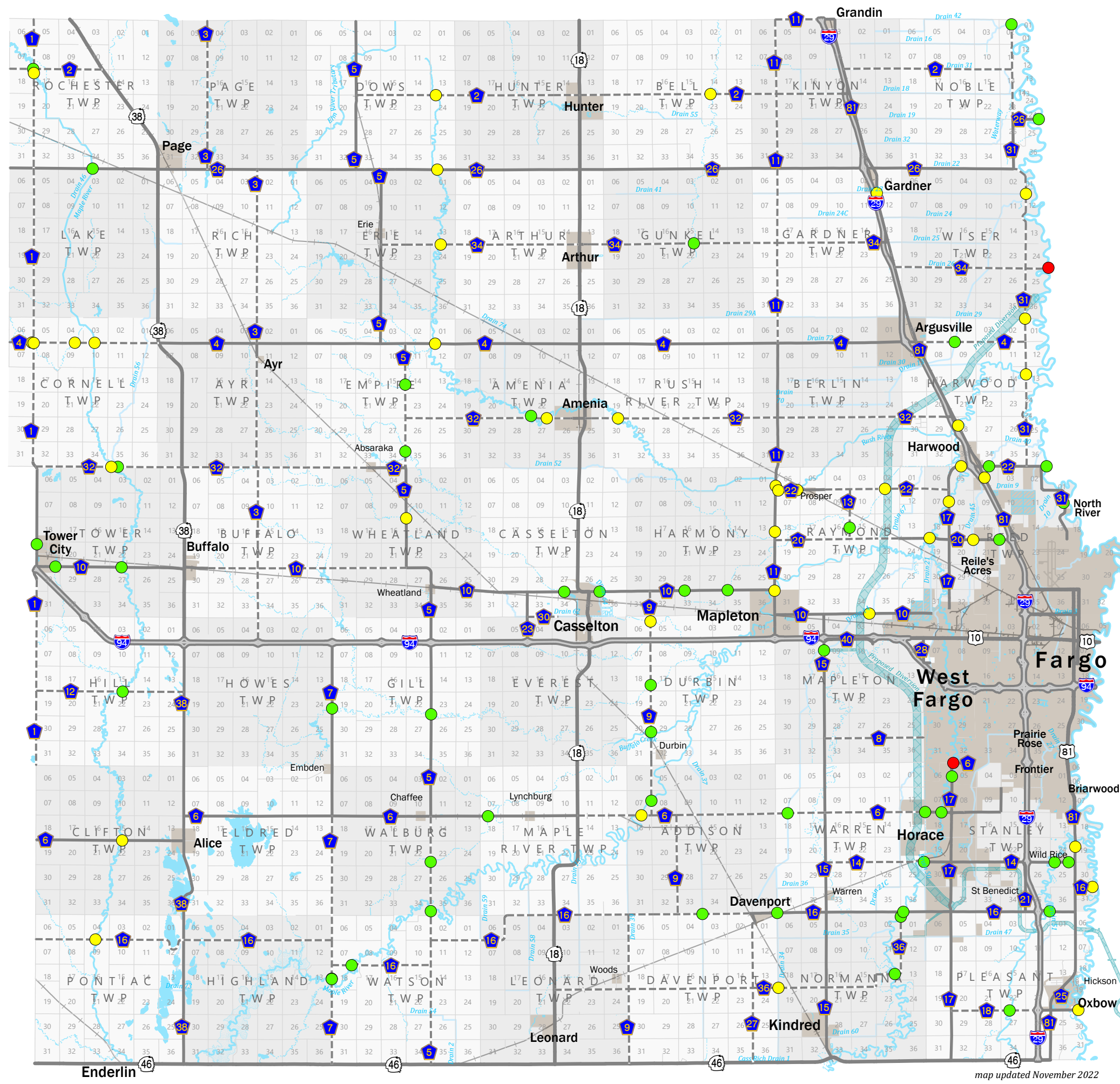
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Appendix 7

Bridges on County Roads: ND DOT 2021/2022 Bridge Inspection and Appraisal



Rating

- GOOD (49)
- FAIR (39)
- POOR (2)

Bridges constructed after testing have an assumed rating of good.

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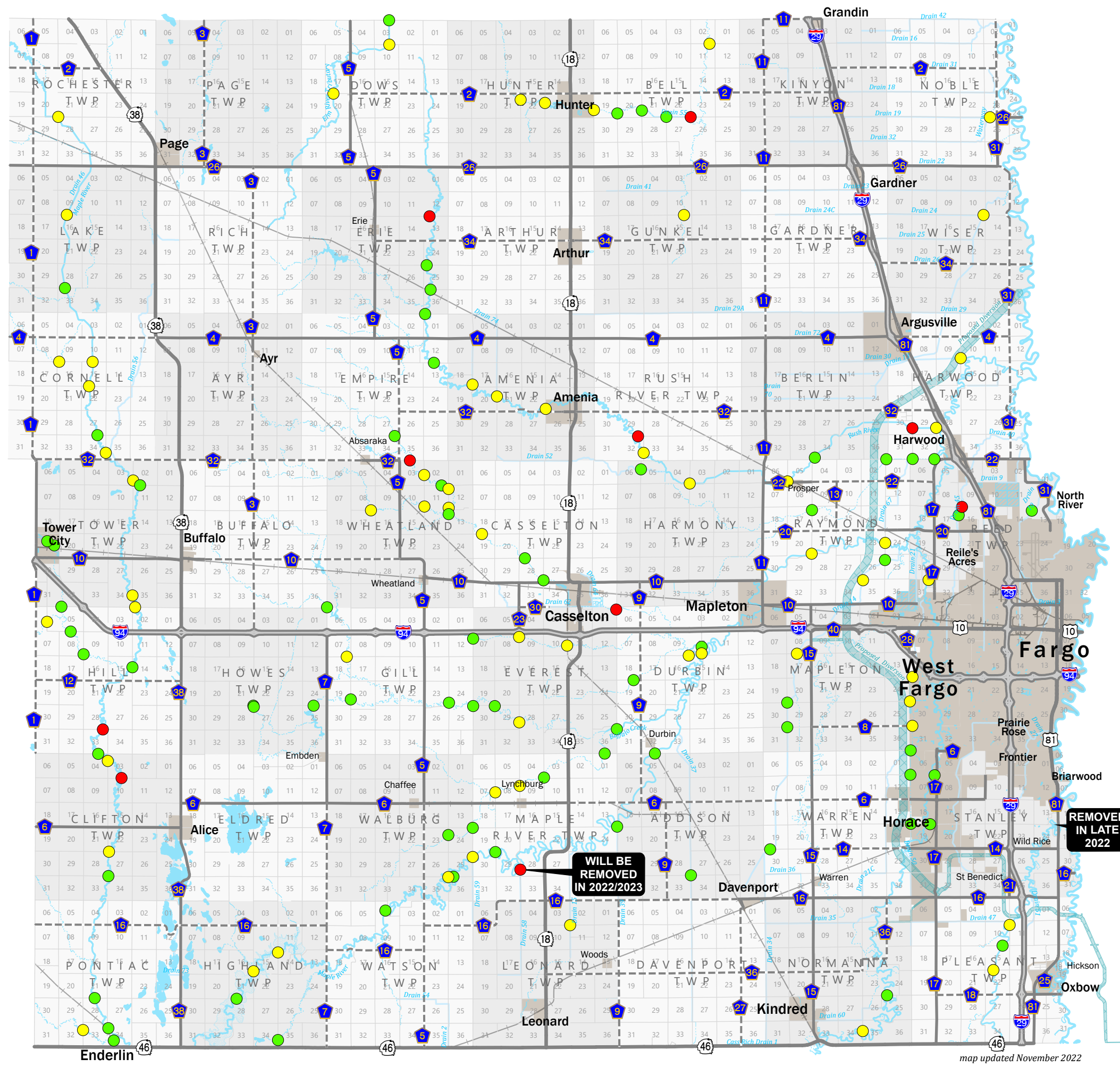
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Appendix 8

Bridges on Township Roads: ND DOT 2021/2022 Bridge Inspection and Appraisal

Rating

- GOOD (70)
- FAIR (60)
- POOR (10)



Bridges constructed after testing have an assumed rating of good.

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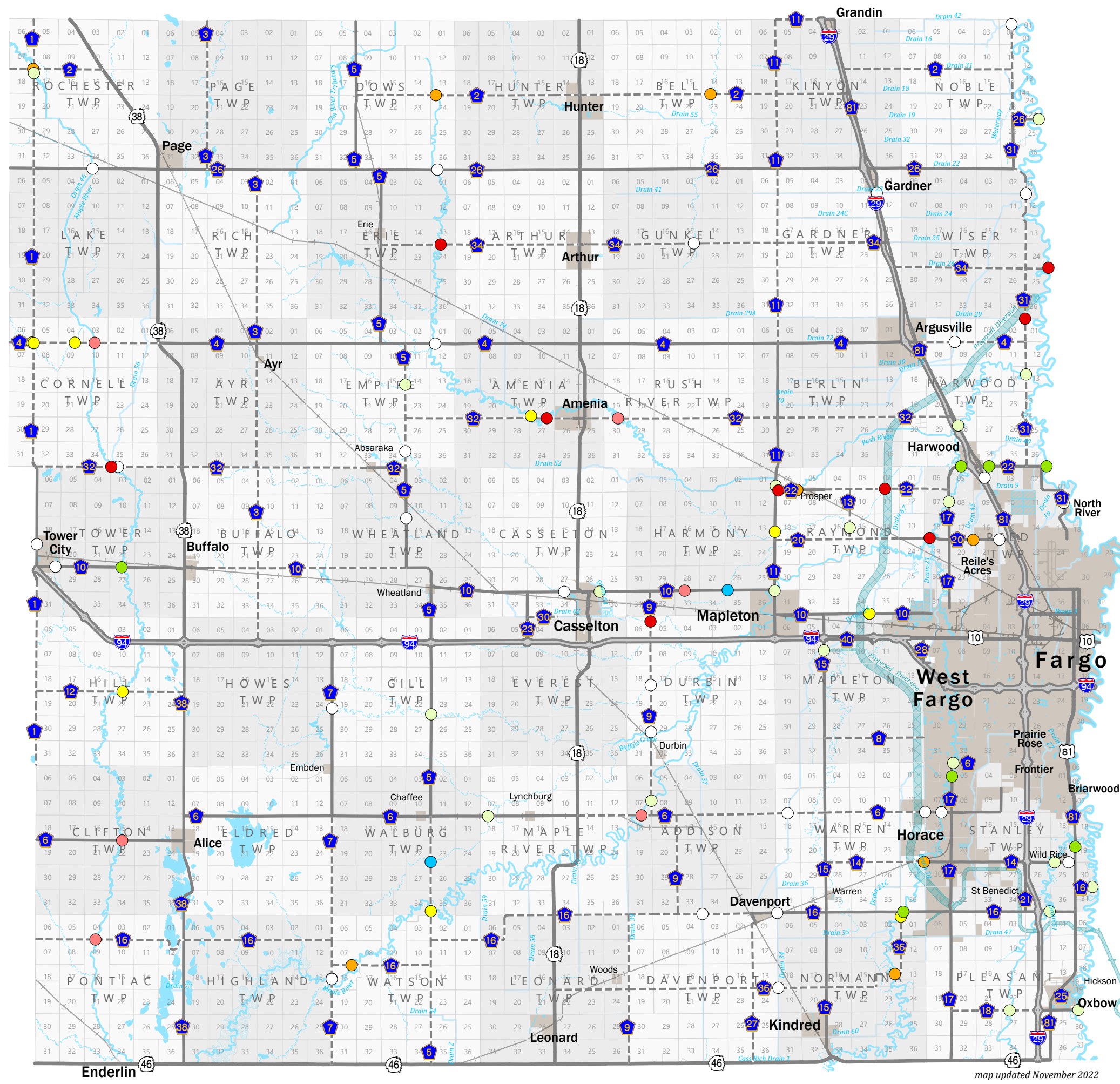
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Appendix 9

Bridges on County Roads: ND DOT 2019/2020 Structure Width

Structure Width

- culvert/no data (29)
- under 24' (9)
- 24' - 25.9' (6)
- 26' - 27.9' (8)
- 28' - 29.9' (9)
- 30' - 39.9' (20)
- 40' - 49.9' (7)
- 50' or more (2)



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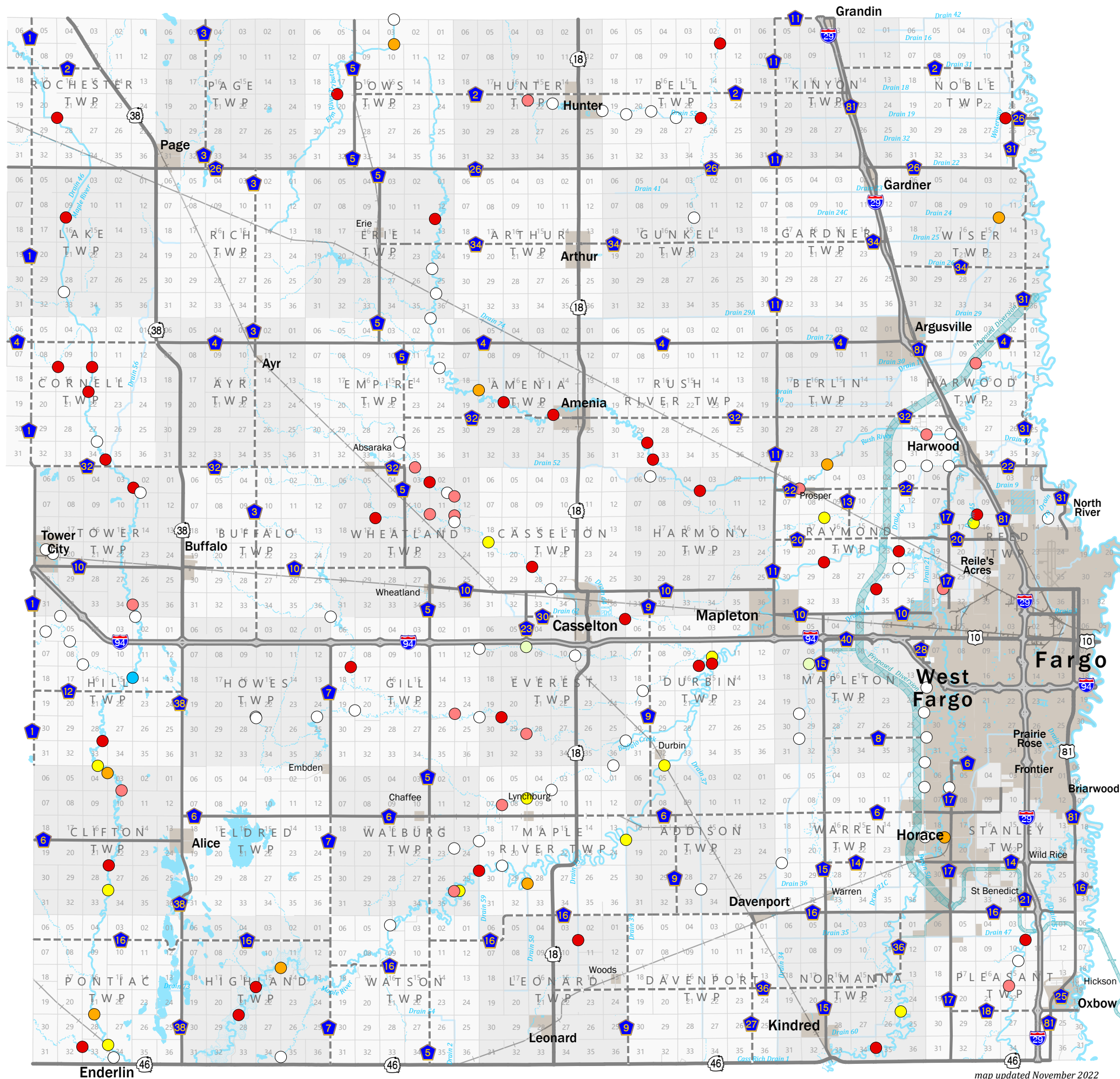
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Appendix 10

**Bridges on Township Roads:
ND DOT 2019/2020
Structure Width**

Structure Width

- culvert/no data (62)
- under 24' (38)
- 24' - 25.9' (16)
- 26' - 27.9' (9)
- 28' - 29.9' (12)
- 30' - 39.9' (2)
- 40' - 49.9' (0)
- 50' or more (1)



map updated November 2022

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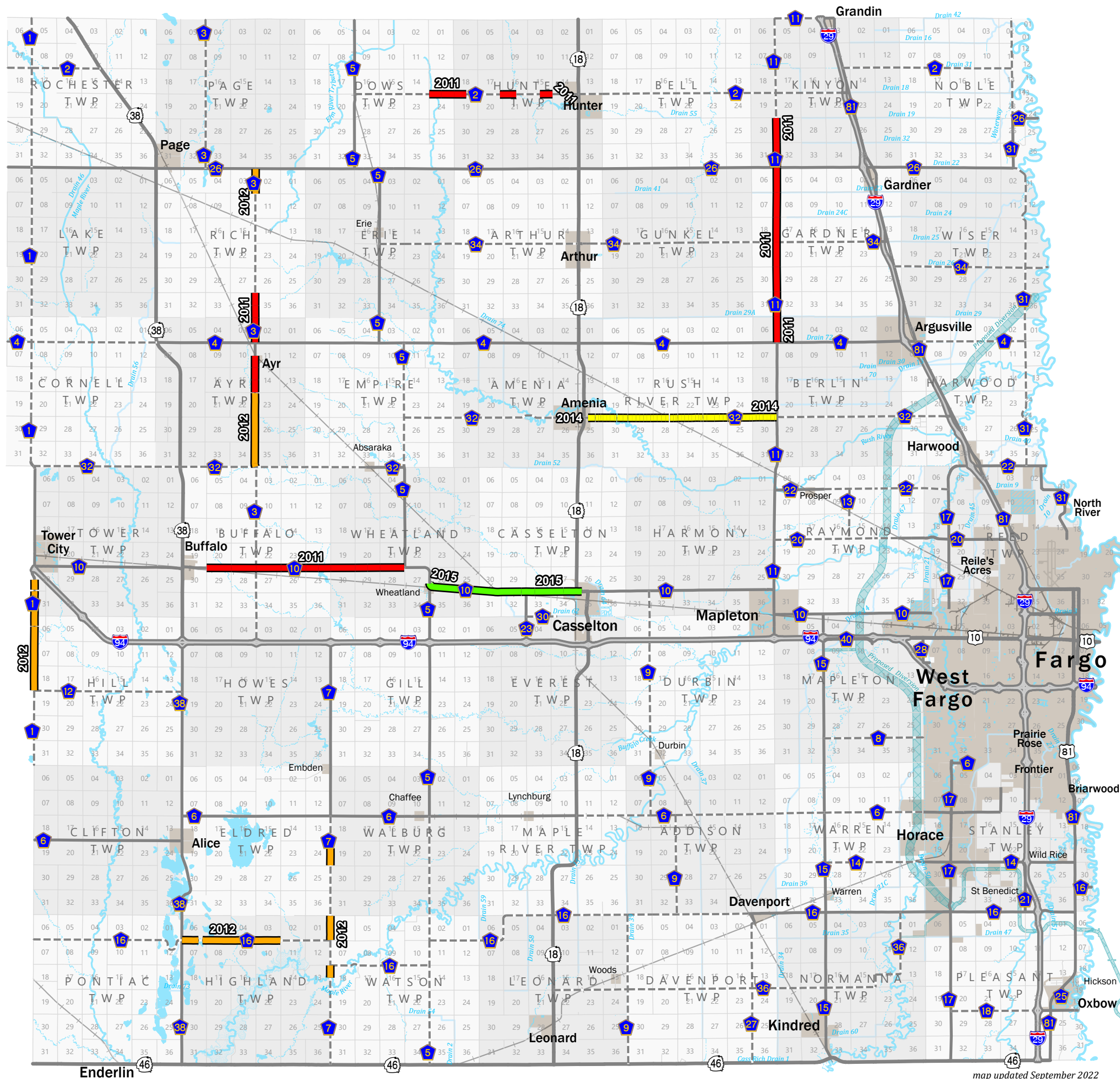
Appendix 11

Drain Tile Projects

Year of Last Project

- 2011
- 2012
- 2014
- 2015

Year	Miles
2011	23.07
2012	14.25
2014	7.45
2015	6.2
Total	50.97



map updated September 2022

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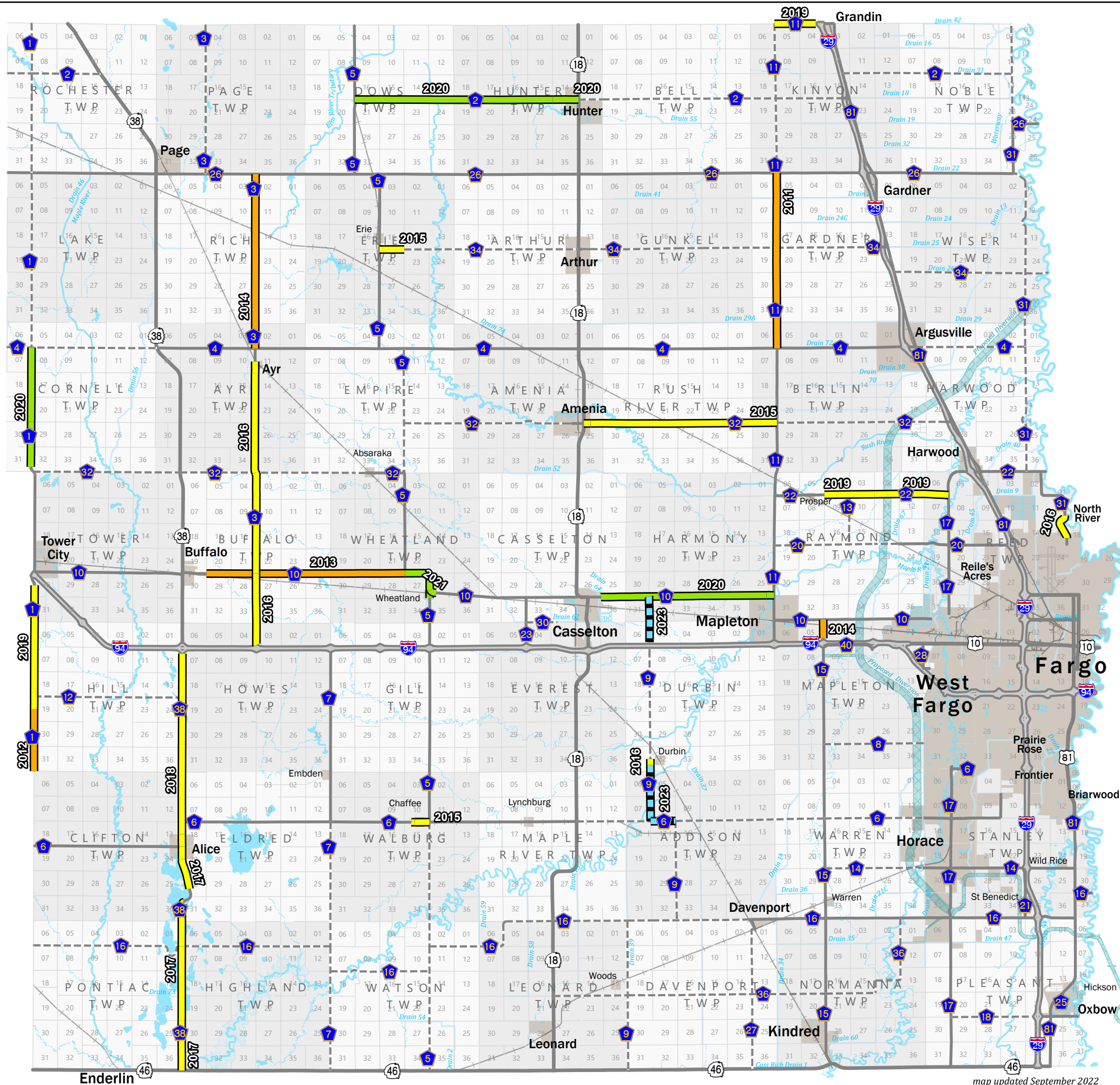
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Subgrade Repair Projects

Year of Last Project

- 2010 - 2014
- 2015 - 2019
- 2020 - 2022
- 2023

Year	Gravel Miles	Paved Miles	Total Miles
2010 - 2014	24.6	0.75	25.35
2015 - 2019	32.1	18.1	50.2
2020 - 2022	13.8	9.2	23
2023	5.1	0	5.1
Total	75.6	28.05	103.65



map updated September 2022

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Appendix 13

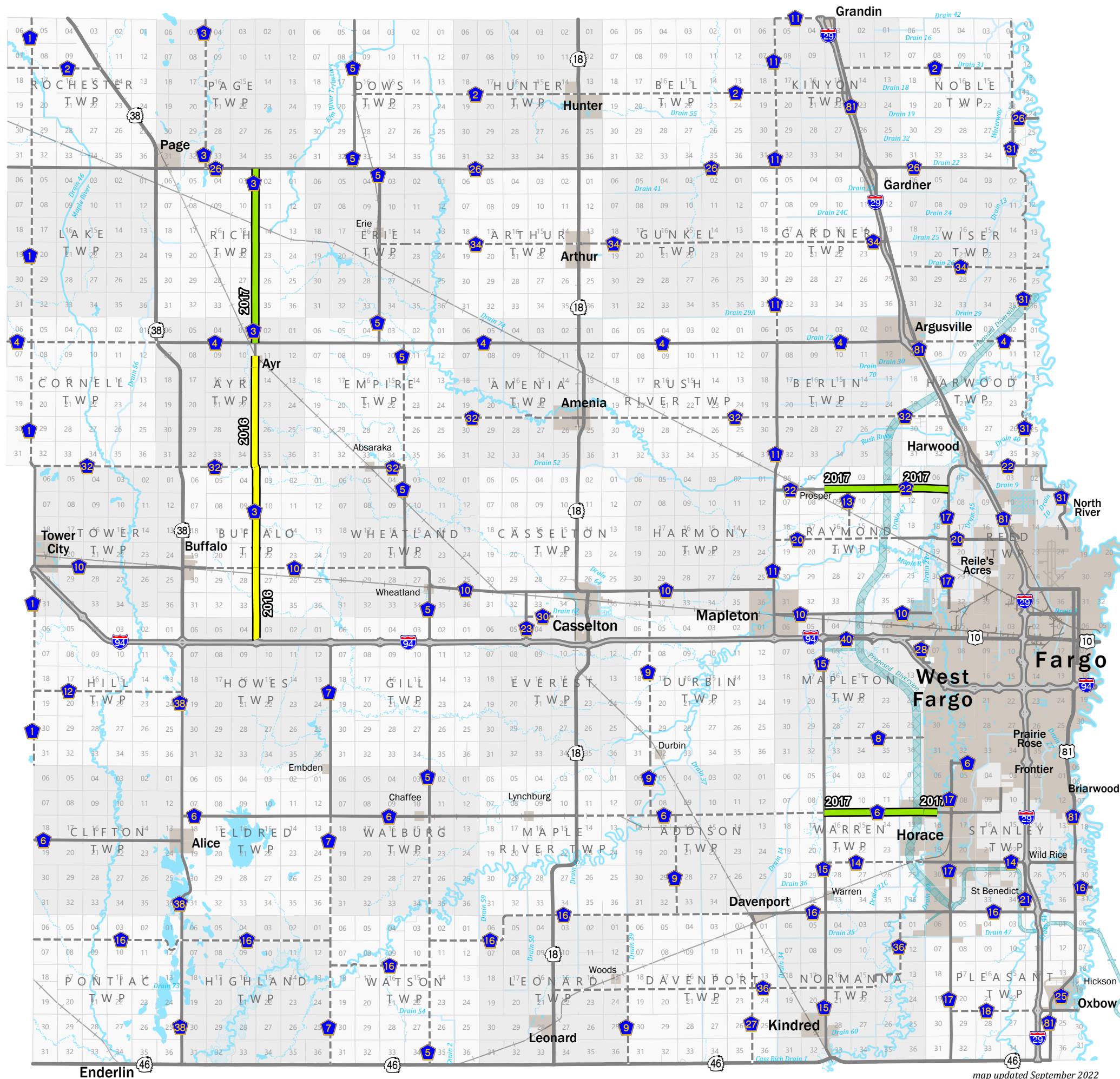
Gravel Stabilization Projects

Year of Last Project

2016

2017

Year	Miles
2016	11.42
2017	16.55
Total	27.97



map updated September 2022

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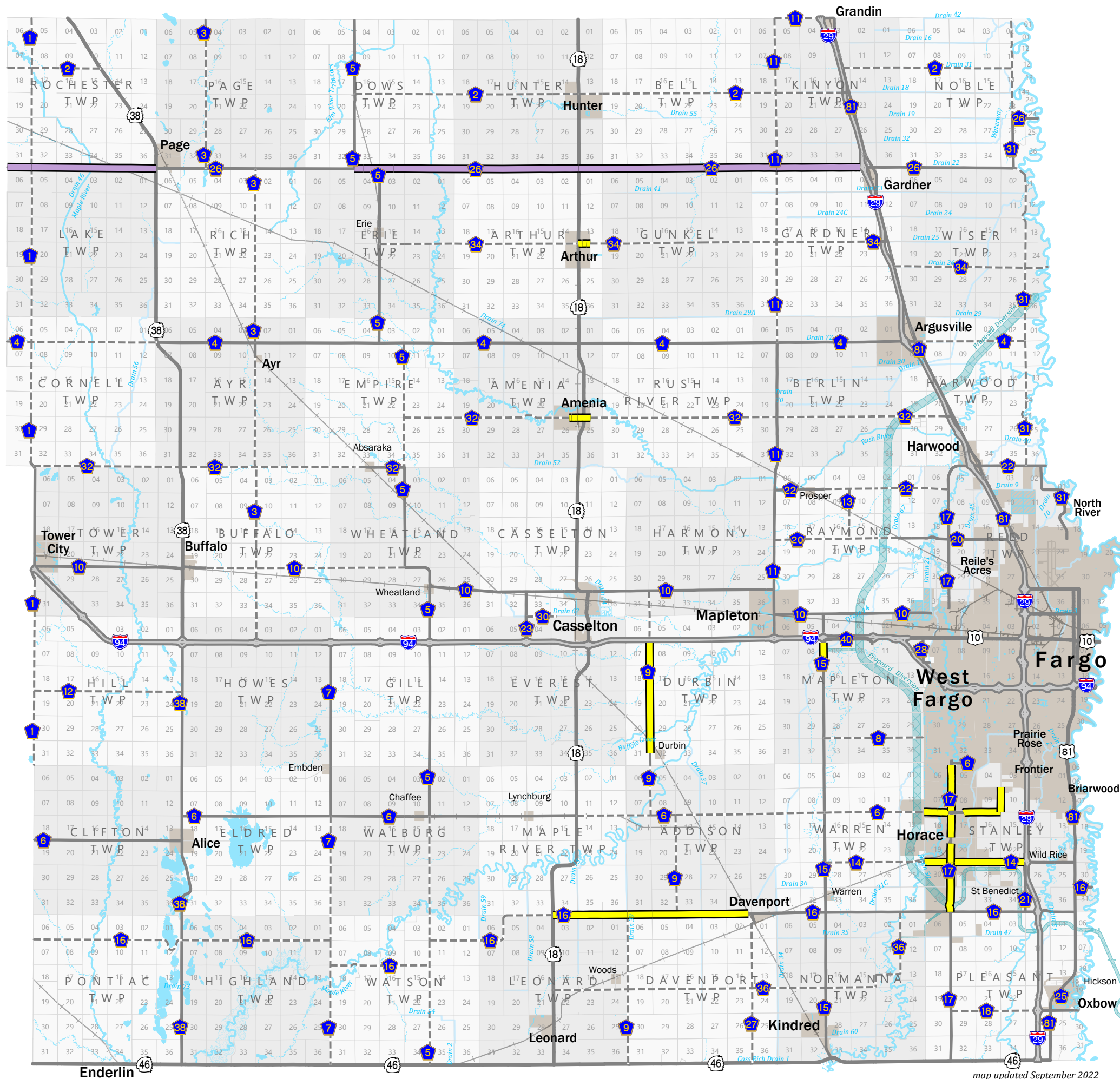


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Proposed Chip Seal Projects



2025 — 2027 —

Year	Miles
2025	27.5
2027	26.3
Total	53.8

map updated September 2022

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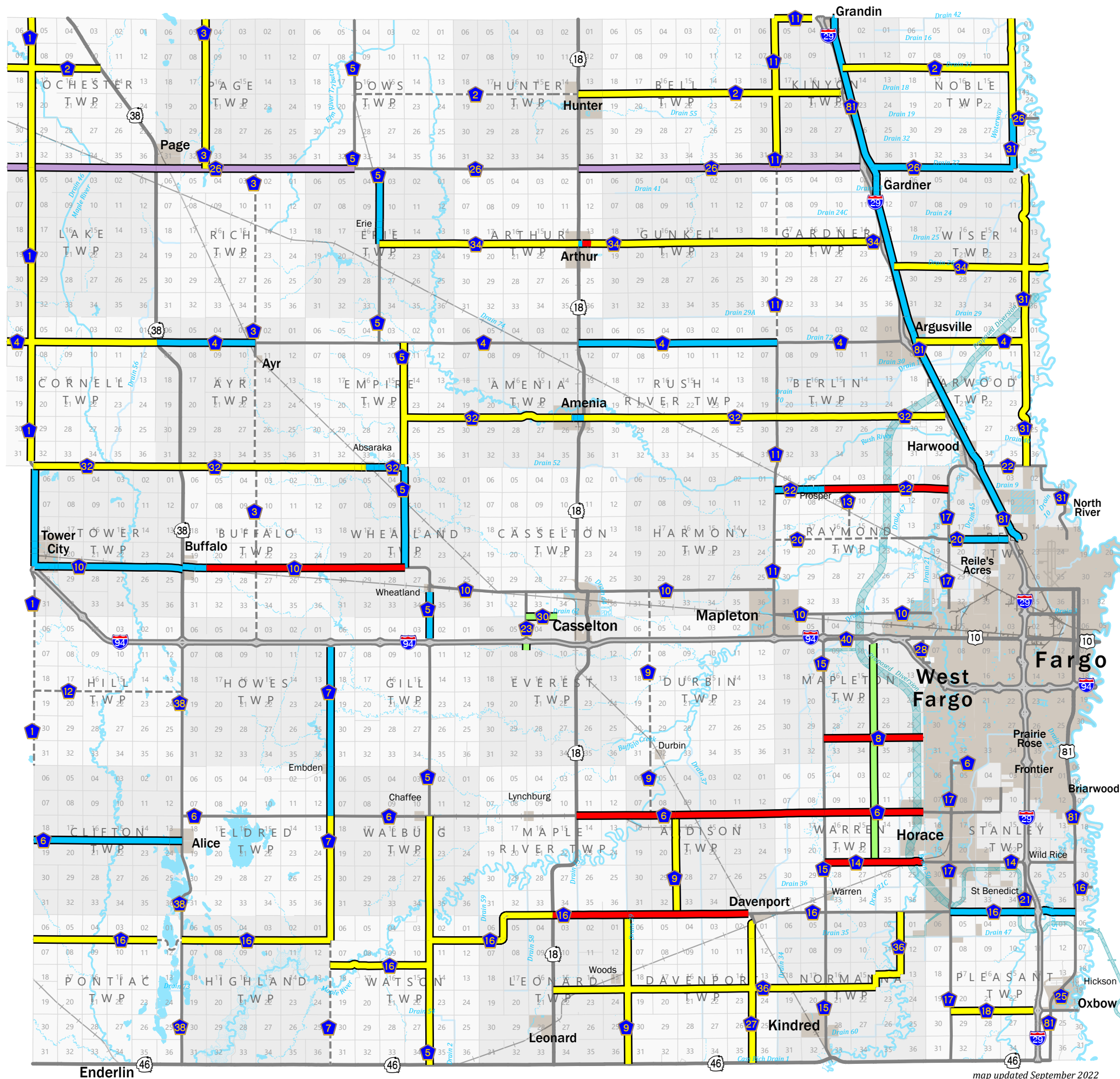


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Projected 30 Year Improvements



- Gravel - Needs Paving/Grading
- Gravel - Needs Reshaping
- Paved - Needs Widening
- Future County Highway
- Replace Culverts

Type of Improvement	Miles	Cost/Mile*	Estimated Total
Gravel - Needs Paving/Grading	43.1	\$1.5 Million	\$64.7 Million
Gravel - Needs Reshaping	216.1	\$225 K	\$48.6 Million
Paved - Needs Widening	86.1	\$1.5 Million	\$129.2 Million
Future County Highway	10.3	\$1.5 Million	\$15.5 Million
Replace Culverts	25.3	\$100 K	\$2.5 Million
		Total:	\$260.5 Million

**Cost per mile figures represent today's costs and do not take into account inflation.*

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Recommended Pavement Overlay

-  1.5 - 1.75 inch Mill and Overlay
-  1.5 - 1.75 inch Overlay
-  2 inch Mill and Overlay
-  2 inch Overlay
-  2.5 - 2.75 inch Mill and Overlay
-  2.5 - 2.75 inch Overlay
-  3 inch Overlay

Recommended Pavement Overlay*	Miles
1.5 - 1.75 inch Mill and Overlay	4.6
1.5 - 1.75 inch Overlay	47.3
2 inch Mill and Overlay	2.57
2 inch Overlay	0.82
2.5 - 2.75 inch Mill and Overlay	0.98
2.5 - 2.75 inch Overlay	9.6
3 inch Overlay	1.03
Total	66.9

* Recommended pavement overlay thickness needed to achieve a 10 tons/axle road (from American Engineering 2017 testing results)

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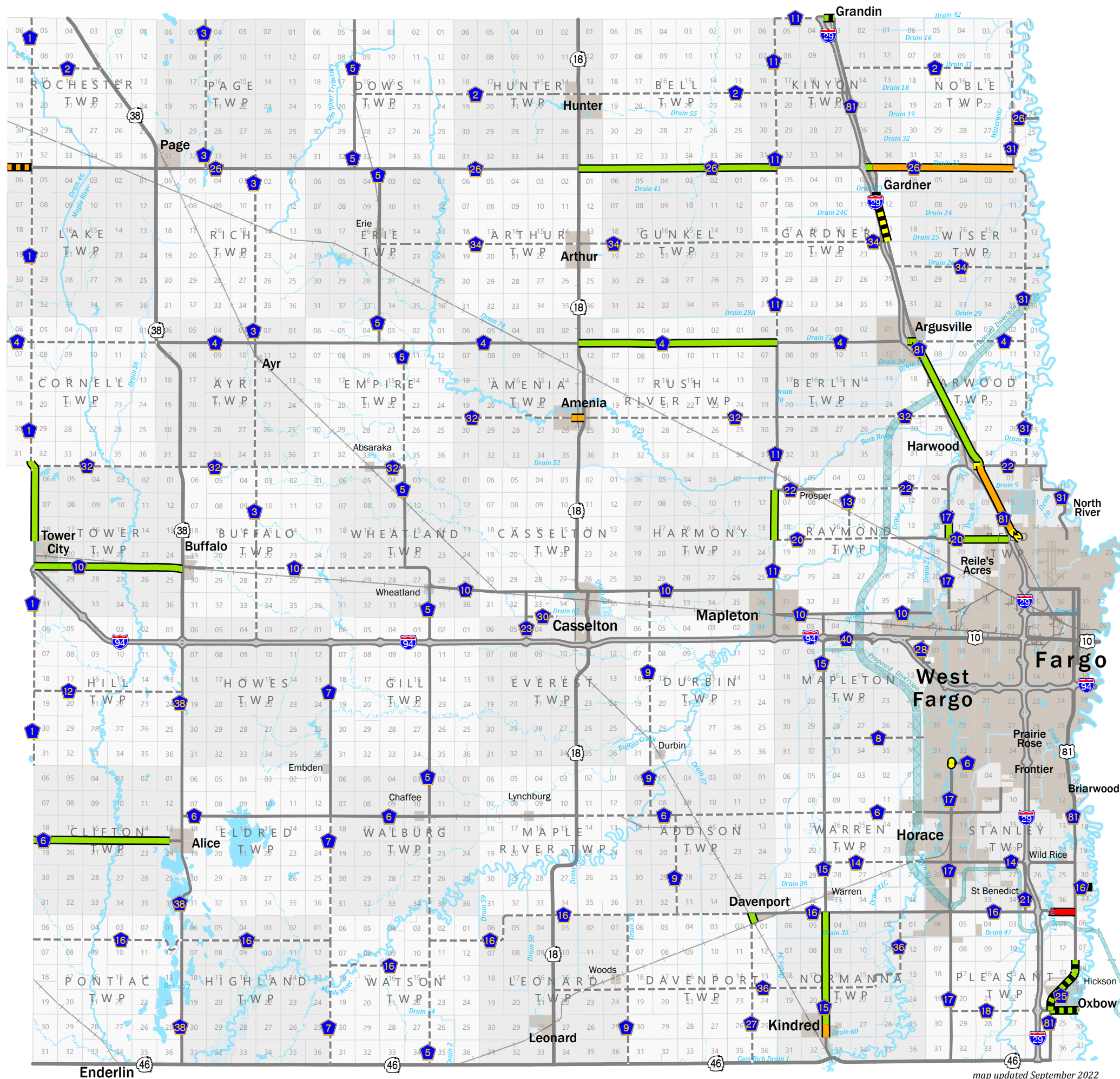
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Highway Superintendent



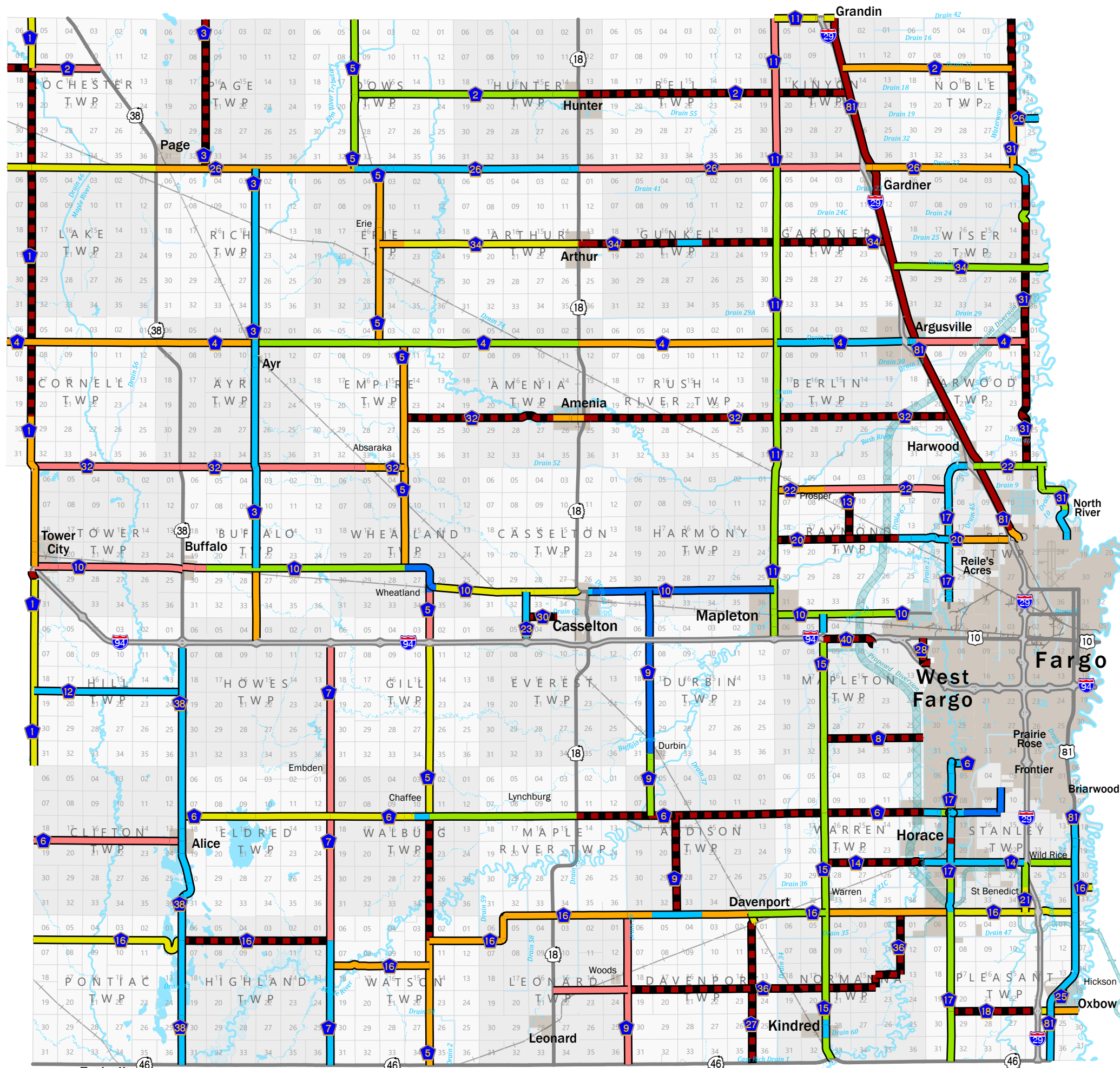
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Age of Highways and Estimated Age of Culvert Infrastructure



Year of Road Grading - Est. Age of Culverts

- unknown/TBD 65+ years old
- 1937 - 1949 72 - 84 years old
- 1950 - 1959 62 - 71 years old
- 1960 - 1969 52 - 61 years old
- 1970 - 1979 42 - 51 years old
- 1980 - 1999 22 - 41 years old
- 2000 - 2019 2 - 21 years old
- 2020 - 2022 0 - 2 years old

Year of Road Grading	Miles	% of Mileage
unknown/TBD (65+ years old)	151.5	23.65%
1937 - 1949	22	3.43%
1950 - 1959	78.4	12.24%
1960 - 1969	102.2	15.95%
1970 - 1979	60.3	9.41%
1980 - 1999	110.1	17.18%
2000 - 2019	97.8	15.27%
2020 - 2021	18.3	2.86%

The age of highways is based upon the year of road grading. In most cases, the age of culverts is equivalent to the age of highways.

Cass County Highway Department

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Deputy County Engineer, P.E.

Blaine Laaveg
Highway Superintendent



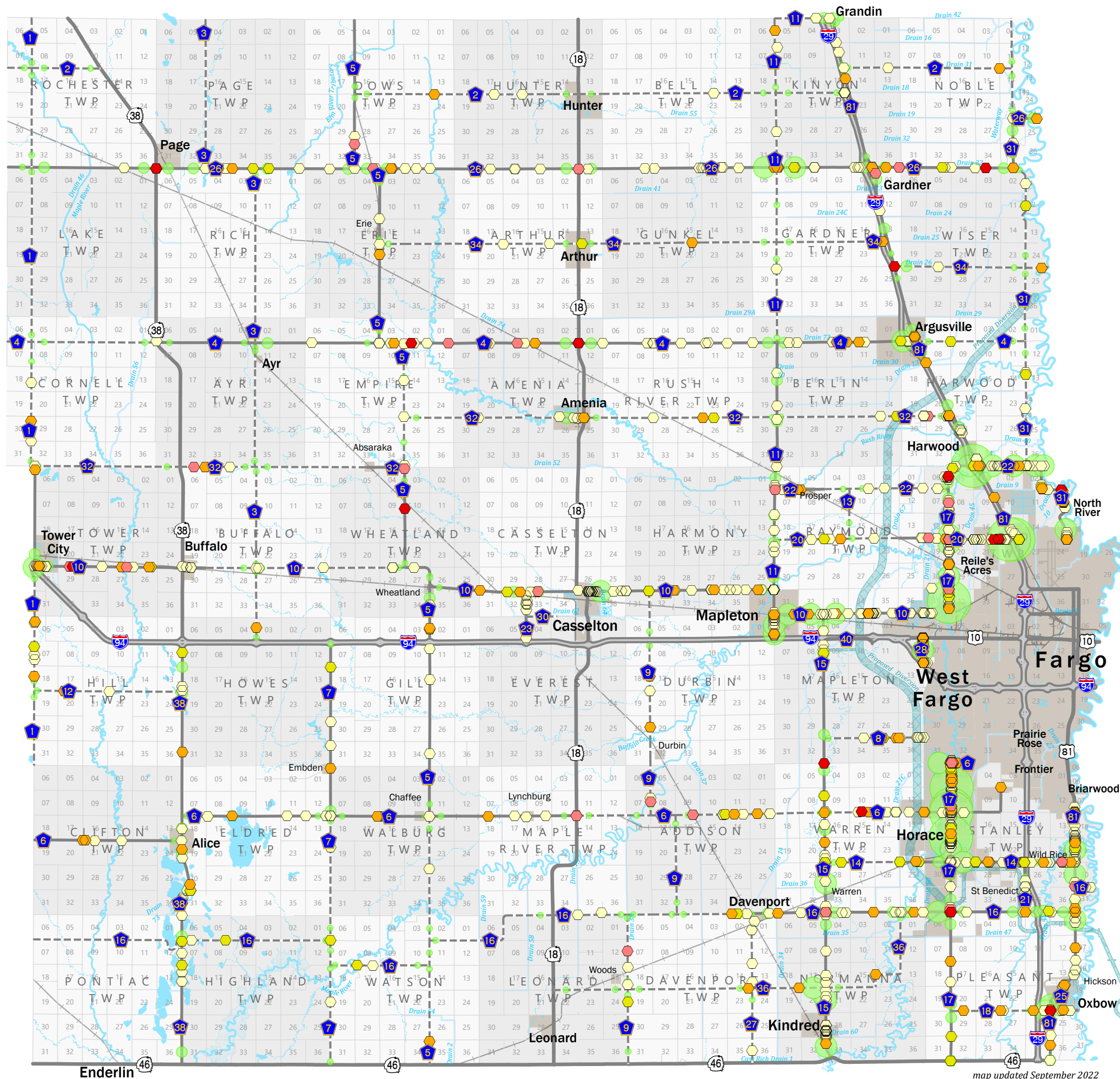
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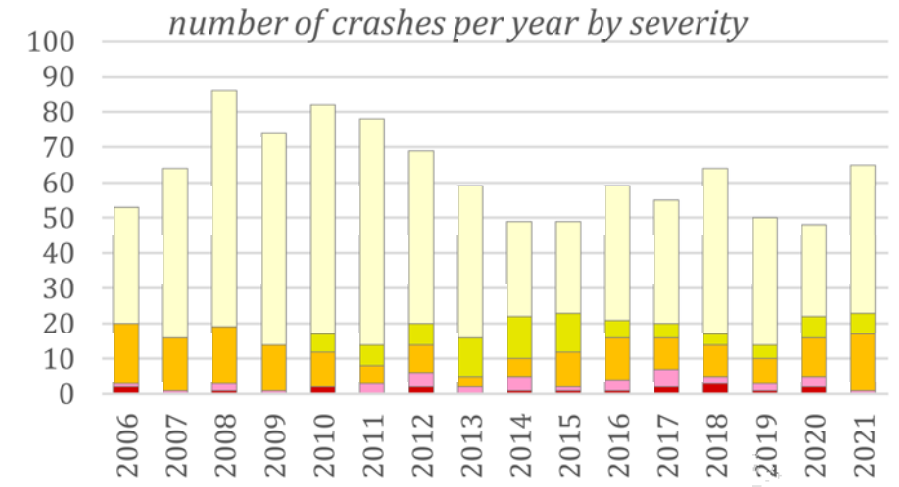
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Appendix 18

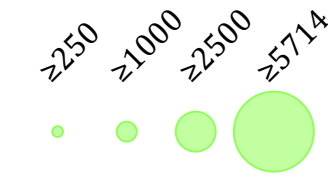
**Crashes on County Highways:
2006 - 2021**



- Crash Severity**
- Fatal
 - Incapacitating Injury
 - Non-incapacitating Injury
 - Possible Injury
 - Property Damage Only (PDO)



Average Daily Traffic Count (2018)



County Highway Type

- Paved
- - - Gravel

Crash Data Source: North Dakota Department of Transportation
Traffic Count Source: KIJ Engineering

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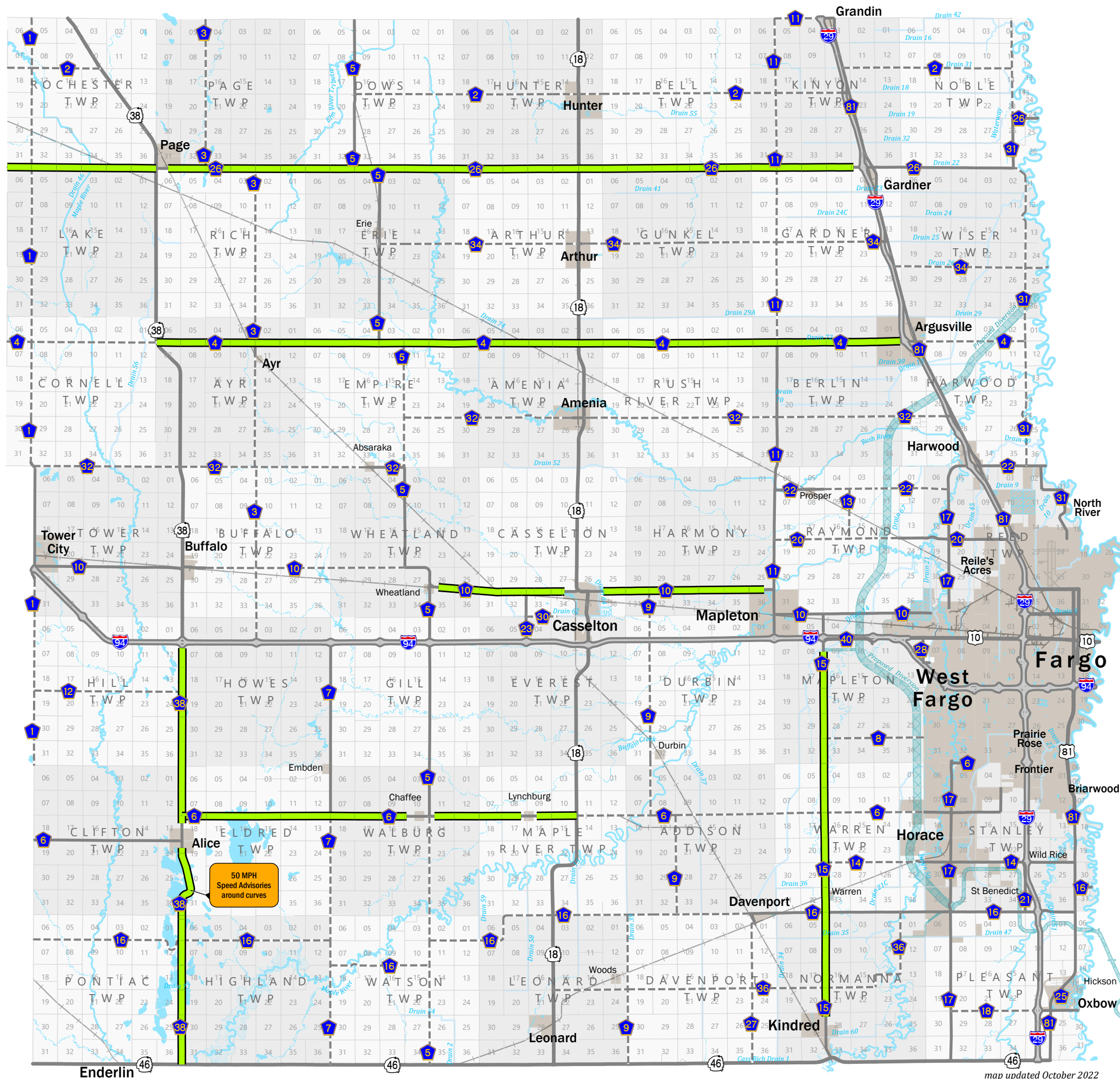
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65 MPH County Highways

 65 MPH Posted Speed Limit



The speed limit increase on designated county highways from 55 MPH to 65 MPH was passed by the Cass County Commission on October 19, 2020. Approximately 119.86 miles of County Highway now have a speed limit of 65 MPH.

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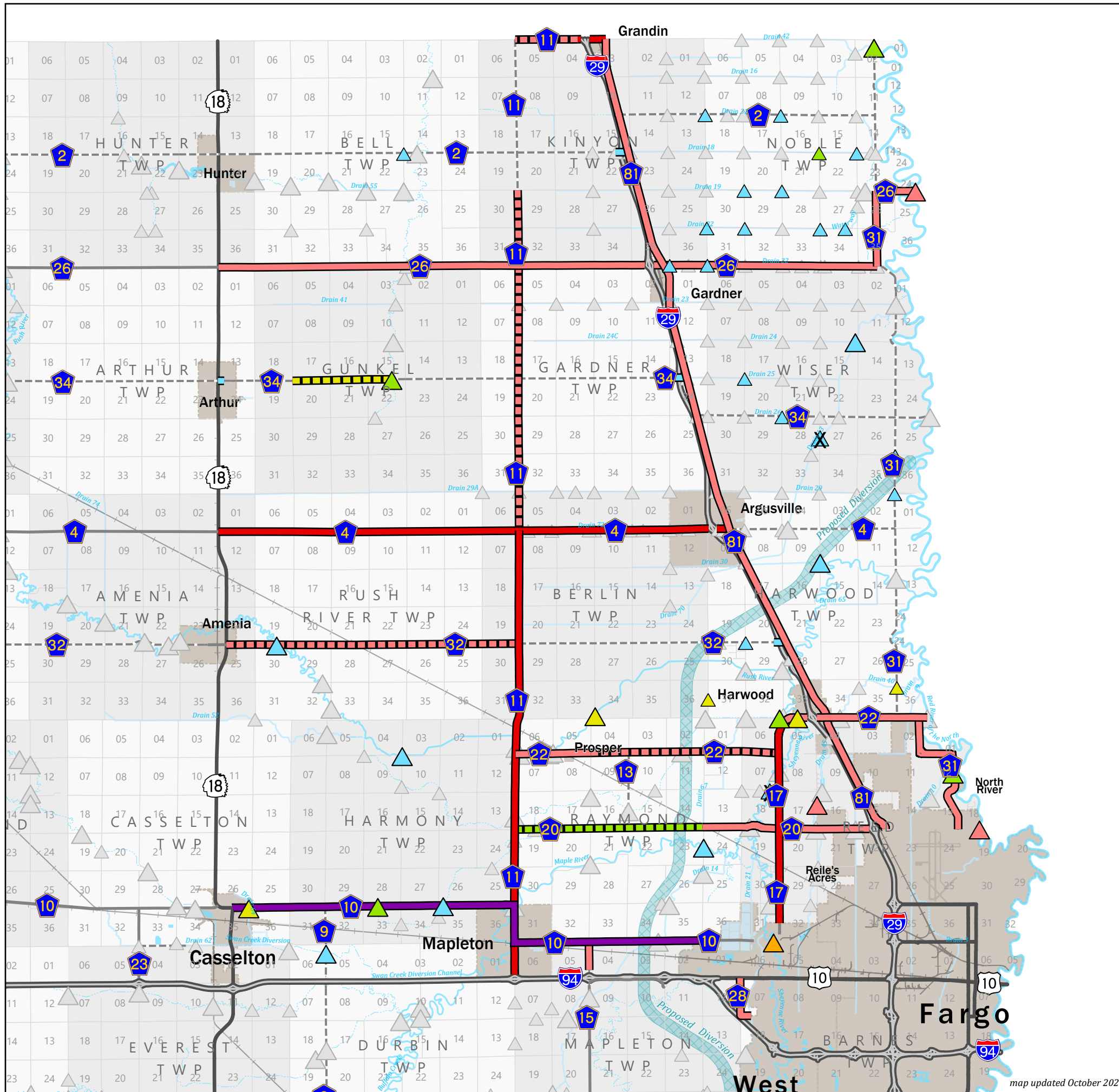
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Appendix 20ne

2000 - 2021 Construction Project History northeast quadrant



County Structures

cost per structure in this quadrant

Minor	Major	Removed	
▲ (18)	▲ (7)	✕ (2)	under \$100K
▲ (1)	▲ (5)	✕ (0)	\$100K - \$250K
▲ (2)	▲ (3)	✕ (0)	\$250K - \$500K
▲ (0)	▲ (0)	✕ (0)	\$500K - \$1M
▲ (0)	▲ (2)	✕ (0)	over \$1M

Projects also occurred on structures currently in Fargo (1) and West Fargo (2) that are displayed in the map but are not included in the counts above. Since being constructed by Cass County, these 3 structures have been turned over to those cities.

County Highways

cost per highway in this quadrant

Gravel	Paved	
▬	▬	under \$100K
▬	▬	\$100K - \$250K
▬	▬	\$250K - \$500K
▬	▬	\$500K - \$1M
▬	▬	\$1M - \$5M
▬	▬	\$5M - \$10M
▬	▬	over \$10M

Bridge Removals	2	\$50,286
Bridge Repairs	9	\$424,966
New Bridges	38	\$20,343,424
Total Bridge Cost		\$20,818,676
Total Road Cost		\$59,263,123
Final Cost		\$80,081,799

Notes:
Projects for school beacons and snow gates on County Highways are not displayed in the map but are included in highway costs.
The Hwy Dept parking lot project is included in the costs for the northeast quadrant.

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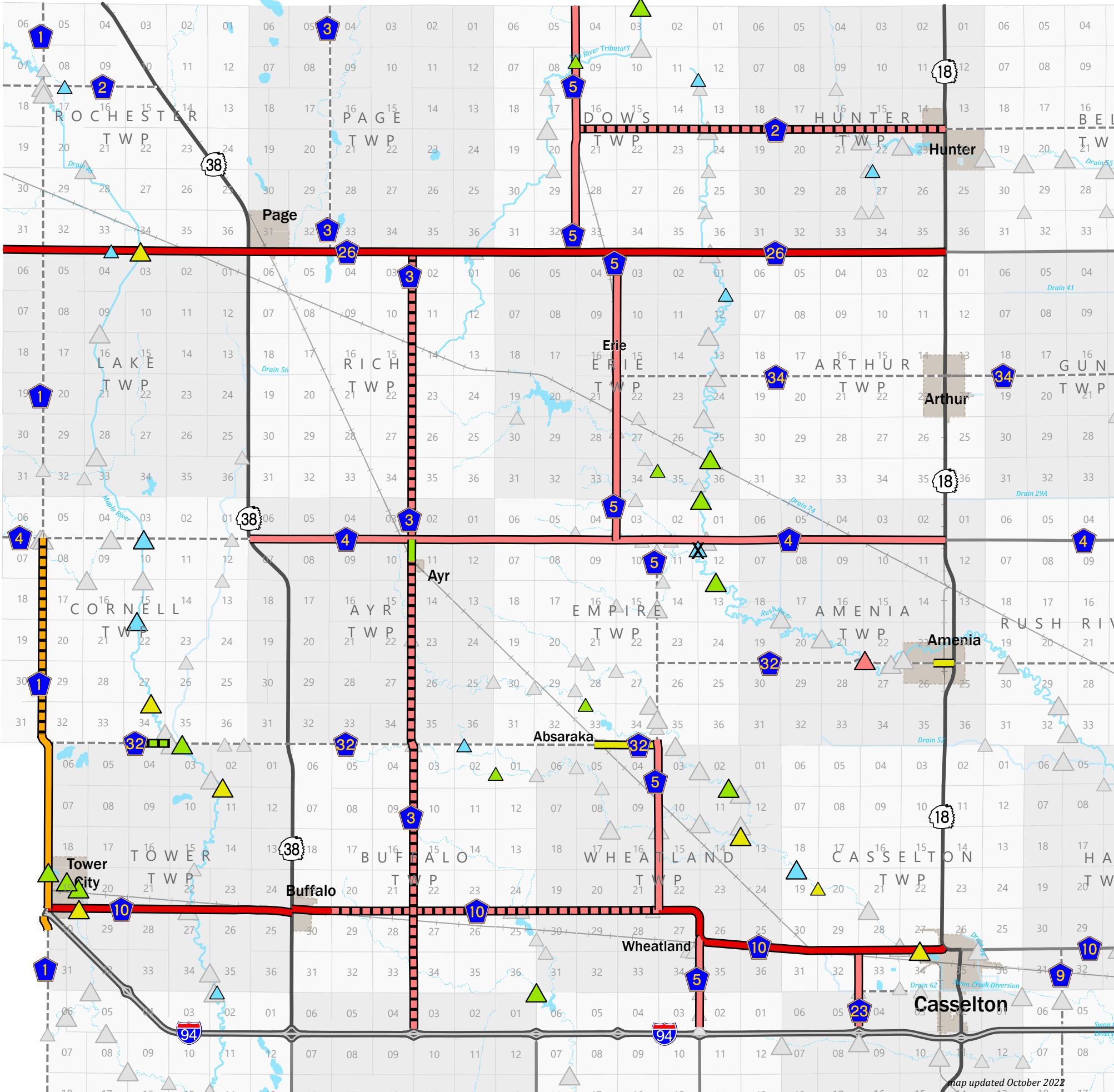


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**2000 - 2021
Construction Project History**
northwest quadrant



County Structures

cost per structure in this quadrant

Minor	Major	Removed	Cost Range
▲ (7)	▲ (3)	▲ (1)	under \$100K
▲ (4)	▲ (10)	▲ (0)	\$100K - \$250K
▲ (1)	▲ (6)	▲ (0)	\$250K - \$500K
▲ (0)	▲ (0)	▲ (0)	\$500K - \$1M
▲ (0)	▲ (1)	▲ (0)	over \$1M

Projects also occurred on structures currently in Fargo (1) and West Fargo (2) that are displayed in the map but are not included in the counts above. Since being constructed by Cass County, these 3 structures have been turned over to those cities.

County Highways

cost per highway in this quadrant

Gravel	Paved	Cost Range
▬	▬	under \$100K
▬	▬	\$100K - \$250K
▬	▬	\$250K - \$500K
▬	▬	\$500K - \$1M
▬	▬	\$1M - \$5M
▬	▬	\$5M - \$10M
▬	▬	over \$10M

Bridge Removals	1	\$9,040
Bridge Repairs	5	\$153,019
New Bridges	30	\$6,200,697
Total Bridge Cost		\$6,362,756
Total Road Cost		\$31,537,762
Final Cost		\$37,900,518

Notes:
Projects for school beacons and snow gates on County Highways are not displayed in the map but are included in highway costs.
The Hwy Dept parking lot project is included in the costs for the northeast quadrant.

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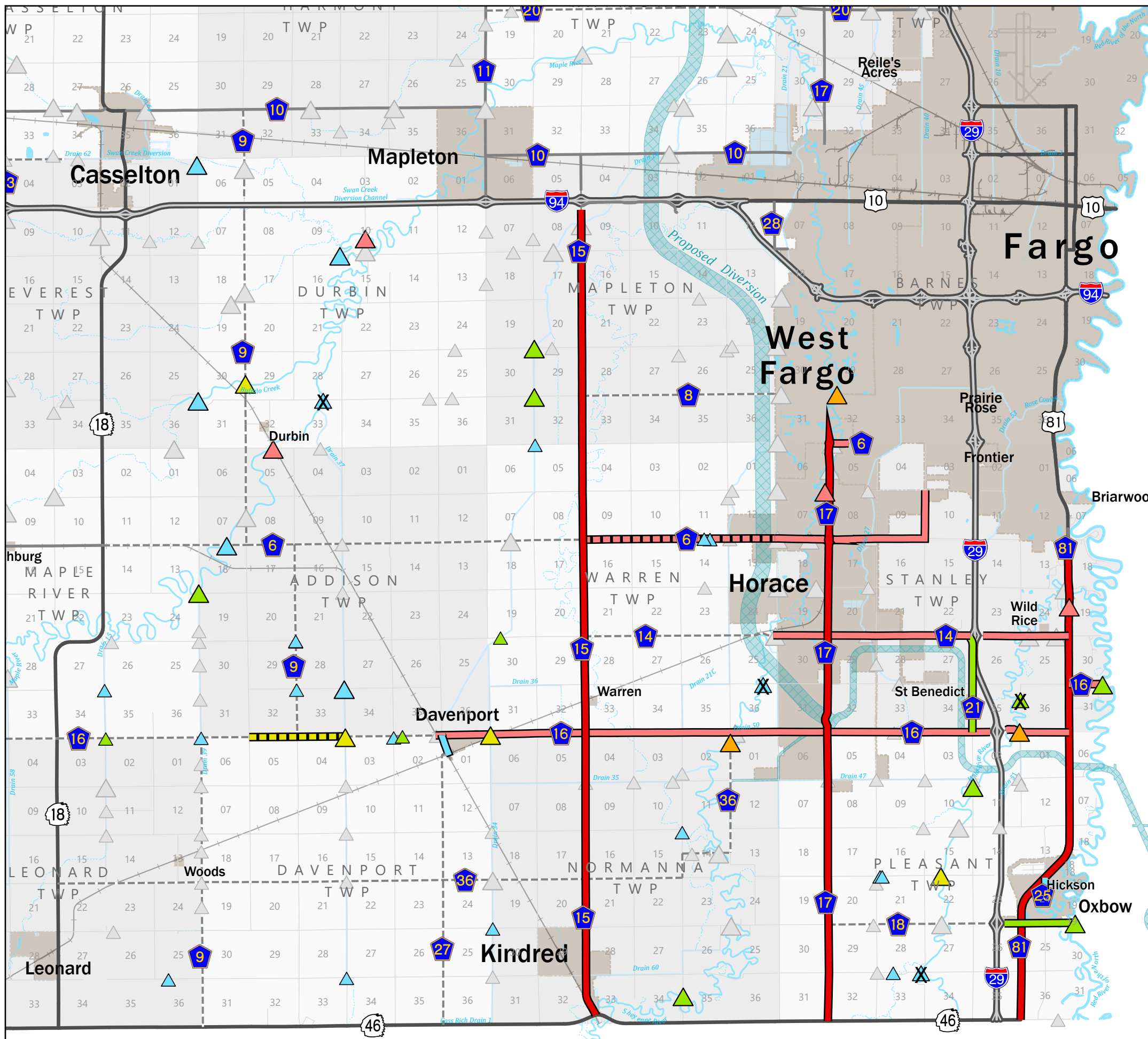
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Appendix 20se

2000 - 2021 Construction Project History southeast quadrant



County Structures

cost per structure in this quadrant

Minor	Major	Removed	Cost Range
▲ (16)	▲ (5)	✕ (3)	under \$100K
▲ (3)	▲ (7)	✕ (1)	\$100K - \$250K
▲ (0)	▲ (4)	✕ (0)	\$250K - \$500K
▲ (0)	▲ (2)	✕ (0)	\$500K - \$1M
▲ (0)	▲ (4)	✕ (0)	over \$1M

Projects also occurred on structures currently in Fargo (1) and West Fargo (2) that are displayed in the map but are not included in the counts above. Since being constructed by Cass County, these 3 structures have been turned over to those cities.

County Highways

cost per highway in this quadrant

Gravel	Paved	Cost Range
▬ (dashed)	▬ (solid)	under \$100K
▬ (dashed)	▬ (solid)	\$100K - \$250K
▬ (dashed)	▬ (solid)	\$250K - \$500K
▬ (dashed)	▬ (solid)	\$500K - \$1M
▬ (dashed)	▬ (solid)	\$1M - \$5M
▬ (dashed)	▬ (solid)	\$5M - \$10M
▬ (dashed)	▬ (solid)	over \$10M

Bridge Removals	4	\$248,392
Bridge Repairs	12	\$990,497
New Bridges	38	\$15,376,099
Total Bridge Cost		\$16,614,989
Total Road Cost		\$36,875,622
Final Cost		\$53,490,611

Notes:
Projects for school beacons and snow gates on County Highways are not displayed in the map but are included in highway costs.
The Hwy Dept parking lot project is included in the costs for the northeast quadrant.

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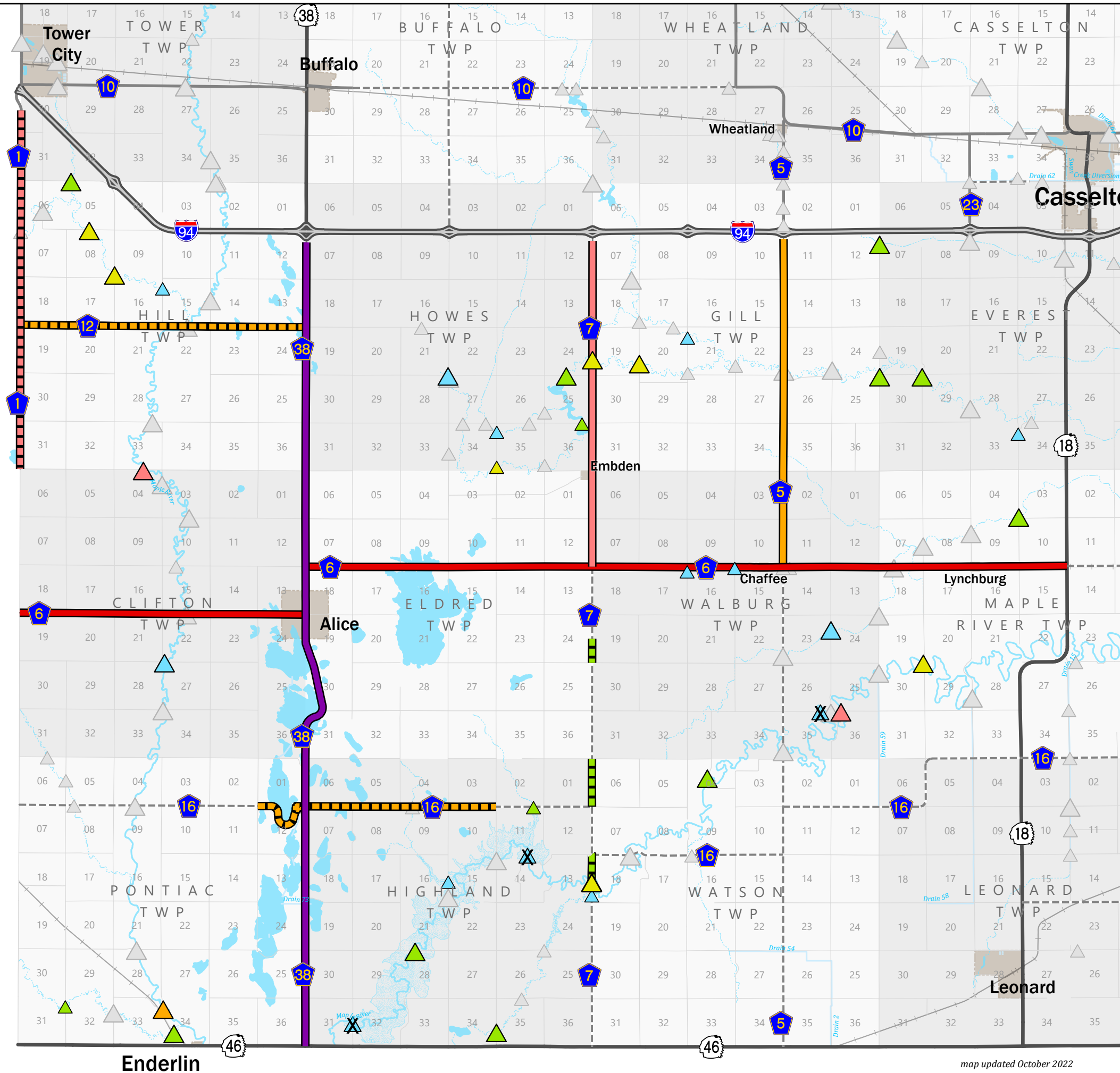
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Appendix 20sw

2000 - 2021

Construction Project History

southwest quadrant



County Structures

cost per structure in this quadrant

Minor	Major	Removed	Cost Range
▲ (8)	▲ (3)	✕ (3)	under \$100K
▲ (3)	▲ (10)	✕ (0)	\$100K - \$250K
▲ (1)	▲ (7)	✕ (0)	\$250K - \$500K
▲ (0)	▲ (1)	✕ (0)	\$500K - \$1M
▲ (0)	▲ (2)	✕ (0)	over \$1M

Projects also occurred on structures currently in Fargo (1) and West Fargo (2) that are displayed in the map but are not included in the counts above. Since being constructed by Cass County, these 3 structures have been turned over to those cities.

County Highways

cost per highway in this quadrant

Gravel	Paved	Cost Range
▬ (dashed)	▬ (solid)	under \$100K
▬ (dashed)	▬ (solid)	\$100K - \$250K
▬ (dashed)	▬ (solid)	\$250K - \$500K
▬ (dashed)	▬ (solid)	\$500K - \$1M
▬ (dashed)	▬ (solid)	\$1M - \$5M
▬ (dashed)	▬ (solid)	\$5M - \$10M
▬ (dashed)	▬ (solid)	over \$10M

Bridge Removals	3	\$136,202
Bridge Repairs	6	\$438,211
New Bridges	35	\$9,802,355
Total Bridge Cost		\$10,376,768
Total Road Cost		\$30,821,379
Final Cost		\$41,198,147

Notes:
Projects for school beacons and snow gates on County Highways are not displayed in the map but are included in highway costs.
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