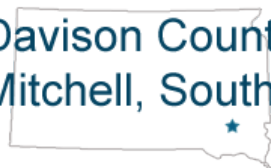


Davison County

MASTER TRANSPORTATION PLAN



Davison County
Mitchell, South Dakota



Davison County

MASTER TRANSPORTATION PLAN

Davison County Master Transportation Plan

FOR
SDDOT, Davison County

**HP5510(16) 3617 P
PD-20-14**

Prepared by: HR Green



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Executive Summary

The Davison County Master Transportation Plan examines the existing transportation facility issues and needs within the County and provides a comprehensive framework for guiding the County's transportation network over the next 20+ years. The Master Transportation Plan is intended to be a living document that can be used as a "road map" to accommodate the interests or desires of private land developers, elected and appointed local officials, and members of the traveling public. Three major goals were established for the Davison County Master Transportation Plan. These goals are:

1. Identify transportation issues and needs facing Davison County.
2. Develop feasible solutions to address those issues and needs that meet current design standards and/or traffic level of service expectations under both the current and predicted future traffic condition while promoting a livable community that will enhance the economic and social well-being of Davison County residents.
3. Create final products for use by Davison County and the South Dakota Department of Transportation (SDDOT) which will provide guidance to implement recommended improvements and react to future development plans within the area.

Through a review of existing conditions, transportation network conditions, and a public involvement process, nine need categories were identified to further guided the development of the Master Transportation Plan. Five more detailed 'plans' and guidelines were developed to provide a systematic approach to the planning, prioritization, and implementation of future transportation projects, system preservation, and maintenance activities.

Providing a reliable network of priority routes and accommodating consistent vehicle width and weight safely is important to the agriculture community. The Major Roads Plan identifies the priority routes through the County to guide future improvements along corridors most important to transportation network users in Davison County.

Bridges were repeatedly noted by the public as a need requiring attention in the Master Transportation Plan. The Bridge Plan reviews bridges throughout Davison County to outline the condition of the County's bridges and examine the cost of bridge repair or replacement. A priority rating system developed for Davison County identifies bridges that are functionally obsolete, structurally deficient, or in need of repair or replacement and provides a system to quantify bridge needs to better program future bridge projects.

Davison County Transportation Needs

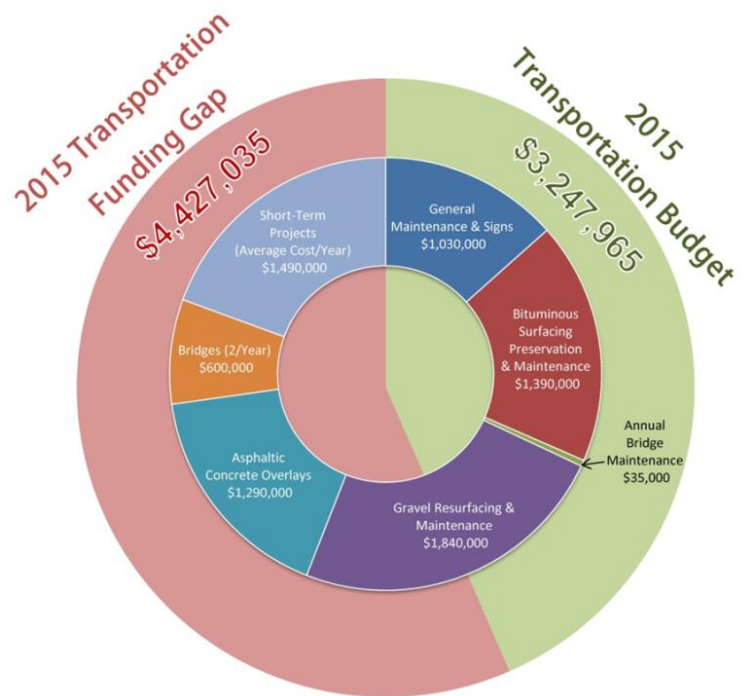
1. **Bridges**
2. **Intersections**
3. **Drainage**
4. **Maintenance**
5. **Traffic**
6. **Corridors**
7. **Unofficial Bypass Routes**
8. **Pedestrian and Bicycles**
9. **Urbanized Area Expansion**

Roadway design and analysis standards for Davison County's transportation network are provided in the Roadway Design, Analysis, and Policy Guidelines. These guidelines provide the basis for project assessment and design, incorporating motorists and bicyclists/pedestrians, and work hand-in-hand with the Major Roads Plan and Roadway Preservation and Maintenance Plan in the development of future transportation network projects. These four 'plans' and guideline sections of the Davison County Master Plan, along with recommendations from stakeholder and public input, were used to develop a list of projects to address needs identified for the Davison County transportation network.

Projects summarized in the Project Implementation Plan have been divided based on priority levels of Short Term, Medium Term, and Long Term (0-10, 11-20, 20+ years). Recommendations include 11 intersection projects, 27 roadway segment projects, 9 multimodal projects, 5 system management and development recommendations, and 22 bridges identified as in need of rehabilitation, replacement, or additional monitoring. Projects include planning level cost estimates based on current industry planning-level estimating procedures, combined with SDDOT and Davison County input on recent project costs and locality adjustments.

One of the more significant components affecting the implementation of the Master Transportation Plan is the availability of transportation funding. The established needs of Davison County were quantified and compared to historic budgets and potential, future funding sources to highlight a funding gap of over \$4 million annually. This gap emphasizes the importance of prioritizing the selection of future improvements, preservation and maintenance to maximize the useful life of the current investments, as well as the functionality of each route within the County's network.

The Davison County Master Transportation Plan provides the framework by which Davison County will be able to prioritize, select, and implement improvements to the transportation network over the next 20+ years. It provides the flexibility to react to changing conditions and shifts in the County's transportation needs as they arise. The Plan is an important step in working towards maintaining the viability of the County's transportation network into the future, in addition to recognizing the hurdles facing the implementation of this Plan. Ultimately, the Plan provides solutions to address existing and future issues and needs while promoting a livable community that will enhance the economic and social well-being of Davison County residents.



Transportation Funding Needs vs. 2015 Road and Bridge Budget

1. Introduction

Background

As an early railroad center along the Chicago, Milwaukee, and St. Paul railroad within a rich agricultural landscape, Davison County has established a reliable, multi-modal transportation network to facilitate agricultural commerce in the area. Building upon its strong agricultural foundation, Davison County has continued to expand into additional economic realms such as technology, healthcare, education, and recreation/tourism to develop a thriving, multi-faceted economy that reaches throughout the world. The County's diverse multi-modal transportation needs each create a unique demand on the transportation network to efficiently and sustainably deliver the best transportation services to residents, industry, and tourists.

The Study Area for the Davison County Master Transportation Plan encompasses all of Davison County including the incorporated and unincorporated cities and townships of Davison County. This Plan will primarily focus on the County Highway System within Davison County, but all roadways within the Study Area will be included to provide a comprehensive view of the Davison County transportation network. Additionally, the Master Transportation Plan will take a multi-modal approach, so that issues and needs of all transportation users are addressed in the Plan. The Study Area and associated roadways are illustrated in Figure 1-1.

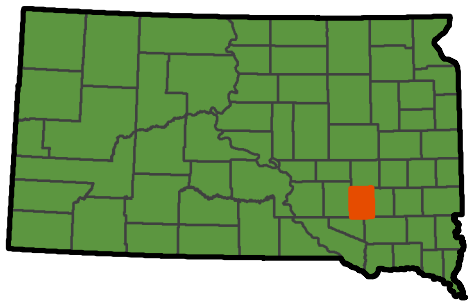
Population Trends

Davison County and the incorporated towns of Ethan, Mitchell, and Mount Vernon have all experienced growth since the 1990 Census. Davison County is one of the few South Dakota counties able to retain and attract new opportunities to sustain this growth. Growth has been welcomed, but it brings new challenges to the region. Growth exacerbates "old problems" as the demands on the transportation network continually evolve. Table 1-1 illustrates population growth trends in Davison County and the incorporated towns within the Study Area.

Table 1-1: Davison County Population Trends

	1990	2000	2010	% Change 1990-2010
Mitchell	13,798	14,558	15,254	10.55%
Mount Vernon	368	477	462	25.54%
Ethan	312	330	331	6.09%
Davison County	17,503	18,741	19,504	11.43%
South Dakota	696,004	754,844	814,180	16.98%

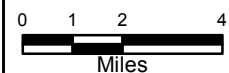
Source: United States Census Bureau, US Department of Commerce



**Figure 1-1:
Study Area**

Legend

- | | | |
|----------------|------------------|-----------------------------|
| Interstate | Rail Lines | Cities |
| State Highways | Rivers & Streams | Study Area (Davison County) |
| County Roads | | |
| Township Roads | | |



1 in = 4 miles



Economic Growth

The economy of Davison County is based on the production of agricultural goods, industrial manufacturing, and tourism. In December 2006, an ethanol plant was built in the County near Loomis and created an increased demand for agricultural products within Davison County and the surrounding region. The plant produces approximately 68 million gallons of ethanol annually from nearly 24 million bushels of corn.¹ The increased demand for goods to produce the ethanol travels primarily by truck within Davison County. The ethanol plant is also located along a rail line extending north from the City of Mitchell which allows for shipment of ethanol by rail across the country.



In 2006, ethanol production began north of the City of Mitchell in Davison County. Located adjacent to an existing rail facility allows and improves the movement of freight into and out of Davison County. The Davison County Master Transportation Plan will evaluate transportation issues impacting major economic sectors in the County.

The urbanized area and growth areas around the City of Mitchell continue to expand into the County as commercial and residential development expands south of Interstate 90 (I-90). Convenient access to I-90 and South Dakota Highway 37 (SD 37) supports commercial and industrial development to the south. Additionally, with the expansion of the Mitchell Technical Institute (MTI) campus along Spruce Street (255th Street), the increased student population south of I-90 will continue to drive commercial development south.

As the home of the world famous Corn Palace and a premier pheasant hunting location within South Dakota, this makes Davison County the ideal location for businesses related to tourism to develop. Having a well-connected transportation network that is easy to navigate is a component of supporting the tourism industry in Davison County. The existing transportation constraints and future needs of the primary economic sectors within Davison County will be evaluated as part of the Master Transportation Plan.

Transportation Funding Constraints

Like many counties throughout South Dakota, Davison County is experiencing roadway funding constraints as federal and state funding sources continue to diminish, while construction and material costs continue to increase. This creates challenges in the County to not only maintain roadways to levels that residents and motorists are accustomed to, but to continue to improve roadway capacity, safety, and network connections. The existing and future needs of the Davison County transportation network will be compared to existing and projected funding to

¹ www.poet.com

compare gaps in the transportation program, reexamine funding structures, and prioritize projects through the Master Transportation Plan.

The Role of the Master Transportation Plan

As both the City of Mitchell and Davison County continue to grow and the economy becomes more diversified, traffic levels and patterns are anticipated to change. Of the many transportation challenges that Davison County will need to address, the Master Transportation Plan examines the current and projected state of the County's roadway, railroad, and trails systems. The Plan makes recommendations for the maintenance, safety, capacity, and mobility improvements to each of these components.

The Davison County transportation system is comprised of a well-connected network of state, county, city, and township roads which distribute trips and provide adequate mobility throughout the County. The roadway system is generally in good repair, but there are a number of ongoing preservation and expansion needs. There are also a number of unpaved and partially paved routes, which necessitate ongoing maintenance. Continued financial challenges and evolving road user demands require the County and Townships to assess the County transportation assets and determine maintenance and future improvement priorities. Davison County is interested in prioritizing preservation and reconstruction needs along with identifying standard roadway designs based on a comprehensive functional classification system in order to efficiently guide infrastructure investment decisions.



The Davison County Master Transportation Plan will identify roadways, like the one above, for improvements prioritized based on short-, medium-, and long-term needs.

The Master Transportation Plan examines the transportation facility needs and potential solutions in the County. The Plan is intended to be a living document that can be used as a blueprint, or "road map" to accommodate the interests or desires of private land developers, elected and appointed local officials, and members of the traveling public.

The importance of the Plan in defining current system deficiencies, identifying future system needs, and ultimately prioritizing the transportation needs for Davison County are the key outputs of the planning process. With limited budgets for transportation infrastructure maintenance and construction, available

funding for planning level documents meant to guide future system improvements must be efficiently used to achieve the intended benefit. It is, therefore, very important for the County and the South Dakota Department of Transportation (SDDOT) to have up-to-date, reliable (documented) transportation system needs sorted by priority and ability to deliver (costs and

other considerations), especially within the competition for available Federal and State improvement funding.

Study Guidance (Study Advisory Team)

The Davison County Master Transportation Plan was guided by a Study Advisory Team (SAT) comprised of technical staff and elected officials from SDDOT, Davison County, and the City of Mitchell. The SAT met 8 times during the development of the Master Transportation Plan to provide input, feedback and comments on the components of the Plan's chapters. The SAT also provided available background data from which transportation system issues and needs were assessed and evaluated. The SAT was instrumental in selecting the list of improvement needs associated with the Plan, including a prioritization (short-, medium-, or long-term) of improvements and their estimated costs.

Master Transportation Plan Goals

Three major goals were established for the Davison County Master Transportation Plan. These goals are:

1. Identify transportation issues and needs facing Davison County.
2. Develop feasible solutions to address those issues and needs that meet current design standards and/or traffic level of service expectations under both the current and predicted future traffic condition while promoting a livable community that will enhance the economic and social well-being of Davison County residents.
3. Create final products for use by Davison County and the SDDOT which will provide guidance to implement recommended improvements and react to future development plans within the area.

Method and Assumptions

The Davison County Master Transportation Plan was completed over a ten-month schedule. The plan was completed according the following three phases of the project schedule:

1. Inventory and analysis of existing and future conditions and identification of problems and needs.
2. Development of strategies, alternatives, and possible solutions that may solve existing problems and future needs.
3. Selection of alternatives for further study and development, provide for integration with other investments, and prioritization of planned improvements.

The Study timeline and process are shown in Figure 1-2. Additional information and documentation of the Study Methods and Assumptions as approved by the SAT are located in Appendix A.

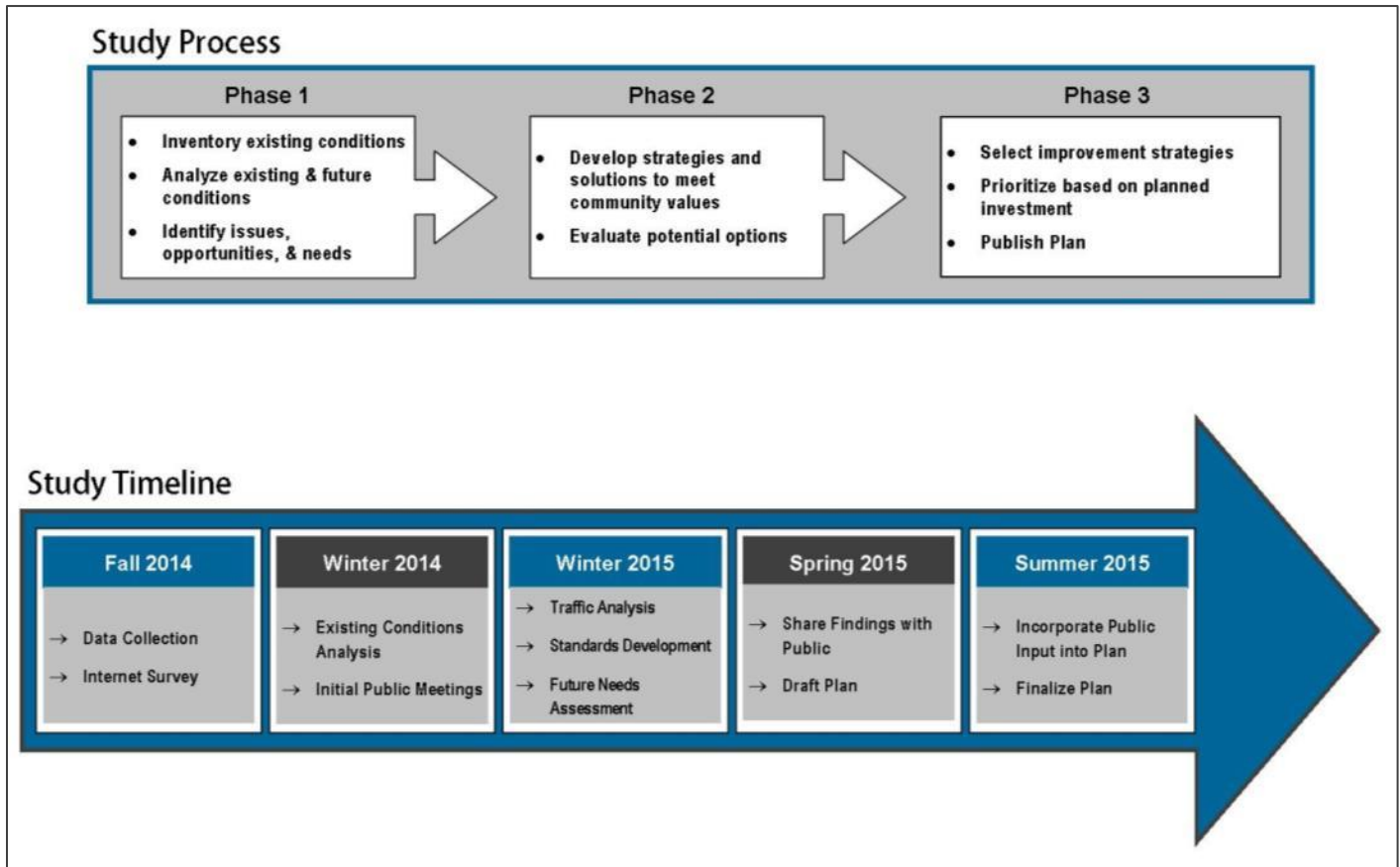


Figure 1-2: Study Process and Timeline

Previous and Related Studies

The Davison County Master Transportation Plan was developed with consideration for land use and comprehensive planning documentation completed for Davison County and the City of Mitchell. This document is meant to act in conjunction with land use planning documents to guide the development of the transportation network as land uses within Davison County are evaluated. Documents utilized in the development of the Davison County Master Transportation Plan include:

- Davison County Comprehensive Plan
- Davison County Zoning Ordinance
- City of Mitchell Comprehensive Plan
- City of Mitchell Land Use Plan
- City of Mitchell Recreational Trail Plan

2. Existing Conditions

An inventory of the existing conditions for the transportation infrastructure within Davison County was completed in order to identify transportation-related issues and opportunities. This included a review of the existing roadway network, traffic volumes and operations, crash history, non-motorized transportation facilities, transit service, airport, and freight facilities. The following sections summarize the key findings of this review.

Roadway Network

Traveler safety in Davison County is generally well-managed; however, there are some problematic areas. Typical of many rural counties, Davison County has roads that exhibit design characteristics of dated design standards and practice. These locations typically exhibit geometric concerns, such as lack of shoulders, steep side-slopes, limited sight distance, atypical intersection configuration, or designs that do not meet the respective design speed. As urban areas, such as the City of Mitchell, continue to extend outward into the rural countryside, there begins to be a blending of urban development with rural design features. What may have worked for low-volume, high-speed situations in the previous decades, begin to become an issue as traffic volumes and turning conflicts increase.

Davison County has experienced notable traffic growth over the past few years due to new development and shifts in county-wide traffic patterns. The greatest traffic volumes on the County highway system are typically adjacent to the Mitchell urban area, dissipating as the distance away from Mitchell grows. Still, Mitchell attracts workers from throughout the region, with commuter traffic originating from neighboring communities such as Mount Vernon, Ethan, Parkston, and new residential development just over the County border in the adjacent Hanson County.

Existing Infrastructure

The existing transportation network within Davison County is made up of over 950 miles of roadway. Approximately 330 miles of the total roadway mileage is maintained under the jurisdiction of the County. Many more miles are maintained by townships within Davison County to complete a grid-like pattern of roadways crisscrossing the County. Figure 2-1 provides an overview of roadway jurisdiction within Davison County.

Of the 330 miles of roadway under the jurisdiction of Davison County, approximately 173 of those miles are surfaced with a bituminous surfacing (asphaltic concrete or blotter) and another 6 miles are Portland Cement Concrete (PCC) as shown in Figure 2-2. These paved roadways provide connections to the County's urbanized area, as well as to destinations throughout the region. Many of these paved segments are identified as major or minor collector roadways based on their role as supporting routes to SD 37, SD Highway 42 (SD 42), and I-90. These

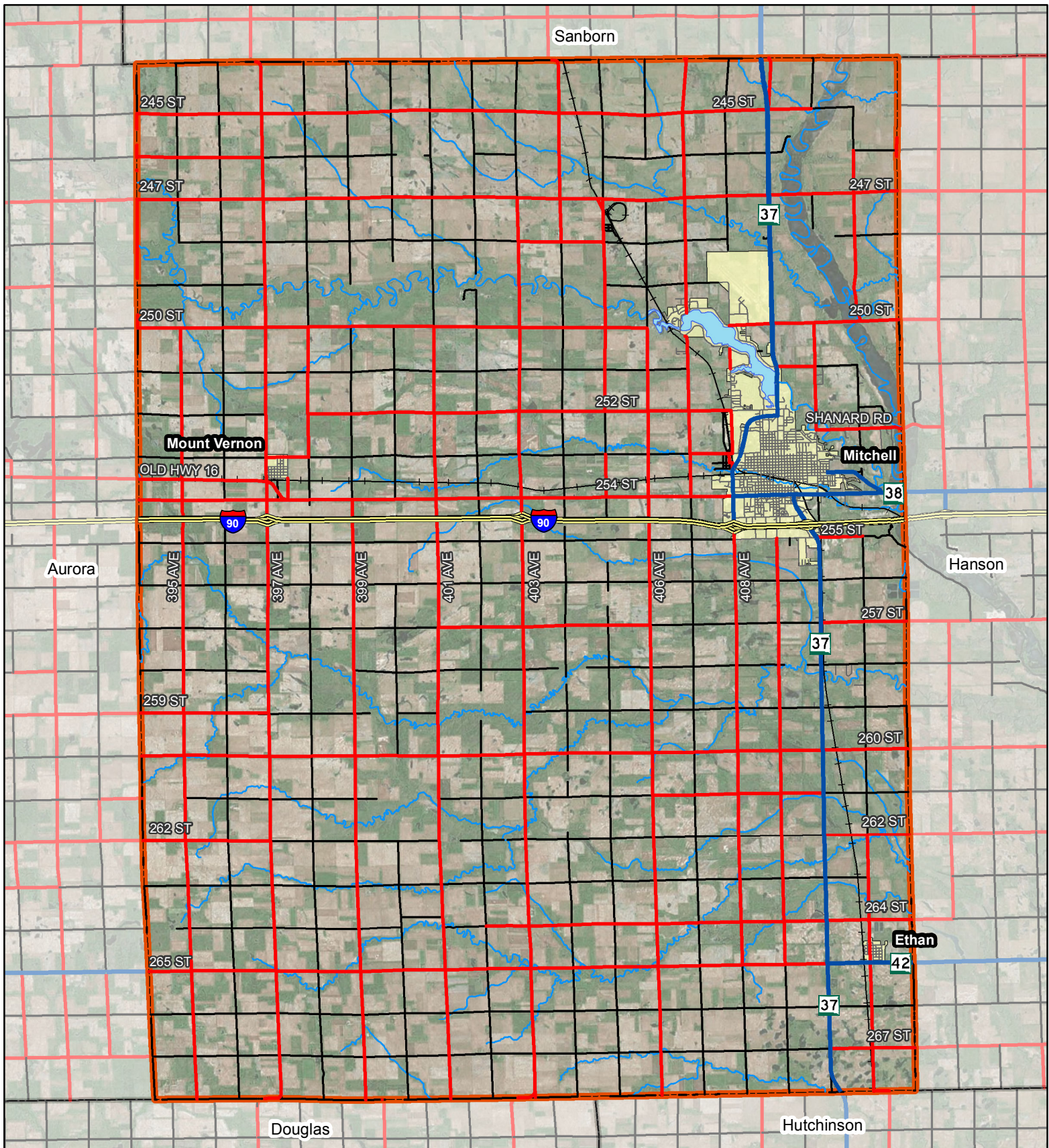
collector roadways move traffic to higher speed routes or more local (unpaved) routes that provide additional access to properties adjacent to the roadway.

Nearly all the north-south roadways within Davison County cross at least one natural barrier cutting across the County – streams. In order to provide continuous routes over these barriers, more than 120 bridges have been constructed throughout the roadway network. Davison County currently maintains, in partnership with respective townships, 88 of the 124 bridges under inspection within the County. The locations of these bridges are also shown in Figure 2-2. In addition to the bridges, there are numerous culverts and smaller crossings that must be monitored and maintained to create a reliable roadway network.

Existing Roadway Safety Analysis

An evaluation of crash history within Davison County was completed to determine the overall level of safety of the transportation network. Historical crash data for the most recently available five-year period (2009-2013) was provided by the SDDOT. High crash frequency and severe crash locations were identified as locations of potential safety improvements. The crash locations throughout the County, categorized by crash severity, are spatially depicted in Figure 2-3. Crashes that occurred on City of Mitchell jurisdiction roadways were excluded from the map and crash totals.

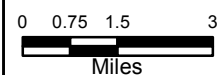
Between 2009 and 2013, a total of 1,444 crashes were reported on County and State facilities within Davison County (broken out based on conditions in Table 2-1). Of the 1,444 crashes, nearly 82 percent resulted in no injury or were a vehicle-animal crash. Approximately 15 percent resulted in possible or non-incapacitating injury. Less than 4 percent of the crashes included a serious injury or fatality (41 with at least 1 incapacitating injury and 5 with at least 1 fatality). The incapacitating injury and fatal crashes are mapped in Figure 2-4. Three of the 5 fatal crashes occurred on State routes (2 on SD 37 between Mitchell and Ethan, one on I-90). Two of the fatal crashes occurred at the intersection of County routes, at the intersections of 265th Street and 403rd Avenue, and 245th Street and 404th Avenue.



**Figure 2-1:
Existing Roadway
Jurisdictions**

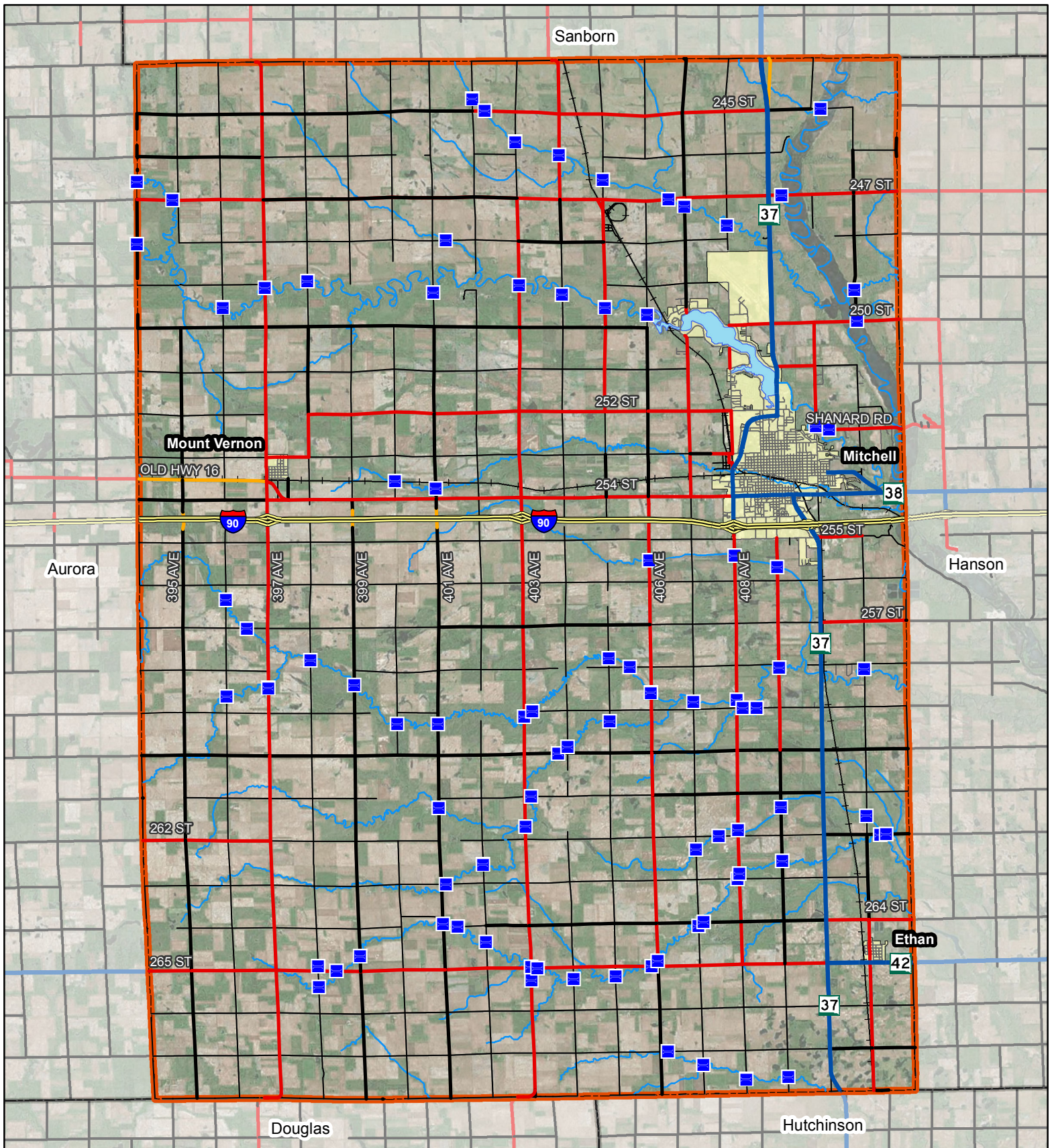
Legend

- | | | |
|----------------|------------------|-----------------------------|
| Interstate | Rail Lines | Cities |
| State Highways | Rivers & Streams | Study Area (Davison County) |
| County Roads | | |
| Township Roads | | |



1 in = 3 miles





**Figure 2-2:
Existing
Infrastructure**

Davison County
MASTER TRANSPORTATION PLAN

Legend

- | | | |
|--------------|------------------|--------------------------------|
| ■ Bridges | — Interstate | — Rail Lines |
| County Roads | — State Highways | — Rivers & Streams |
| — Gravel | — Township Roads | — Cities |
| — Bituminous | | Study Area
(Davison County) |
| — Concrete | | |

0 0.75 1.5 3
Miles

1 in = 3 miles



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Table 2-1: Davison County Crash History

Crash Severity	Total # Crashes
Fatal Injury	5
Incapacitating Injury	42
Non-Incapacitating Injury	91
Possible Injury	125
No Injury	715
Wild Animal Hit	466
Total Crashes	1,444

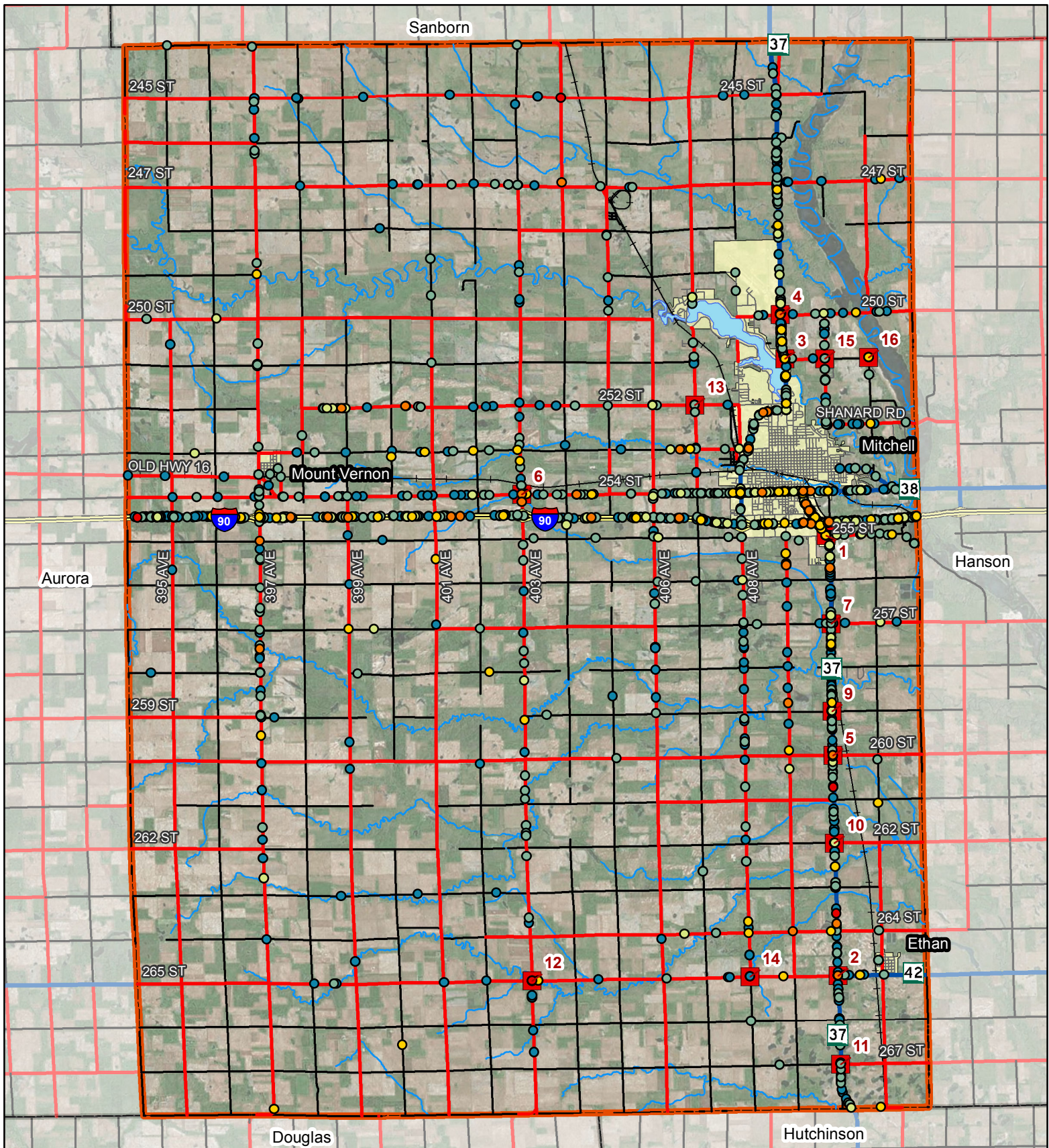
Month	Total # Crashes
January	119
February	112
March	74
April	93
May	113
June	120
July	97
August	119
September	123
October	156
November	187
December	131
Total Crashes	1,444

Light Condition	Total # Crashes
Dark – Lighted Roadway	92
Dark – Roadway Not Lighted	498
Dark – Unknown Roadway Lighting	5
Dawn	67
Daylight	727
Dusk	55
Total Crashes	1,444

Pavement Condition	Total # Crashes
Dry	1,092
Frost	5
Ice	110
Sand, Mud, Dirt, Gravel	7
Slush	20
Snow	85
Unknown	1
Water (Standing, Moving)	1
Wet	123
Total Crashes	1,444

Source: SDDOT Crash Database

Crashes on Davison County, township and State of South Dakota roadways; excludes City of Mitchell roadways



**Figure 2-3:
Crash History**

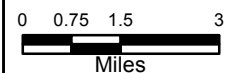
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Crash Severity*

- Fatal Injury (5)
- Incapacitating (42)
- Non-incapacitating (91)
- Possible (125)
- Wild Animal Hit (715)
- No Injury (466)

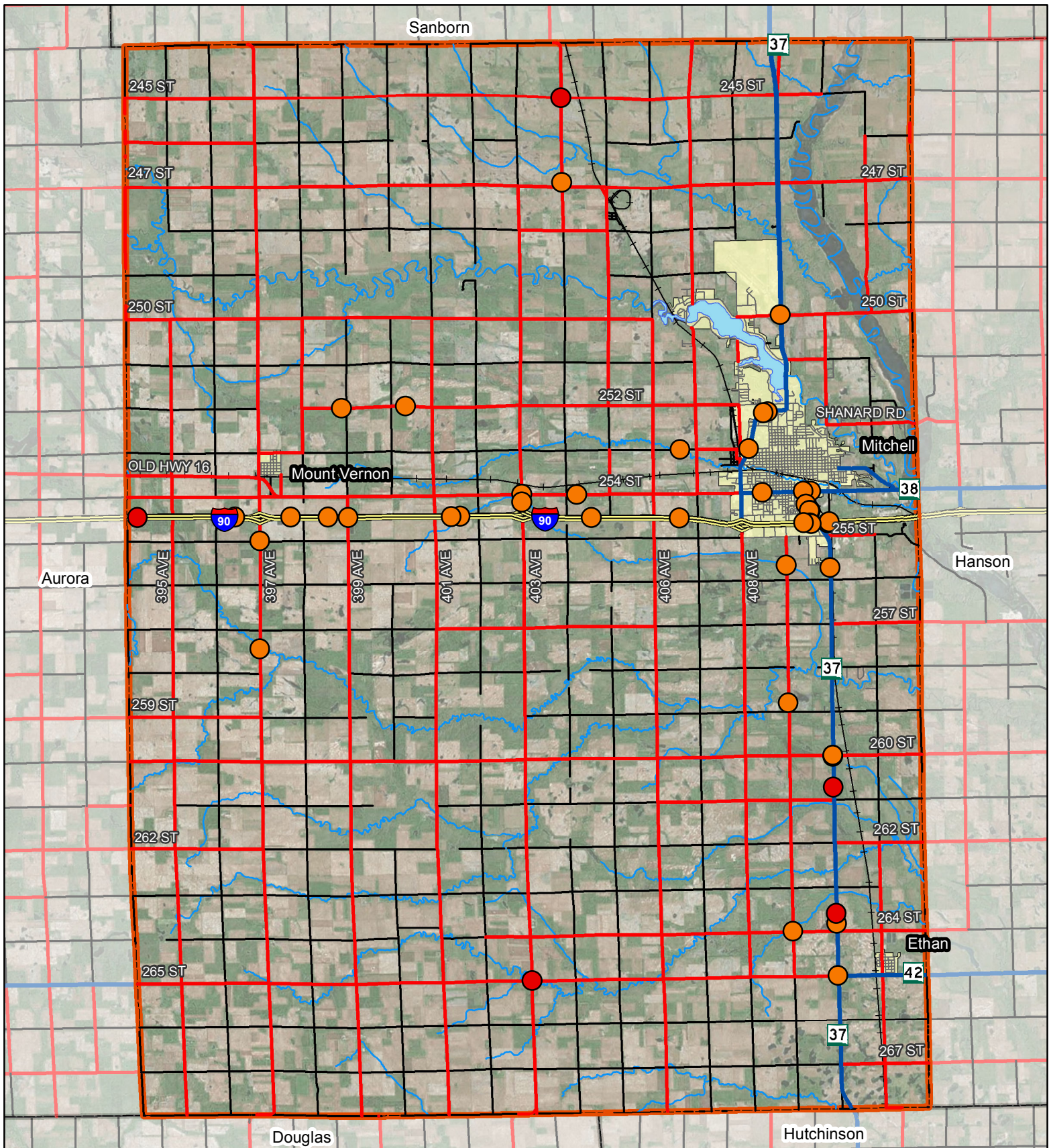
- Intersections - Top 16
- Interstate
- State Highways
- County Roads
- Township Roads

- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)



1 in = 3 miles





**Figure 2-4:
Crash History -
Severe Crashes**

Davison County
MASTER TRANSPORTATION PLAN

Legend

Crash Severity*
● Fatal Injury (5)
● Incapacitating (42)

— Interstate
— State Highways
— County Roads
— Township Roads
— Rail Lines
— Rivers & Streams
— Cities
— Study Area (Davison County)

0 0.75 1.5 3
Miles

1 in = 3 miles



HRGreen

* Crash years 2009-2013, Source: SDDOT

Intersections

In addition to examining the severity of crashes, specific crash locations were also evaluated for intersections and roadway corridors in Davison County. County intersections with the greatest number crashes over the five-year period, excluding City of Mitchell jurisdictional roadways, are shown in Table 2-2. Crash rates were established for intersections with three or more crashes using available average daily traffic (ADT) counts reflective of traffic during the crash period. Intersection crash rates are expressed in terms of crashes per million entering vehicles (MEV).

Table 2-2: Intersection Crashes on County and State Roadways (2009-2013)

Location		Total # Crashes	Crash Rate (Crashes/MEV)
North-South Roadway	East-West Roadway		
SD 37	Spruce Street	9	0.39
SD 37	SD 42/265 th Street	6	0.88
SD 37	251 st Street	5	0.52
SD 37	250 th Street	3	0.36
SD 37	260 th Street	3	0.45
403 rd Avenue	254 th Street	3	0.70
SD 37	257 th Street	2	
SD 37	258 th Street	2	
SD 37	259 th Street	2	
SD 37	262 nd Street	2	
SD 37	267 th Street	2	
403 rd Avenue	265 th Street	2	
407 th Avenue	252 nd Street	2	
408 th Avenue	265 th Street	2	
410 th Avenue	251 st Street	2	
411 th Avenue	251 st Street	2	

Source: SDDOT Crash Database (total number of crashes and location)

Note: Crashes on Davison County, township and State of South Dakota roadways; excludes City of Mitchell roadways

Crash patterns exhibited by the list of 16 intersections in Table 2-2 indicate 39 of the 49 crashes occurred during daylight hours. Thirty-nine crashes occurred during dry conditions, meaning that 10 of the 49 occurred on a wet, snowy, or icy roadway. The most frequently occurring crash type at these intersections was angle crashes, accounting for 33 of the 49 crashes. Six of the 49 crashes were rear-end crashes, and five were vehicle-animal crashes.

Overall, 10 of the 16 intersections are located on SD 37, which typically handles the greatest daily traffic volumes of all rural roadways throughout the County (excluding I-90). As each intersection provides unique circumstances that may contribute to the respective intersection's crash history, the following provides further details regarding intersection-specific crash characteristics at the six intersections with three or more crashes.

SD 37 and 255th Street (Spruce Street)

Crash patterns at this intersection show 7 of the 9 crashes occurred during daylight hours, 7 of 9 occurred during dry conditions, and 6 of 9 were angle crashes. These nine crashes involved vehicles in all directions of travel, with the northbound and southbound directions being the most frequent. The intersection crash rate is 0.39 crashes per MEV.

The intersection of SD 37 and 255th Street (Spruce Street) is located approximately 0.25 miles south of I-90. It is a skewed intersection, as SD 37 is oriented in a northwest to southeast direction, transitioning from a two-lane highway south of Mitchell to a divided 4-lane facility northward into Mitchell. The intersection is signalized, with exclusive left-turn lanes on SD 37 and dual left-turn lanes on eastbound Spruce Street.



SD 37 & 255th Street Intersection
(Source: Google Earth)

Significant traffic generators are located along Spruce Street, including Mitchell Technical Institute, the Mitchell Livestock Auction, and Dakotafest to the east of SD 37 and Cabela's and other large commercial development to the west. These generators, in addition to the recurring volumes as a southern gateway into the City of Mitchell and adjacent to I-90, can create unique traffic volume and composition fluctuations depending on time of day, day of the week, and season.

SD 37 and SD 42/265th Street

Five of the 6 crashes at this location occurred during daylight hours, 4 of 6 occurred during dry conditions, and 5 of 6 were angle crashes. Three of the angle crashes involved vehicles traveling in the northbound direction. The intersection crash rate was calculated to be 0.88 crashes per MEV.



SD 37 & SD 42/265th Street Intersection
(Source: Google Earth)

The intersection is a four-leg intersection, two-way stop-controlled from the 265th Street and SD 42 approaches. It is located 10 miles south of Mitchell and one mile to the west of Ethan.

SD 37 and 251st Street

Crash history at this intersection show 3 of the 5 crashes occurred in daylight hours, 4 of 5 occurred in dry conditions, and 5 of 5 were angle crashes. Three of the five crashes involved a westbound vehicle, from the stop-controlled approach, failing to yield to SD 37 traffic.



SD 37 & 251st Street Intersection
(Source: Google Earth)

The other two crashes involved vehicles in the northbound direction failing to yield during a turn and an improper turn. The intersection crash rate is 0.52 crashes per MEV.

The County roadway intersects SD 37 on a horizontal curve that is angling from northwest to southeast. Because 251st Street continues east-west through the intersection, instead of aligning at a perpendicular angle with the highway, it creates a skewed intersection on the eastbound approach. 251st Street also exhibits a notable profile grade up to the intersection. SD 37 is also transitioning from an undivided 5-lane cross-section to a divided 4-lane cross-section with depressed turf median through the intersection. Approximately 25 feet of median storage is available for crossing vehicles from edge of inside shoulder to edge of inside shoulder. A left-turn lane is provided for the northbound to westbound traffic movement.

SD 37 and 250th Street

This intersection shows 2 of the 3 reported crashes occurred in daylight hours, 1 of 3 occurred in dry conditions, and 2 of 3 were angle crashes. The crash rate at this intersection is 0.36 crashes per MEV.

Located approximately one mile north of 251st Street, this intersection is stop-controlled from the 251st Street approaches. SD 37 is a 4-lane divided facility with a depressed turf median. A left-turn lane is provided in the northbound direction of SD 37. Vehicle storage is available between the northbound and southbound SD 37 travel lanes for 251st Street traffic to complete a 2-stage maneuver when crossing the highway.

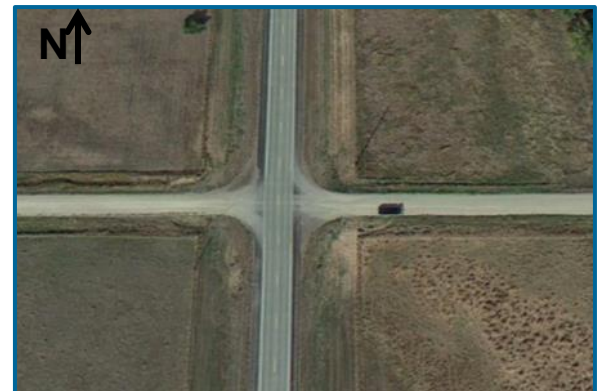


*SD 37 & 250th Street Intersection
(Source: Google Earth)*

SD 37 and 260th Street

Crash history at this intersection shows 2 of 3 crashes occurring in daylight hours, 3 of 3 occurring in dry conditions, and 2 of 3 were rear-end crashes. The third crash was an angle crash. All three occurred in the southbound direction.

SD 37 does not include turn lanes in either the northbound and southbound direction. This requires left-turning vehicles to decelerate and stop in the through travel lane and wait for a gap in traffic before proceeding. Similarly, right-turning traffic will decelerate in the through travel lane prior to completing the right-turn. This creates a greater speed differential between the through and turning traffic, contributing to rear-end crash situations.



*SD 37 & 260th Street Intersection
(Source: Google Earth)*

403rd Avenue and 254th Street

The 3 reported crashes at this intersection occurred in daylight hours, 2 of 3 in dry conditions, and 3 of 3 were angle crashes. Two crashes occurred from a stop-controlled approach, one from the northbound direction and one from the southbound direction, with failure to yield and disregarding traffic signs, respectively. The third involved a westbound vehicle completing a turn to 403rd Avenue.

The intersection is located approximately 0.5 miles north of the I-90 and 403rd Avenue interchange. It is stop-controlled from the 403rd Avenue approach.



403rd Avenue & 254th Street Intersection
(Source: Google Earth)

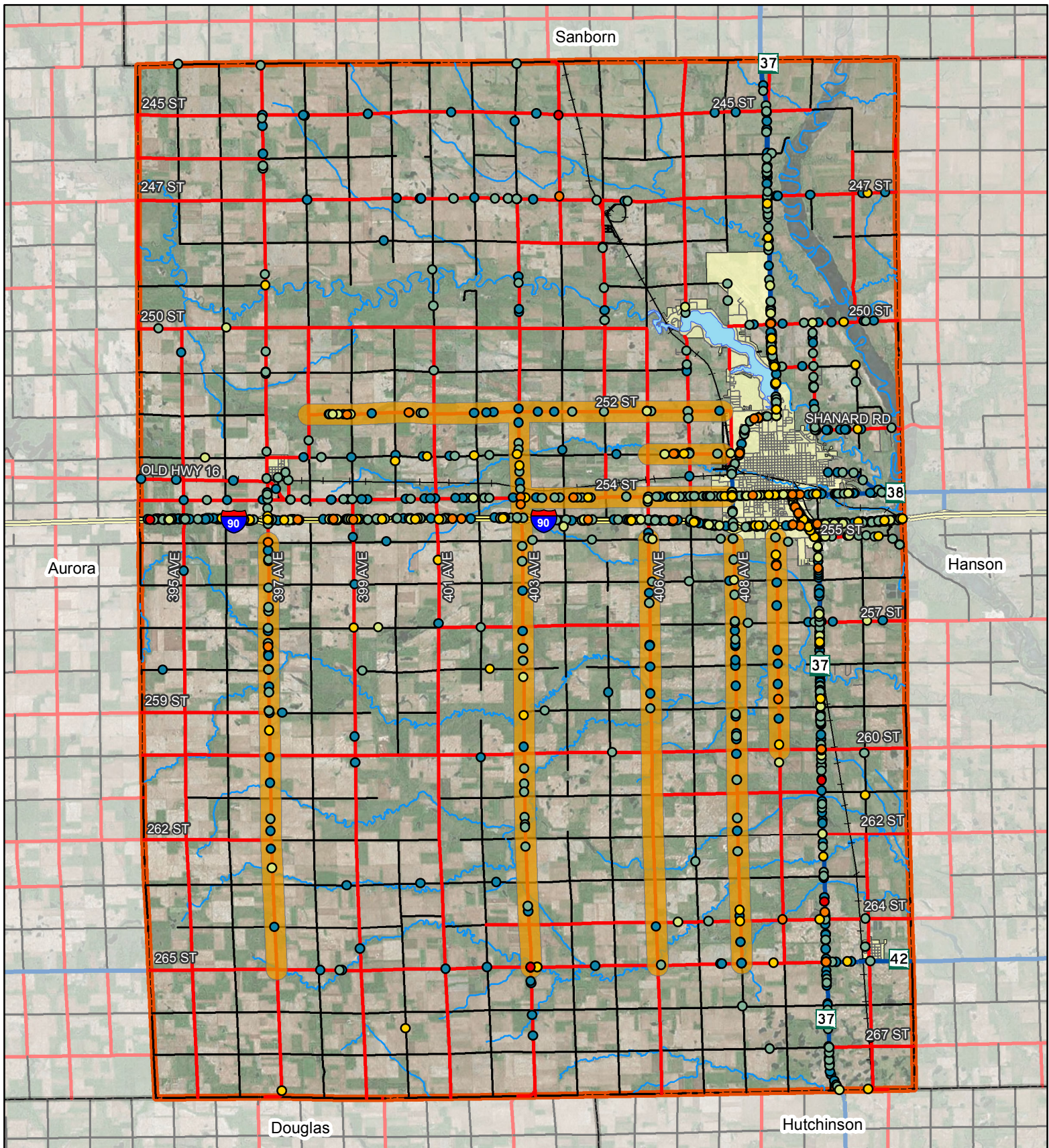
Corridor Segments

Based on the crash history, roadway segment crash rates were developed to quantify crash frequency in relation to traffic volumes. Segments were selected based on number of recorded crashes and identified safety concerns and limits were determined by natural break points in the roadway network (such as urban/rural transitions, major roadway intersections, or change in surface). Segmental crash rates are calculated in terms of crashes per hundred million vehicle miles traveled (HMVMT) using the most recently available ADT. The 11 selected roadway segments are shown in Table 2-3 and spatially identified in Figure 2-5.

Table 2-3: Crashes on County Roadway Segments (2009-2013)

Select North-South County Corridors		Length (miles)	Total # Crashes	Crash Rate (Crashes/HMVMT)
Roadway Corridor	Limits			
397 th Avenue	255 th St to 265 th St	10	29	391
403 rd Avenue	252 th St to 255 th St	3	8	329
403 rd Avenue	255 th St to 265 th St	10	18	349
406 th Avenue	255 th St to 265 th St	10	11	231
408 th Avenue	255 th St to 265 th St	10	28	175
409 th Avenue	255 th St to 260 th St	5	12	272

Select East-West County Corridors		Length (miles)	Total # Crashes	Crash Rate (Crashes/HMVMT)
Roadway Corridor	Limits			
252 nd Street	398 th Ave to 408 th Ave	10	26	234
253 rd Street	406 th Ave to 408 th Ave	2	7	267
254 th Street	403 rd Ave to Mitchell Limits	5	44	197
Sub-corridor:	406 th Ave to Mitchell Limits	2	26	242
Spruce Street	East of SD 37 to Dakotafest Drive	1.15	10	200



**Figure 2-5:
Crash History -
Analysis Corridors**

Davison County
MASTER TRANSPORTATION PLAN

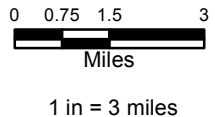
Legend

Crash Severity*

- Fatal Injury (5)
- Incapacitating (42)
- Non-incapacitating (91)
- Possible (125)
- Wild Animal Hit (715)
- No Injury (466)

- Analysis Corridors
- Interstate
- State Highways
- County Roads
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)

* Crash years 2009 - 2013,
Source: SDDOT



Overall, the majority of reported crashes on these corridors involved vehicle-animal crashes, both wild and domestic animals. There were also a number of run-off-the-road crashes, frequently exhibiting an overturn/rollover type event. With regard to environmental conditions, crashes often occurred during the dusk-to-dawn timeframe and/or dry pavement conditions. The following provides further details regarding corridor-specific crash characteristics along the 11 identified corridors.

397th Avenue, from 255th Street to 265th Street

Of the 29 crashes on this corridor, 10 occurred during daylight hours and 24 occurred in dry conditions. The majority of crashes involved vehicle-animal crashes at 21 of the 29 crashes. Of the other 8 crashes, 3 were angle crashes, 1 rear-end and 4 run-off-the-road type crashes (3 exhibiting a rollover type crash). The segment crash rate was calculated at 391 crashes per HMVMT, the highest crash rate of the selected corridors.

403rd Avenue, from 255th Street to 265th Street

Crash patterns at this location show less than half, 7 of 18, of the segment crashes occurred during daylight hours and 13 of the crashes occurred under dry pavement conditions. Eight of the 18 crashes involved animals and the other 10 involved a run-off-the-road type crash either striking an object on the roadside or exhibiting an overturn/rollover type crash. A fatal crash occurred in 2011 at the southern 403rd Avenue intersection with 265th Street. Failure to yield to vehicle was the identified contributing circumstance. The segment crash rate was calculated at 349 crashes per HMVMT, the second highest crash rate of the selected corridors.

406th Avenue, from 255th Street to 265th Street

The 406th Avenue corridor shows a crash history of 11 crashes, with only 2 occurring during daylight hours and all 11 occurring on a dry roadway surface. All 11 recorded crashes involved vehicle-animal collisions. The segment crash rate on this corridor was calculated at 231 crashes per HMVMT.

408th Avenue, from 255th Street to 265th Street

Crash patterns occurring along this segment show 14 of the 28 crashes occurred during daylight hours and 23 occurred during dry conditions. Similar to the other north-south corridors in the southern half of Davison County, the bulk of the crashes involved vehicle-animal collisions, 20 of 28. Of the 8 other recorded crashes, 6 involved run-off-the-road type crashes (two being overturn/rollover type crashes), 1 involved a rear-end crash and 1 involved an angle crash. The segment crash rate was the lowest of the selected corridors at approximately 175 crashes per HMVMT.

409th Avenue, from 255th Street to 260th Street

Crash patterns on this segment indicated only 3 of the 12 crashes occurring during daylight hours and 10 of 12 occurring on dry pavement. Nine of the 12 crashes involved animals. The other 3 were run-off-the-road type crashes with 2 of those exhibiting overturn/rollover events. The crash rate was calculated at 272 crashes per HMVMT.

403rd Avenue, from 252nd Street to 255th Street

The lone selected north-south segment that extends north of I-90 crash patterns show that 5 of the 8 crashes occurred during daylight hours and 7 of 8 occurred under dry conditions. Two of the crashes involved wild animals. Of the other 8 crashes, 5 were run-off-the-road type crashes (with 3 exhibiting an overturn/rollover event), and 1 was an angle crash. The crash rate was calculated at 329 crashes per HMVMT.

252nd Street, from 398th Avenue to 408th Avenue

A total of 26 crashes were reported on 252nd Street between 398th and 408th Avenues. Of those 26, 13 occurred in daylight hours and 20 occurred under dry pavement conditions. Sixteen of the 26 crashes involved vehicle-animal crashes, 4 were angle, 1 was rear-end, and 5 were run-off-the-road crashes (4 exhibiting an overturn/rollover event). The segment crash rate was estimated at 234 crashes per HMVMT.

253rd Street, from 406th Avenue to 408th Avenue

A total of 7 crashes were noted along 253rd Street between 406th Avenue and 408th Avenue. Five of the 7 crashes occurred during daylight hours and 5 occurred on a dry roadway surface. Unlike the other selected corridors, this corridor includes approximately 1.5 miles of gravel surfacing as well as 1 mile of township jurisdiction roadway west of 407th Avenue. Five of the 7 crashes occurred on an approximately ½ mile segment west of 407th Avenue. The majority of crashes were single-vehicle run-off-the-road crashes, with 2 involving overturn/rollover events and 3 striking a fixed object. The segment crash rate was estimated at 267 crashes per HMVMT.

254th Street, from 403rd Avenue to Mitchell City Limits

Crash history along this segment show 24 of the 44 crashes occurred during daylight hours and 31 of 44 occurred on a dry pavement surface. Unlike several of the other corridors in Davison County, the number of vehicle-animal crashes accounted for less than 50 percent of the segment crashes with 16 of the 44 total crashes. Of the other 28 crashes, 6 involved angle crashes, 2 sideswipe, 8 rear-end, and 12 run-off-the-road (2 with overturn/rollover events and the remaining 10 striking fixed objects). The crash rate for the segment was calculated at 197 crashes per HMVMT.

Twenty-six of the 44 crashes occurred on the two mile stretch between the Mitchell city limits and 406th Avenue. This equates to a calculated sub-segment crash rate of 242 crashes per HMVMT.

Spruce Street, from East of SD 37 to Eastern Dakotafest Driveway

The crash patterns along Spruce Street were evaluated east of the SD 37 intersection to the eastern-most driveway into Dakotafest. A total of 10 crashes were identified over this 1.15 mile segment, with 8 of 10 occurring during daylight hours and all 10 on a dry roadway surface. Five of the 10 crashes were rear-end crashes (4 of those in the westbound travel direction) the other 5 crashes were run-off-the-road crashes (4 of those striking a fixed object and 1 exhibiting an overturn/rollover event). The segment crash rate was calculated at 200 crashes per HMVMT. It should be noted, however, that Spruce Street is subject to seasonal and weekly fluctuations in traffic due to the unique generators east of SD 37, including MTI, the Dakotafest grounds, and the Mitchell Livestock Auction.

Five of the 19 crashes occurred between August 15 and August 19 in the respective year, with 4 of those being rear-end type crashes in the westbound direction. These crash characteristics and time of year coincide with the traffic congestion experienced on Spruce Street during Dakotafest.

Railroad Crossing Analysis

With over 50 miles of rail lines crossing Davison County roadways, grade crossing conflicts can create congestion, travel barriers, and safety issues throughout the County. Conflict points occur at each of the at-grade roadway-rail line intersections throughout Davison County.



Davison County has 37 at-grade rail crossings throughout the County. Many of these crossing feature passive controls similar to the one pictured (above).

The Federal Railroad Administration railroad crossing inventory lists a total of 65 at-grade crossings in Davison County, 21 private, and 44 public. Seven additional crossings are grade separated. Of the 44 listed public at-grade crossings, 37 of them occur outside of the City of Mitchell corporate limits. These at-grade crossings are typically equipped with passive crossing control such as cross-bucks, but a few do include an active warning system with flashing lights and/or automated gate arm.

Train/vehicle exposure is a common measure of railroad crossing volume which is calculated as a function of average daily train volumes and the average daily traffic volumes (i.e., train volumes X traffic volumes), which can be used to prioritize railroad crossing investments. Table 2-4 lists the 10 busiest crossings in Davison County (excluding the City of Mitchell) based on train/vehicle exposures.

Through a review of the highway-rail crash summaries from the US DOT Grade Crossing Inventory, 2 vehicle-train crashes have been reported in Davison County over the last 10 years (2005-2014). One occurred in 2009 at a BNSF Railway (BNSF) crossing indicated as Jones Avenue and a second in 2011 at the 257th Street and BNSF crossing. In the instance of the

257th Street crash, it was reported that the train hit the vehicle after the vehicle failed to stop and yield the right-of-way to the train. There were no reported injuries, and the SDDOT crash report indicated glare as a contributing factor.

Table 2-4: Railroad Crossing Inventory

Roadway	Railroad Company/ Track Owner	Train/Vehicle Exposures	Crossing Control
Spruce Street	BNSF	5,000	Post mounted flashing lights, cross-bucks
252 nd Street (23 rd Avenue)	BNSF	2,920	Post mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
SD Hwy 42	BNSF	2,125	Post mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
253 rd Street (8 th Avenue)	BNSF	1,505	Cross-bucks
407 th Avenue	BNSF	1,265	Gates, post mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
264 th Street	BNSF	1,125	Cross-bucks, stop bar and advance warning pavement markings
397 th Avenue (Earl Street)	Dakota Southern	1,060	Cross-bucks, stop bar and advance warning pavement markings
407 th Avenue	Dakota Southern	1,040	Cross-bucks, stop bar and advance warning pavement markings
247 th Street	BNSF	910	Gates, post mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
405 th Street	BNSF	780	Gates, post mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings

Source: US DOT Grade Crossing Inventory

Regional Connectivity and Route Continuity

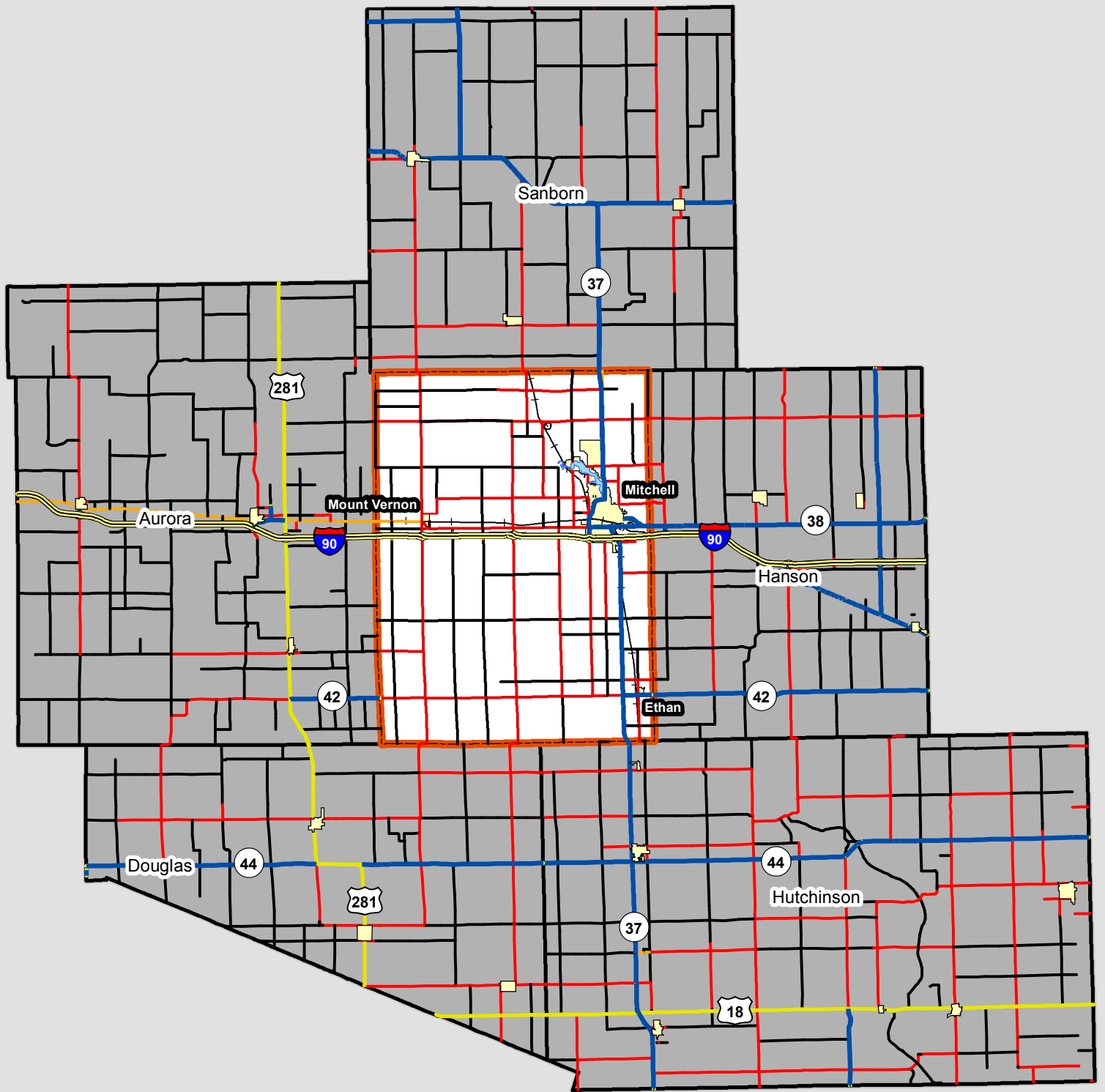
Regional connectivity and route continuity are important aspects of transportation mobility in Davison County. Not only does the County transportation network facilitate travel within Davison County, but it is the gateway of being able to efficiently move goods, services, and people on a more regional level through the interconnection of all roadway classifications. This is an important aspect to Davison County due to the benefits a regional market has on the local economy. When looking at these aspects of the transportation network on a regional connectivity and route continuity, goals include:

- Provide and maintain regional routes across the County, those that are continuous across multiple counties or to key destinations.
- Provide and maintain routes that accommodate regional travel to/from the City of Mitchell as the primary population center in the area.
- Provide connectivity for farm-to-market routes and linking towns throughout the region.
- Provide efficient connections to higher function routes (state highways).
- Minimize out-of-the-way travel when traveling primary routes or key destinations.
- Provide consistent roadway design throughout a primary route.

I-90 and SD 37 are the primary, high-speed routes across Davison County, connecting origins and destinations well beyond Davison County. Davison County also has short segments of SD Highway 38 (SD 38) and SD 42 that extend east SD 37. County roadways provide both supplemental routes to destinations within Davison County and beyond as well as a continuation of these routes such as 265th Street extending west of SD 37.

Existing paved-surface routes, including asphaltic concrete, other asphalt-treated surface, or PCC, within Davison County and adjacent counties are provided in Figure 2-6.

The discussion of a consistent route in terms of connectivity and continuity lends itself to route prioritization in future maintenance and reconstruction. Consideration to regional travel patterns and how the regional roadway network supplements state highways to efficiently and safely move people and goods are reflected in the development of the Davison County Major Roads Plan.



**Figure 2-6:
Regional Connectivity
& Route Continuity**

Davison County
MASTER TRANSPORTATION PLAN

Legend

- | | | |
|----------------|---------------------|-----------------------------|
| Interstate | County Roads | Rail Lines |
| US Highway | Surface Type | Cities |
| State Highways | Gravel | Study Area (Davison County) |
| | Bituminous | Regional Counties |
| | Concrete | |

0 2.5 5 10
Miles

1 in = 9 miles



HRGreen

Planning Level Traffic Capacity Thresholds

Planning level capacity for a specific route is determined by the number of lanes along the route. As the number of lanes on a roadway increases, so does the roadway capacity. The table below summarizes the planning level capacity vehicles per day (VPD) based on number of lanes.

Table 2-5: Planning Level Traffic Capacity

Number of Lanes	Planning Level Capacity (VPD)
2	8,000
3	16,000
4	20,000
5	30,000

Source: South Dakota Department of Transportation Road Design Manual

volume to capacity does not depict peak hour traffic volume impacts or non-recurring type traffic fluctuations such as special events or operational effects from large, slow-moving vehicles. It also fails to differentiate between corridors with significant variations in frequency of access locations and spacing. Further, unforeseen development or shifts in traffic patterns may have significant impact on specific routes in Davison County. As localized congestion or traffic issues arise, these locations may require further analysis with more detailed data collection to assess the specific conditions.

The transportation industry defines the quality of service offered by highway facilities under specific traffic demands by using the Highway Capacity Manual 2010 Level of Service (LOS) rating. LOS is measured on a scale of A through F, representing the operating conditions of the roadway facility based on speed, travel time, freedom to

Existing Conditions Traffic Operations Analysis

In order to better understand existing traffic operations within Davison County, traffic capacity and operations analyses were conducted based on traffic volumes provided by the SDDOT.

Operations Analysis Measures

A volume-to-capacity ratio was used to provide a “high-level” review of congestion along a stretch of roadway within Davison County. As a planning analysis tool, congested conditions along a roadway segment are likely to exist when the ratio of traffic volume to roadway capacity approaches or exceeds 1.0. As traffic volumes approach planning level capacity, traffic operations are expected to deteriorate resulting in lower speeds, significant delays, and unstable operations.

The quantification and measurement of route

Level of Service Definitions

Level of Service is measured on a scale of A through F, representing the operating conditions of the roadway facility based on speed, travel time, freedom to maneuver, traffic interruptions, and comfort and convenience measures.

Table 2-6: Level of Service Definitions

Level of Service (LOS)	Operating Conditions
A	Primarily Free Flow Operations/Exceptional Progression/Short Cycle Length
B	Reasonably Unimpeded Operation/Highly Favorable Progression/Short Cycle Length
C	Stable Operation/Favorable Progression/Cycle Length is Long
D	Less Stable Operation/Ineffective Progression/Long Cycle Length
E	Unstable Operation/Unfavorable Progression/Long Cycle Length
F	Low Speed/Congestion/Poor Progression/Long Cycle Length/Unable to Clear Queues

Source: Highway Capacity Manual 2010 (HCM 2010)

maneuver, traffic interruptions, and comfort and convenience measures.

Level of Service for signalized, stop-controlled, and roundabout intersections, is measured by delay a vehicle experiences, and subsequent increase in travel time, to traverse through an intersection. Table 2-5 displays the LOS delay ranges for signalized, two-way stop-control, all-way stop-control and roundabout intersections. For the purpose of this study, LOS D is considered to the primary mobility goal for intersections.

Table 2-7: Intersection LOS Thresholds

Level of Service (LOS)	Intersection Delay per Vehicle (sec/veh)	
	Signalized Intersections	Two-Way Stop Control, All-Way Stop Control, and Roundabouts
A	0 – 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Transportation Research Board, *Highway Capacity Manual*, 2010.

2015 Existing Conditions – Traffic Volumes

The SDDOT provided the most recent traffic counts on County, Municipal, and State roadways throughout Davison County. These volumes, represented by average daily traffic (ADT) counts, were collected over the previous four years (2011-2014) through their traffic data collection programs. An SDDOT growth rate was utilized to establish traffic volumes for 2015 existing conditions for County and State roadways. (Additional information regarding traffic volume counts and growth rates can be found in Appendix B).

The 403rd Avenue (Betts Road) interchange was identified by the SAT as an outlying interchange motorists use to access western and northern Mitchell and has seen steady increases in traffic volumes as development continues along the west side of Mitchell. HR Green, Inc. (HR Green) provided supplemental intersection turning movement counts at the intersection of 403rd Avenue and 254th Street, just north of the I-90 interchange. Traffic counts were collected at this intersection on Wednesday October 22, 2014, from 6:00-9:00 a.m. and 3:30-6:00 p.m. to capture the AM and PM peak travel periods. These turning movement counts were used to establish current year (baseline) intersection operations and to provide the basis to determine future year intersection operations.

The 2015 existing conditions traffic volumes throughout Davison County are presented in Figure 2-7.

2015 Existing Conditions – Route Volume-to-Capacity

Based on the 2015 existing conditions traffic volumes, a volume-to-capacity analysis was completed for select roadway segments throughout Davison County. The 2015 volume-to-capacity ranges for County roadways are shown in Figure 2-7. Overall, all analyzed County roadways exhibit a volume-to-capacity ratio of 'Below 60% Capacity,' depicted by a green roadway segment. This reflects that 2015 traffic average daily volumes do not exhibit congested conditions along Davison County roadway corridors.

2015 Existing Conditions – Intersection Level of Service

The intersection of 403rd Avenue and 254th Street was analyzed using HCM 2010 two-way stop-control intersection methodology as a baseline for existing conditions. Based on the 2014 collected traffic volume, the intersection measured at LOS A in both the AM and PM peak hours.

Event and Seasonal Traffic Considerations

Existing traffic within Davison County is also impacted by seasonal and event peaks due to the two sectors driving the County's economy: tourism and agriculture. During the harvest season, vehicle traffic – primarily heavy truck and farm equipment – increases throughout the County. During the same time period, traffic volumes increase during non-peak hours due to hunting season. Traffic generated by hunters visiting the County is not detrimental to the systems performance, but maintaining a well-connected roadway network makes it easier for visitors to move about the County.

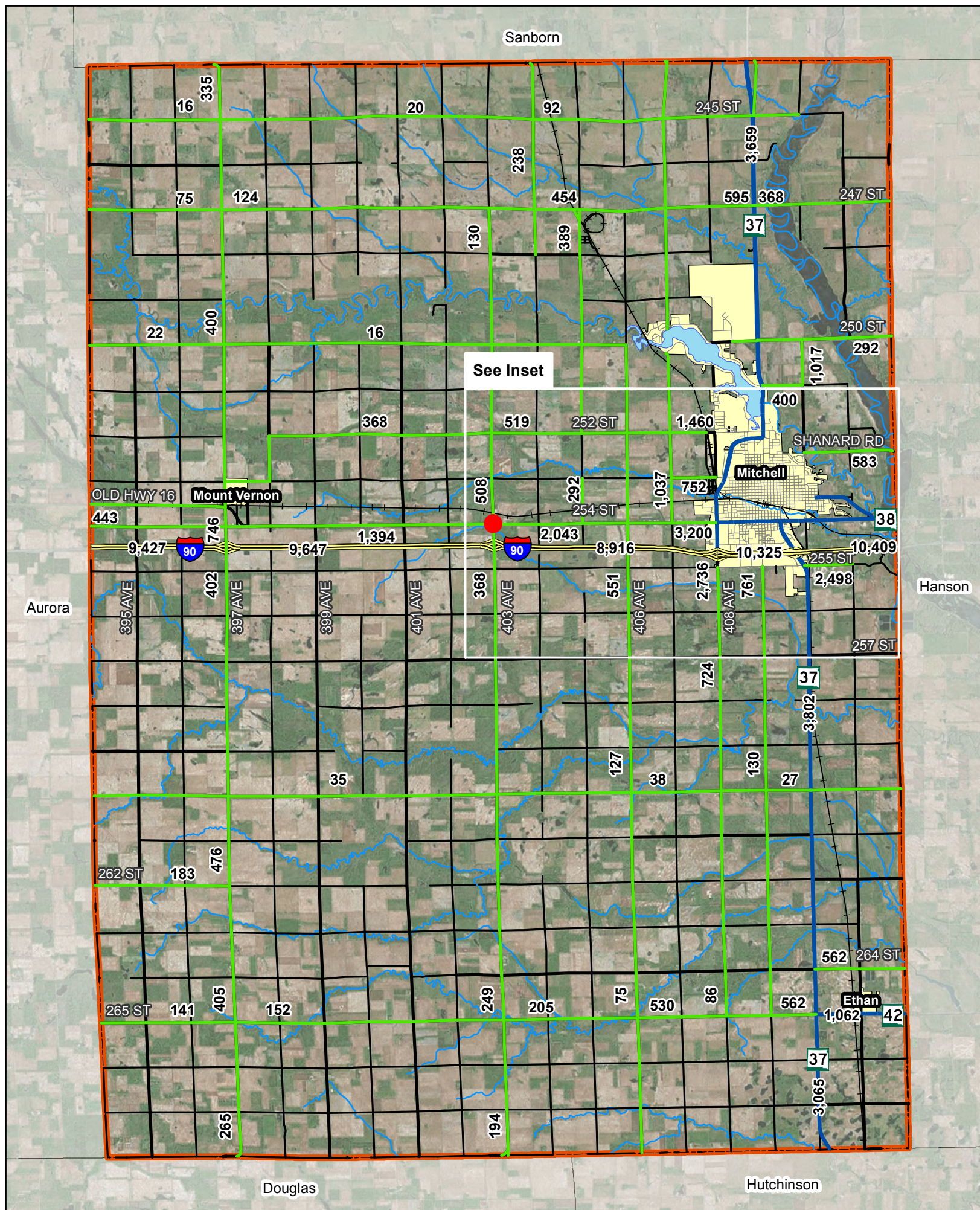
The City of Mitchell and Davison County annually host Dakotafest in August. Dakotafest is the "premier agricultural event in South Dakota." Approximately 30,000 individuals attend the event annually along Spruce Street east of MTI.² Traffic congestion along Spruce Street has been a noted concern for the County for many years before, during, and after the Dakotafest event as exhibitors move products in and out of the site.



(Source: <http://www.ideagroup.com/dakotafest/attend/>, Photo by: Jim Brown)

Two other traffic generators along Spruce Street contribute to off-peak and peak hour congestion: MTI and the Mitchell Livestock Auction. MTI enrollment is over 1,250 students that arrive and depart throughout the day via Spruce Street when school is in session. The Mitchell Livestock Auction currently holds sales three times per week, contributing to steady arrivals and departures in preparation of and during each sale. Congestion and impacts to Spruce Street operations are particularly evident when animals are being brought to the auction for a future sale, with sale volume fluctuating throughout the year.

² www.travelsd.com



Modal Characteristics

Non-Motorized Transportation Network

Most of the existing pedestrian and bicycle facilities within Davison County are located in and around the City of Mitchell and Lake Mitchell area. Currently, the City is in the midst of implementing six phases of their planned bike trail, primarily surrounding Lake Mitchell and on the east side of the City of Mitchell.

As expected, the heaviest concentrations of pedestrian and bicycle travel are within and around the more urbanized areas, but both pedestrians and bicyclists use paved County roads to reach destinations throughout the County. Common routes throughout the County include:

- Mitchell to Letcher via 403rd Avenue, 247th Street, and 404th Avenue
- Mitchell to Mount Vernon via 252nd Street
- Mitchell to Ethan via SD 38, Riverside Drive, 408th Avenue

Public Transit

Davison County is served by both inter- and intra-city transit. Palace Transit/Palace Transit Express is the primary provider of transit service for the City of Mitchell and Davison County. Palace Transit operates on a demand-response system to provide curb-to-curb service for any individual within the City of Mitchell. Palace Transit operates Monday-Friday between 7:30 a.m. and 4:30 p.m., with limited or suspended service on designated days throughout the year.

Palace Transit Express operates Monday-Friday between 5:30 and 7:30 a.m., and 4:30 and 8:00 p.m. Palace Transit Express also operates during the weekend between 5:30 a.m. and 8:00 p.m. (Saturday) and 7:00 a.m. and 8:00 p.m. (Sunday). The “Express” service also provides trips beyond the Palace Transit service boundary for an additional fare, including to the Mitchell and Sioux Falls Airports.

Davison County is also served by Jefferson Bus Lines with inter-city travel between Mitchell and destinations throughout the United States. The Jefferson Bus Lines bus stop is located at 201 W. Haven Street.

Air Transportation

The Mitchell Municipal Airport, originally constructed for the United States Military in 1945, has been managed by the City of Mitchell since the end of World War II. Currently, the airport has two runways of 6,700 and 5,512 feet. The airport has one fixed-base operator, Wright Brothers Aviation. During the pheasant hunting season, the airport provides hunters the opportunity to fly directly into and out of the City of Mitchell. The closest commercial airport is located in Sioux Falls.

Freight Transportation

Freight transportation is the movement of goods from one location to another along the transportation network by means of highways, rail, air, and water. The efficient movement of freight on the transportation network supports the overall economy of a City, County, State, region, and nation. Freight movement in Davison County is primarily carried by truck over the highways and/or rail.

Highway Freight

Truck travel to-and-from major manufacturing locations in Davison County rely on access to the Interstate System to move goods efficiently throughout the United States. Access to the Interstate System is administered by the Federal Highway Administration (FHWA). Currently, Davison County has 4 full access interchanges to I-90 – 2 serving the City of Mitchell via SD 37 and 2 serving rural Davison County at 403rd Avenue and 397th Avenue.

According to the SDDOT 2013 Vehicle Miles Traveled (VMT) Report, Davison County had over 25.3 million VMT by truck on rural and urban roadways. In comparison, Aurora and Hanson Counties both had truck VMT over 20 million (23.3 and 20.1), primarily due to the vehicle travel along I-90.

Rail Freight

Rail transportation in Davison County is supported by two lines – one north-south and one east-west – that join within the City of Mitchell. These rail lines are operated by BNSF and Dakota Southern Railroad. Two unit train facilities are located within Davison County, one at Mount Vernon and a larger facility on the west side of Mitchell.

Major commodities moved by rail through South Dakota include agricultural products and coal. Additionally, rail lines through Davison County carry consumer products and other industrial materials. With the construction of the ethanol plant near Loomis in 2006, additional need for rail freight transportation was needed. Connections to the railroad mainline were created to support the facility, and an expansion of the plants rail facility was completed in 2014.

Environment and Land Use

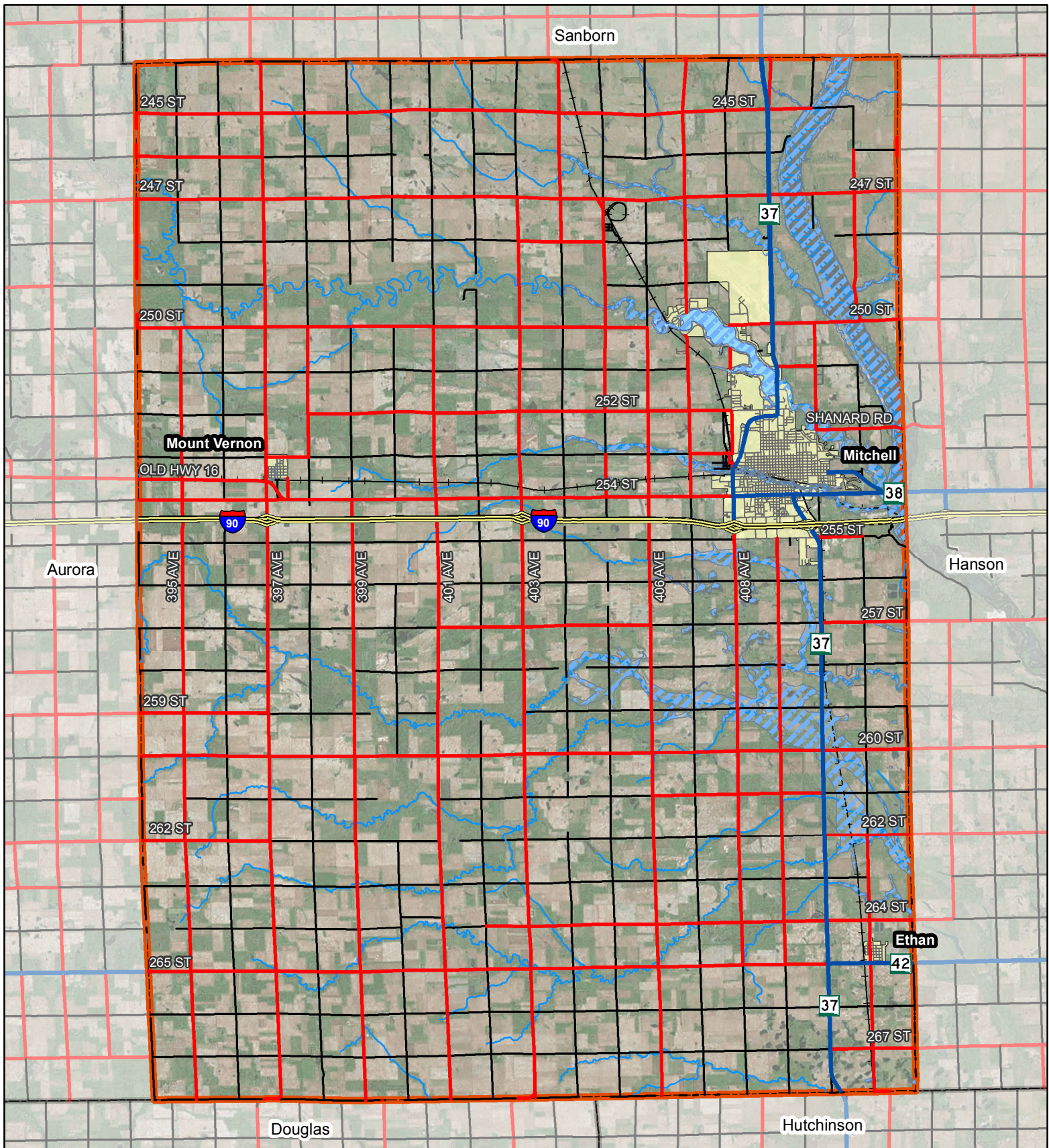
The Davison County transportation network is also impacted by the natural and built environment within the County. Natural features within Davison County provide barriers to connectivity that are overcome by building bridges to link the two sides of rivers and streams that crisscross the county. Additionally, the James River creates a major barrier to travel with limited crossing within the County. Currently, the 250th Street Bridge is the main crossing of the James River within Davison County.

During flood events, roadways in and around these natural barriers are often threatened by flood waters. Identifying roadways that may be impacted by flooding can improve the transportation networks resiliency by planning for alternative routes in the event of flood hazards. Maintaining multiple routes also enables emergency response services viable options

in responding to situations throughout the network. Figure 2-8 shows areas where flooding may occur during 100-year or 500-year events.

The build environment of residential, commercial, and industrial land uses additionally impact the design of the transportation network. Currently, many of the commercial and industrial land uses are located along I-90 or SD 37 in and around the City of Mitchell. Planned commercial and industrial expansion into the County will create challenges to maintain existing infrastructure or provide additional routes to developments.

Likewise, the development of previously agricultural land into residential neighborhoods creates a variety of challenges including providing appropriate transportation connections for residents. The pressure to provide improved facilities throughout the County will grow as the City of Mitchell and Davison County continue to grow. Growth in accordance with the Davison County and City of Mitchell comprehensive plan and zoning ordinances will continue to be monitored and transportation needs will be evaluated during the development process.

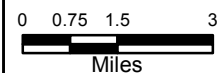


**Figure 2-8:
Flood Hazard
Areas**

Legend

- | | | |
|---------------------|----------------|-----------------------------|
| Flood Hazard Areas* | Interstate | Rail Lines |
| Rivers & Streams | State Highways | Cities |
| | County Roads | Study Area (Davison County) |
| | Township Roads | |

* 100-year and 500-year FEMA floodzones.



1 in = 3 miles



3. Public Participation

Introduction

Public participation for the Davison County Master Transportation Plan was conducted over the course of the ten-month project. Initially, the public had the opportunity to provide the SAT input on the existing conditions, issues, and needs of the Davison County transportation network. After the initial feedback was collected, the information was incorporated into the existing conditions analysis, transportation system needs were forecasted to the year 2035, and a list of improvements was developed. The public then had the opportunity to provide input on the improvements to help prioritize investments throughout the County prior to the completion of the Master Transportation Plan.

The Study utilized several methods to generate feedback from the public; including, stakeholder meetings, public open houses, a transportation user survey, and through comments to the SAT and project staff. A summary of the public participation opportunities is included in this chapter.

Stakeholder Meetings: Existing Conditions and Needs

Assessment

On December 2, 2014, a series of stakeholder meetings were held at the Davison County Fairgrounds to gather input from businesses, organizations, and individuals identified by the SAT as stakeholders. During these stakeholder meetings, approximately 25 participants viewed a presentation on the purpose of the Master Transportation Plan and the planning process. Participants reviewed displays featuring existing conditions data collected by the SAT and the consultant team.



Stakeholders gather around a map of Davison County to discuss transportation conditions and needs.

After reviewing the materials presented at the meeting, participants provided feedback based on the issues and concerns they experience using the Davison County transportation network. Participants identified issue locations on maps with previously identified issue locations within Davison County provided at the meeting. The following issues and concerns were noted by stakeholders throughout the meetings:

- Lack of funding for bridge and roadway improvements.
- Event traffic congestion and management along Spruce Street related to the sale barn and Dakotafest.
- Bicycle and pedestrian issues along Shanard Road, across I-90, and safe routes near schools.
- Lighting along SD 38 east of the City of Mitchell.
- Bridge condition and weight restrictions.
- 250th Street functioning as bypass north of the City of Mitchell.
- Pedestrian mobility across SD 37 in the City of Mitchell.
- Vehicle safety (crashes) at the intersection of SD 37/Minnesota Street and SD 37/8th Avenue.
- Traffic from Innovative along 23rd Avenue.
- Need for bicycle and pedestrian facilities along Ohlman Street.
- Increased train traffic throughout Davison County creating roadway access issues.
- Bridge conditions and ability of handle loads from heavy trucks.
- Need for railroad crossing lights at County and township roads.

Mark Up the Map

Stakeholder and public meeting participants identified issues and concerns by noting the location and a description of the issue on maps like the one below. The results were then included in the list of issues previously generated by the SAT.



Additional issues were identified on the maps provided during the stakeholder meetings (see Appendix C).

Public Open House: Existing Conditions and Needs Assessment

An open house meeting was also held December 2, 2014, at the Davison County Fairgrounds to present the existing conditions and gather input from the public on transportation network needs within Davison County. Approximately, 45 persons attended the open house to view a presentation on the purpose of the Master Transportation Plan and the planning process, review displays featuring existing conditions data collected by the SAT and the consultant team, and comment on issues within the County.

Many of the attendees provided feedback directly to the issue maps located at stations around the meeting room (Appendix C). Issues identified on the maps were included in the overall transportation issues map for Davison County.

Additionally, attendees provided oral and written comments on the transportation network and issues throughout the County. Several major themes for issues within Davison County were shared with SAT members and project staff. The major themes of comments are as follows:

- Bridge condition, weight restrictions, and functionality with current road user equipment.
- Traffic congestion in and around the City of Mitchell.
- The use of County roadways as “bypass” routes around the City of Mitchell.
- Pavement conditions throughout the County.
- Intersection and roadway safety.

Several written comments were received following the public open house. Written comments are included in Appendix C.



Open House attendees listen to a presentation on the Davison County Master Transportation Plan prior to sharing comments with project staff.



Davison County residents review existing conditions displays, examine County transportation issues maps, and discuss transportation projects with other residents, County, and SDDOT staff prior to a presentation on the Davison County Master Transportation Plan.

Transportation Survey Results

A transportation survey was administered between November 19, 2014 and December 26, 2014. The survey was distributed through both paper and the internet via SurveyMonkey. Persons attending the open house were encouraged to take the survey prior to exiting the meeting or at a later date on-line. In total, 77 surveys were received by project staff. Survey results are summarized below, with a copy of the survey questions and full survey results located in Appendix C.

The transportation survey was composed of 36 questions covering travel characteristics for both residents and non-residents traveling on Davison County roads, perceived condition of roadways in Davison County, future transportation improvements, and transportation funding. Below are select responses to survey questions.

Travel Characteristics

According to survey results, the personal vehicle is the most often used mode of transportation for both residents traveling to school or work. Additionally, for the respondents working in Davison County, commute times to work (one-way) do not exceed 30 minutes, with the majority of travelers commuting less than 10 minutes. The primary reasons for residents and non-residents of Davison County are as follows:

Residents

- To/From Work
- Grocery Shopping
- Household Errands
- Other Shopping

Non-Residents

- To/From Work
- Household Errands
- Grocery Shopping
- Other Shopping
- Dining Out

Road Conditions

Survey takers were asked to provide their opinion of the current conditions of paved roadways within Davison County. Of the 67 respondents to this question, approximately 63 percent stated pavement conditions of Davison County roadways are "Fair condition." Approximately 27 percent stated paved roadways were in "Good condition," and 7 percent stated paved roadways were in "Poor condition" (Figure 3-1).

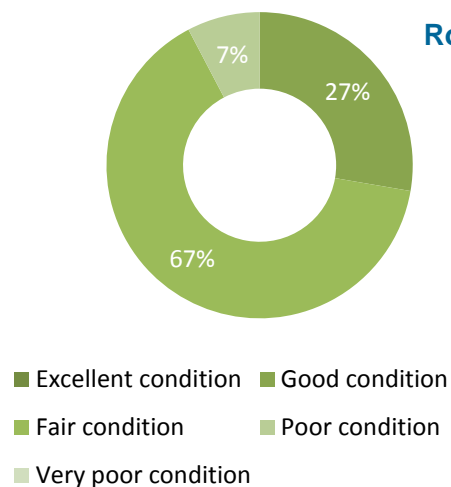


Figure 3-1: Paved Roadway Conditions: Percent of Respondents

Additionally, individuals were asked their opinion of the current conditions of gravel roadways within Davison County. Of the 67 respondents to this question, approximately 64 percent noted gravel road conditions in Davison County are “Fair condition.” Approximately 21 percent stated gravel roadways are in “Good condition” and 7 percent in “Poor condition” (Figure 3-2).

Survey takers were then asked to identify the three safety issues they were most concerned about on roadways within Davison County. Out of 67 responses, the most frequently selected responses were:

- Distracted Drivers (cell phones, texting, etc.)
- Intersections
- Roadway Conditions (pavement surface, ditches, pavement markings, etc.)
- Speeding Vehicles
- Large Vehicles (trucks, farm equipment, etc.)

In order to better understand the perspective of pedestrian and bicyclists in Davison County, survey participants were asked if they walk or bike in Davison County and how safe they feel as a pedestrian or cyclist. Of the 63 participants who answered this question, 47 walk or bike in Davison County of which approximately 30 percent stated they feel “Somewhat Safe,” as shown in Figure 3-3. Additionally, only 6 percent of the respondents stated they feel “Not safe” as a pedestrian or bicyclist in Davison County.

Figure 3-3: Pedestrian and Bicyclist Comfort Level: Percent of Respondents

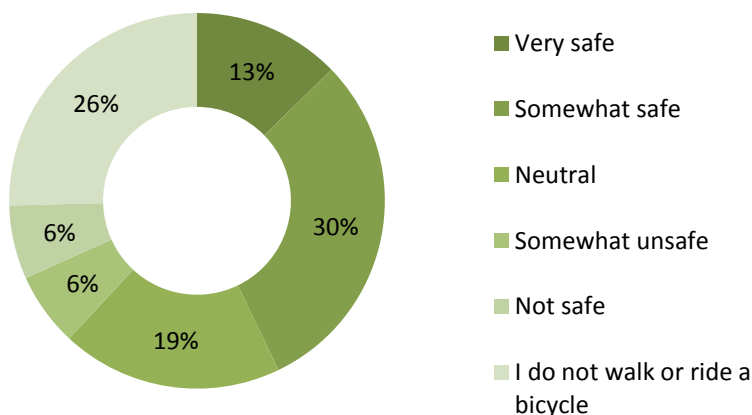
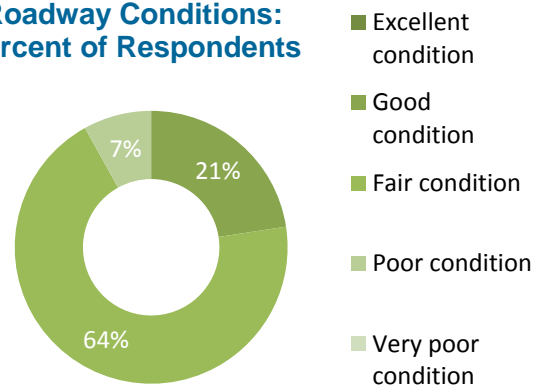


Figure 3-2: Gravel Roadway Conditions: Percent of Respondents



“I walk along the 37 bypass and appreciate the walkway.”

Future Transportation Improvements

Survey participants were asked a series of questions about the needs of the Davison County transportation system in the next 20 to 30 years. One question asked respondents to select the three most important areas of transportation improvements they see for Davison County. Of the 66 participants who answered this question, the top three areas are:

- County Road Maintenance
- City Street Maintenance
- Township Road Maintenance

Additionally, four participants responded “Other” and provided an explanation for improvements they foresee the County needing over the next 20 to 30 years. Three of the four stated bridge replacement or maintenance was important to them. The other participant stated ensuring roads can “handle the heavy traffic without breakup” was important.

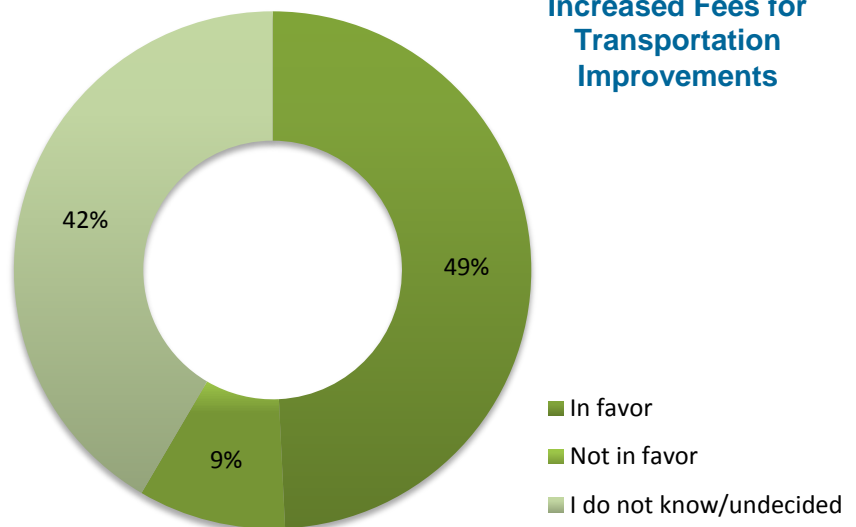
Transportation Funding

As a component of prioritizing transportation improvements and evaluating transportation funding possibilities, survey participants were asked about their willingness to support potential increases in fees to support transportation improvements in Davison County. Of the 65 respondents, approximately 49 percent would be in favor of fee increases to support transportation improvements. Additionally, approximately 42 percent stated they were undecided and approximately 9 percent were not in favor of fee increases.

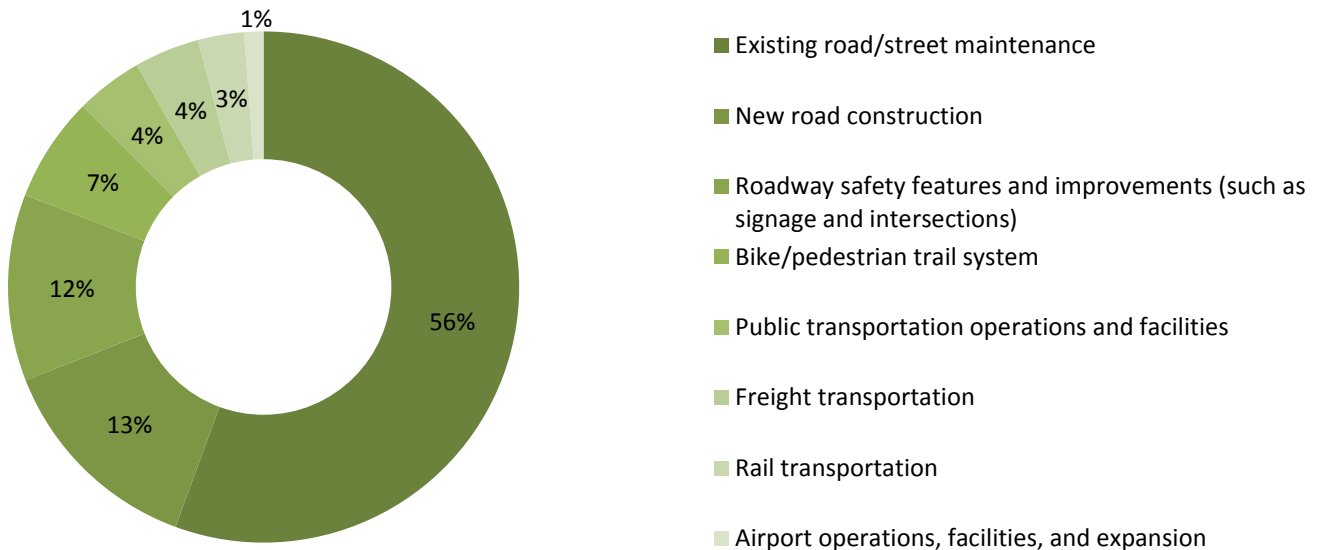
Survey participants were asked to create a budget for future transportation improvements using \$100 and distributing the amount between improvement categories. Of the 58 respondents of this question, nearly 56 percent of all funds budgeted were spent on existing road or street maintenance. Of the 58 respondents, 8 chose to budget the entire \$100 on existing facility maintenance. Figure 3-5 presents the percent of the total funds budgeted for each improvement category.

“Road conditions. Specifically for semi traffic. Many roads don't seem too bad until you drive a semi over them. They are very rough and sometimes it is hard to control the semi safely.”

Figure 3-4: Support for Increased Fees for Transportation Improvements



**Figure 3-5: Budget for Future Transportation Improvements:
Percent of Total Amount**



Stakeholder Meetings: Project Review

A second set of stakeholder meetings were held on June 4, 2015 at the Davison County Fairgrounds to present the list of projects generated to address identified needs, historic and current funding levels for transportation, results of the internet survey, and draft sections of the plan. Eighteen persons registered at one of the two meeting times. Attendees had the opportunity to review informational displays, a presentation on the plan, and discuss the plan with County and Consultant staff.

Feedback gathered during the stakeholder meetings included:

- Support for maintaining the existing system first.
- Bicycle and pedestrian projects should be prioritized after general maintenance and existing roadway system improvements.
- Bicycle and pedestrian projects that are low-cost and easily integrated into other projects should take initial priority over larger, stand-alone bicycle and pedestrian projects.



Stakeholder attendees listen to a presentation on the Davison County Master Transportation Plan.

- General discussion about the funding available through the newly passed Highway Funding Bill (became Law on April 1, 2015), including funding identified for Counties and the State.
- Consideration to the replacement and maintenance of small bridges and culverts not under inspections should be considered.
- Support of improvements to Spruce Street, including a future trail connection as a separate project.

Public Open House: Project Review

A second public information meeting was held on June 4, 2015 at the Davison County Fairgrounds following the stakeholder meetings. Attendees had the opportunity of review the list of projects and priorities generated to address identified needs, historic and current funding levels for transportation, results of the internet survey, and draft sections of the plan. Attendees also had the opportunity to view a presentation on the plan and Davison County transportation funding needs.

Twelve persons registered at the meeting including project staff. Comments provided during the meeting generally echoed comments made during the stakeholder meetings and also offered new thoughts and suggestions, including:

- Bicycle and pedestrian projects should be a lower priority than general roadway maintenance and existing system improvements.
- Transportation funding needs to be identified to reduce the current funding gap.
- Provide a public service announcement at the onset of harvest season each fall, reminding both farmers/truck drivers/motorists and bicyclists/pedestrians the rules of the road and to be alert and aware of conflicts during the harvest season.
- Question regarding making 245th Avenue or 247th Avenue the primary east-west route in the northern part of the County.

One written comment was received after the public meeting about the 254th Street segment between 403rd Avenue and 408th Avenue being too narrow for the level of traffic and large equipment. The written comment also noted the safety concerns of bicyclists and pedestrians along 254th Street.

Written comments are included in Appendix C.

4. Needs Assessment

Transportation Network Needs

Prior to beginning the planning process for the Davison County transportation network, the SAT determined preliminary issues that would need to be addressed in the Master Transportation Plan. These issues were identified as being one of five types: Bridge, Intersection, Drainage, Traffic, or Corridor. Each of the issues identified presents a need for the Davison County Master Transportation Plan to address.

Through the public involvement process additional issue locations and needs were identified that fit within those categories. Three additional categories were created to include issues that did not fit into the five previously identified categories, Pedestrian/Bicycle, Maintenance, and Urbanized Growth-related issues. The issue location identified by the SAT and the public are shown in Figure 4-1. Each issue category is described below with specific locations identified to clarify issues relate to specific locations within Davison County.

Bridge

Bridges identified as issues within Davison County are those creating barriers for travel throughout the County via heavy truck or agricultural equipment and/or those programmed for repair or replacement. The SAT identified the James River Bridge on 250th Street as in need of repairs to maintain access across the James River. The bridge is the longest bridge under maintenance by the County and is on an important route for the movement of goods from Hanson County to destinations within Davison County.

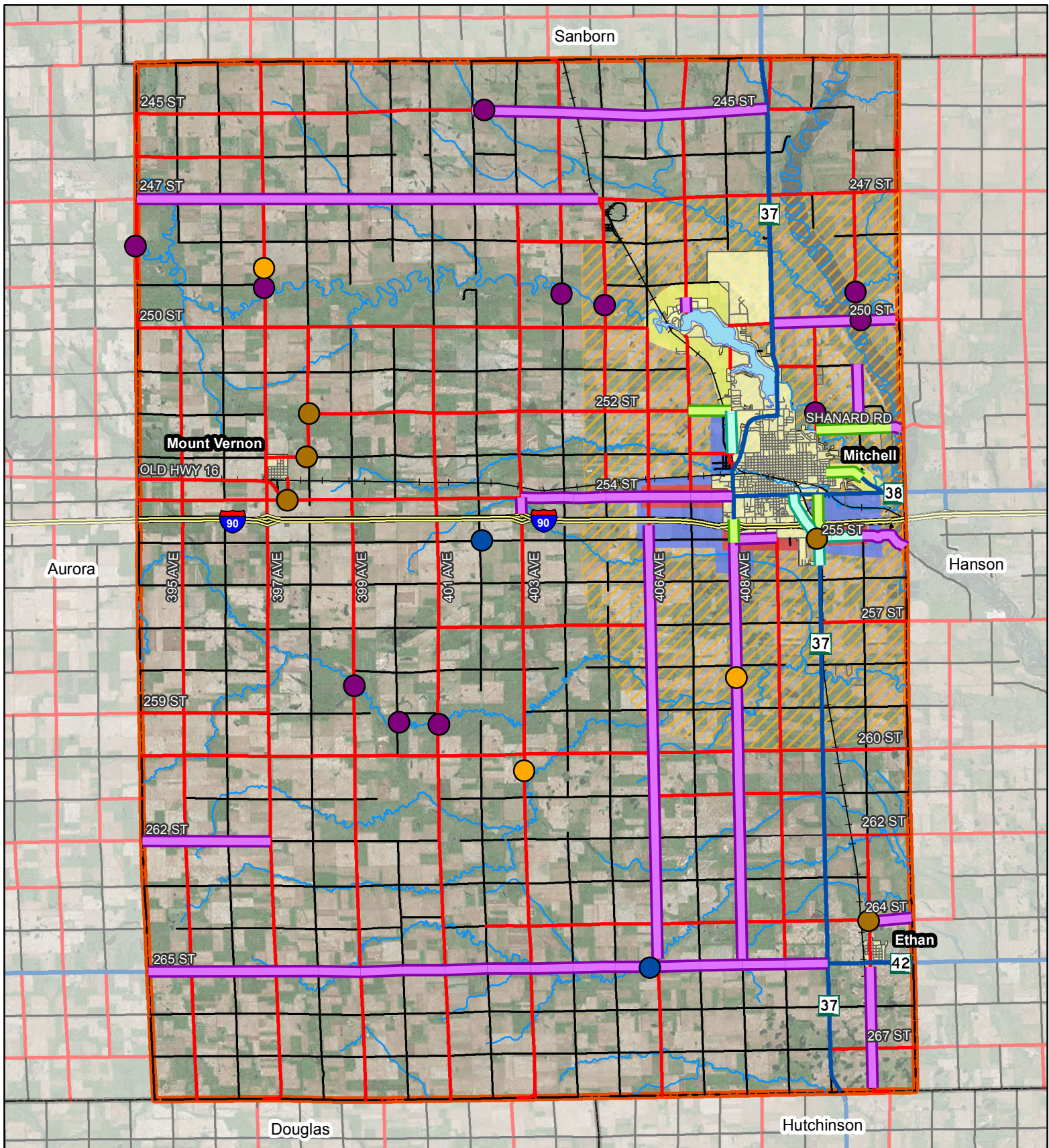
The public noted nine additional bridges throughout Davison County that are frequently traveled, but pose a mobility restriction and are in need of improvements to meet their needs. Many of the bridges identified by the public were noted as being weight restricted or too narrow for easy movement across the structure.

County-wide bridge conditions and needs are discussed further in the Bridge Plan section of the Davison County Master Transportation Plan (Chapter 6).

Intersection

Intersection issues within Davison County primarily relate to safety concerns from sight distance near the intersection and/or geometric design of the intersection. Three intersections were identified by the SAT as locations of concern for the County, with additional intersections identified by the public. These intersections are as follows:

- 264th Street and 411th Avenue – safety and geometrics; large free right-turn movement.
- 254th Street and Haynes Street (South of Mount Vernon) – safety and geometrics; large free right-turn movement.



**Figure 4-1:
Transportation
Needs**

Legend

Need Type

Bridge

Drainage

Intersection

Maintenance

Traffic

Pedestrian/Bicycle

Corridor

City of Mitchell Growth Areas

Acreage and Low-Density Development

Commercial Development

Industrial Development

Suburban Residential Development

Interstate

State Highways

County Roads

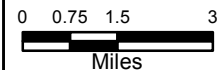
Township Roads

Rail Lines

Rivers & Streams

Cities

Study Area (Davison County)



1 in = 3 miles



- 252nd Street and 398th Avenue – safety due to sight obstructions; trees along roadway and intersection in southeast quadrant
- 253rd Street and 398th Avenue – safety and geometrics; large free movement

Drainage

Two locations have been identified as having drainage issues by the SAT and public during the development of existing issues. The SAT noted that drainage was a concern on 265th Street just west of 406th Avenue. At this location, a stream runs adjacent to 265th Street creating a steep slope from the roadway directly to the stream.

The second drainage issue location is along 225th Street near the intersection of 402nd Avenue. The public indicated that during heavy rainfalls and flood events, the roadway is often overtopped by the adjacent stream making the roadway nearly impassable.

Maintenance

The Davison County Highways Department continually tracks and addresses maintenance needs throughout the County. During the public participation process, both general maintenance and location specific maintenance issues were identified. With regard to general maintenance issues, these were typically related to the development of a washboard effect on gravel roads and winter snow maintenance. "Washboarding" is frequently tied to high or increasing traffic volumes and high travel speeds and are noted at certain locations throughout Davison County.

The first location noted by the public is along 397th Avenue just north of Firesteel Creek. According to the residents of the County, this location is prone to "heaving" in early spring or after a heavy rain. The second location is also prone to "heaving" and is located along 403rd Avenue between 260th and 261st Streets. The final location where maintenance is a noted issue is along the roadway on 408th Avenue between 258th and 259th Streets.

Existing Traffic Conditions

Issues related to heavy traffic and congestion along Davison County roadways were identified by the SAT prior to the first public meeting. Two roadways were identified as having significant traffic issues that need to be addressed. The first location is along 255th Street (Spruce Street). This location features heavy traffic to and from MTI, the Mitchell Livestock Auction, and JD Concrete Products located just east of SD 37. Additionally, Spruce Street is the primary roadway to and from Dakotafest creating event-related traffic issues along the corridor before, during, and after the event.

Traffic issues along Spruce Street have sparked interest in creating new access to the area via an extension of Foster Road or a new north-south roadway between SD 37 and 411th Avenue. Both of these roadway recommendations were identified during stakeholder and public meetings held to discuss existing conditions.

The second location identified by the SAT as having existing traffic issues is 408th Avenue (Ohlman Street) between 252nd and 253rd Streets. This stretch of roadway is noted as having

heavy traffic to and from commercial and industrial land uses along Ohlman Street and 252nd Street (23rd Avenue or Cemetery Road). Ohlman Street provides access to residential land uses north of 23rd Avenue. The combination of land uses and volume of traffic make this a corridor roadway that supports traffic much of the day.

A third roadway segment was identified by the public as having traffic issues. The segment of SD 37 extending from SD 38 through Spruce Street is a main commercial corridor for the City of Mitchell with access to and from the interstate system. The southern part of this segment is the northbound traffic's gateway into the urbanized area, requiring a reduction in speed. The public comments about this segment were primarily focused on the timing of traffic signals along SD 37 creating traffic issues during peak travel periods. Other concerns include the location of the speed reduction for northbound traffic (too close to Spruce Street), turning traffic to/from SD 37, and speed differential between vehicles (with noted emphasis on the high speeds).

Corridor

Corridor issues within Davison County are identified as roadways with multiple issues related to the design, safety, access, traffic operations, or pavement condition that may not be isolated to one location along the roadway. While most of the roadways with corridor issues were initially identified by the SAT at the onset of the study, the public provided additional issues and needs through many of the corridors and verified others. The following corridors have been identified as having issues to be addressed:

- **245th Street** (SD 37 to 402nd Avenue) – inconsistent roadway material, existing traffic volumes, rough roadway conditions near the surface material transition
- **247th Street** (Davison-Aurora County line to 405th Avenue) – inconsistent roadway material
- **Shanard Road** (Barber Place to Davison-Hanson County line) – potential flooding, bicycle and pedestrian safety
- **254th Street** (403rd Avenue to SD 37) – access, safety, design, existing traffic volumes, urbanized growth area
- **255th Street/Spruce Street** (SD 37 to Davison-Hanson County line) – existing traffic volumes, safety, bicycle and pedestrian access, event congestion, inconsistent roadway material
- **262nd Street** (Davison-Aurora County line to 397th Avenue) – inconsistent roadway material
- **264th Street** (411th Avenue to Davison-Hanson County line) – inconsistent roadway material
- **265th Street** (SD 37 to Davison-Aurora County line) – safety, design, roadway condition, congestion
- **403rd Avenue** (254th Street to I-90) – safety, design, existing traffic volumes
- **407th Avenue** (Carson Avenue to North Harmon Drive) – rough roadway conditions, inconsistent roadway material, urbanized growth area

- **411th Avenue** (253rd Street to Shanard Road) – safety, rough roadway conditions, urbanized growth area
- **411th Avenue** (SD 42 to Davison-Hutchinson County line) – existing traffic volumes, inconsistent roadway material

Unofficial Bypass Routes

Two truck bypass routes to avoid all or a portion of the City of Mitchell were identified through the initial SAT meetings and public involvement process. The first bypass route results from trucks traveling on SD 37 attempting to avoid issues south of the City of Mitchell. Instead of continuing on SD 37 through the City, trucks utilize 408th Avenue between I-90 and 265th Street. 408th Avenue provides a continuous route parallel to SD 37, avoiding lower speed, higher volume roadways within the City of Mitchell at the I-90 and SD 37 interchange.

The second bypass route occurs along the east and north sides of Mitchell, between the I-90 and Riverside Drive interchange to the east (in Hanson County) and the SD 37 and 250th Street intersection east of Lake Mitchell.

These routes were not constructed to handle the continuously increasing volumes of trucks, creating safety concerns for other motorists and maintenance issues with the roadway pavement. Further, the truck volumes are also a consideration to the James River Bridge crossing on 250th Street.

Pedestrian/Bicycle

Non-motorized transportation needs within Davison County fall into two main categories: access and safety. Within the City of Mitchell, there is a well-connected network of sidewalks and planned bike paths. However, I-90 creates an access barrier between the City of Mitchell and the MTI. This need is well documented within the county and creates additional access issues during peak times and during events.

The second major need is overall safety improvements for pedestrian and bicyclists. Safe facilities need to be provided along major use corridors to ensure pedestrians and bicyclists are not competing with vehicles for roadway lanes. In rural areas, shoulders are needed to provide safe locations for non-motorized users to buffer themselves from vehicles, especially along roadways with high traffic volumes or increased speed limits.

Urbanized Area Expansion

As the City of Mitchell continues to grow outward into the surrounding rural areas, several common issues will surface as there is a transition from rural to suburban/urban residential, commercial, or industrial land uses. Several of these issues were voiced through the public involvement process by those that live in these transition areas. These may include, but not limited to:

- Desire for paved roadways
- Improved connectivity (multiple routes to access a location)

- Accommodation of increasing traffic volumes (traffic control, roadway geometrics, roadway surface)
- Access to or new pedestrian/bicycle facilities
- More frequent maintenance of granular surface roadways and paved roadways

Planning Year Traffic and Operations Analysis

In order to better understand how projected future traffic volumes may impact traffic operations within Davison County, a future year traffic operations analysis was conducted based on the forecasted 2035 Planning Year traffic volumes.

2035 Planning Year – Traffic Forecasts

Traffic volumes were forecasted to a 2035 Planning Year horizon using a growth rate similar to what was used in factoring recent traffic counts to 2015 Existing Conditions. A straight-line 2.3 percent growth rate was applied to County and State highway routes. A straight-line 2.2 percent growth rate was applied to I-90 traffic volumes. Figure 4-2 provides a comparison of the 2015 Existing Conditions and 2035 Planning Year traffic volumes, illustrating the anticipated growth over the following 20 years.

2035 Planning Year – Route Volume-to-Capacity

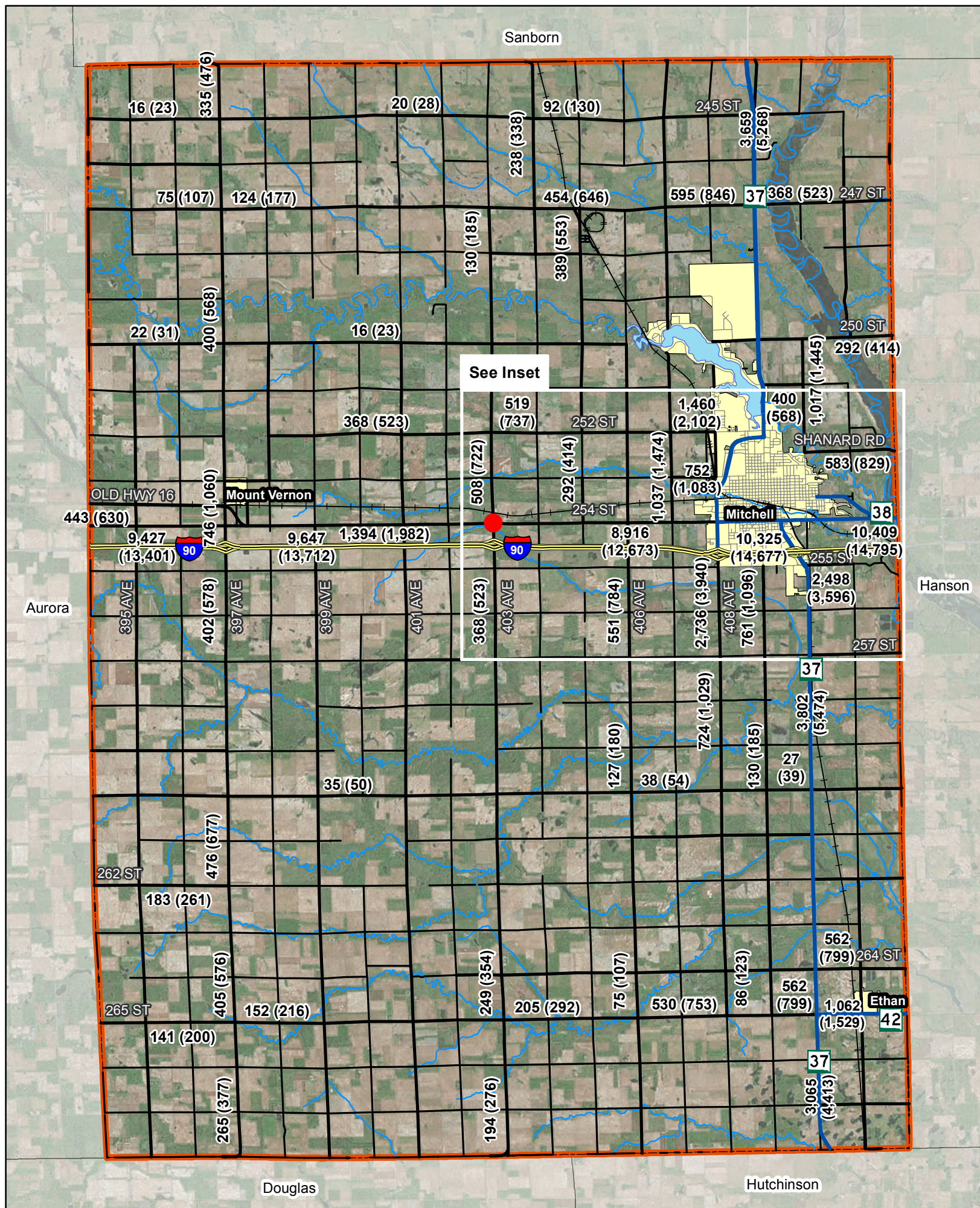
The 2035 Planning Year traffic volumes and planning-level volume-to-capacity ranges for roadway segments are provided in Figure 4-3. Similar to the 2015 Existing Conditions traffic volumes, all Davison County jurisdictional roadways are projected to exhibit a planning level capacity ratio of 'Below 60% Capacity,' depicted by a green roadway segment.

Three locations approach the 4,800 vehicles per day (vpd) threshold, representing between 60 percent and 80 percent of capacity: 254th Street between 407th Avenue and the Mitchell city limits, Spruce Street east of SD 37, and 408th Avenue south of I-90.

2035 Planning Year – Intersection Level of Service

The 254th Street and 403rd Avenue intersection turning-movement volumes were forecasted to 2035 using the SDDOT-provided straight-line growth rate of 2.3 percent, similar proportions of daily traffic volumes entering the intersection within the AM and PM peak hours, and existing turning-movement percentages. Based on this methodology, the projected 2035 Planning Year operations for this intersection is projected to be at LOS B at the worst-case stop-controlled approach in the AM and PM peak hours.

One thing to note is that this projection assumes a straight-line growth over the following 20 years, or an increase in overall traffic volumes of approximately 46 percent. This forecast is subject to change due to factors not accounted for in this projection, such as significant development or change in traffic patterns on the west side of Mitchell.



Legend

- Intersection Studied
- Interstate
- State Highways
- County Roads
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)
- X,XXX** Existing Average Daily Traffic (ADT)
- (X,XXX)** Forecast Average Daily Traffic (ADT)

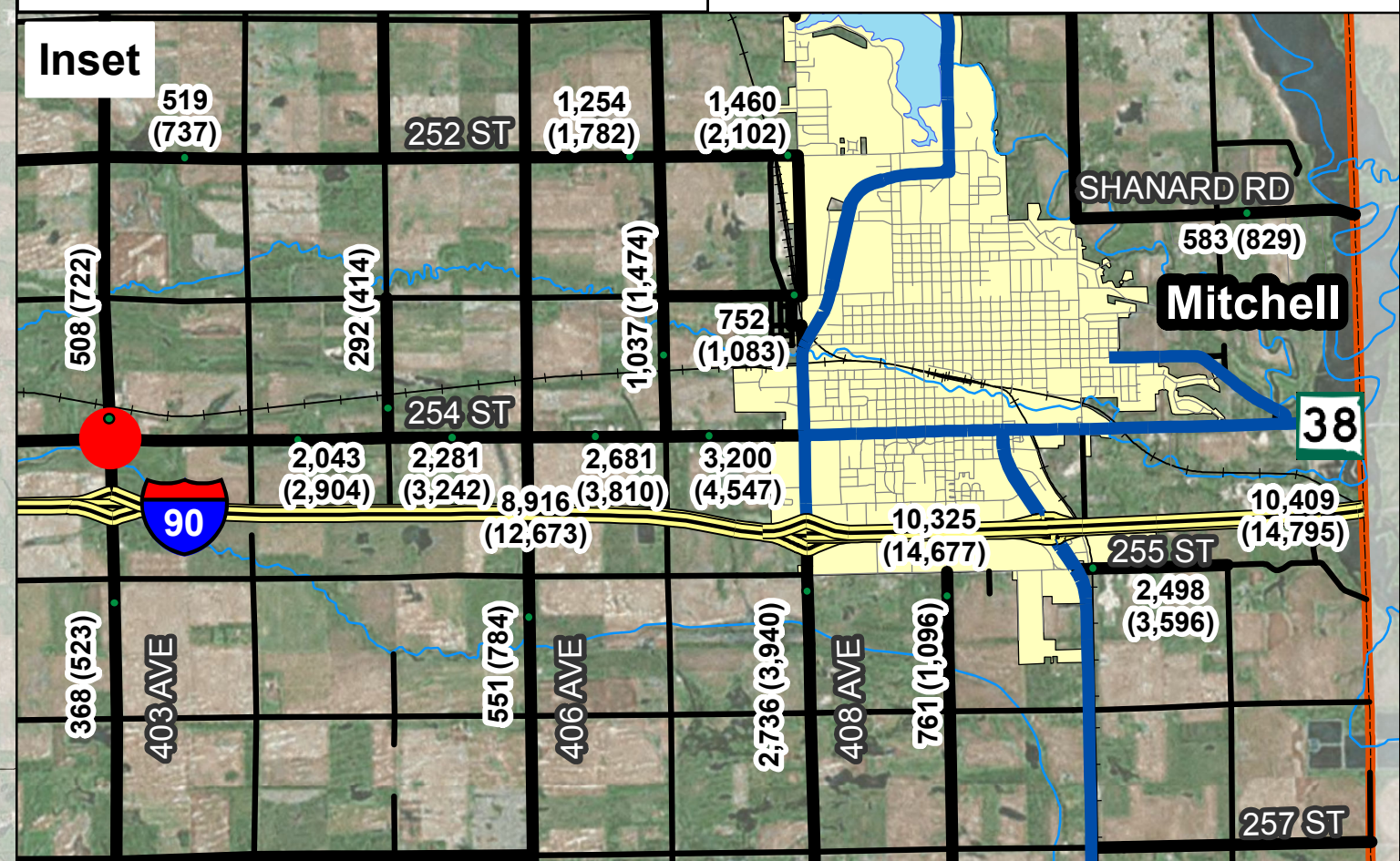
**Figure 4-2:
Existing (2015) & Forecast
(2035) Year Traffic Volumes**

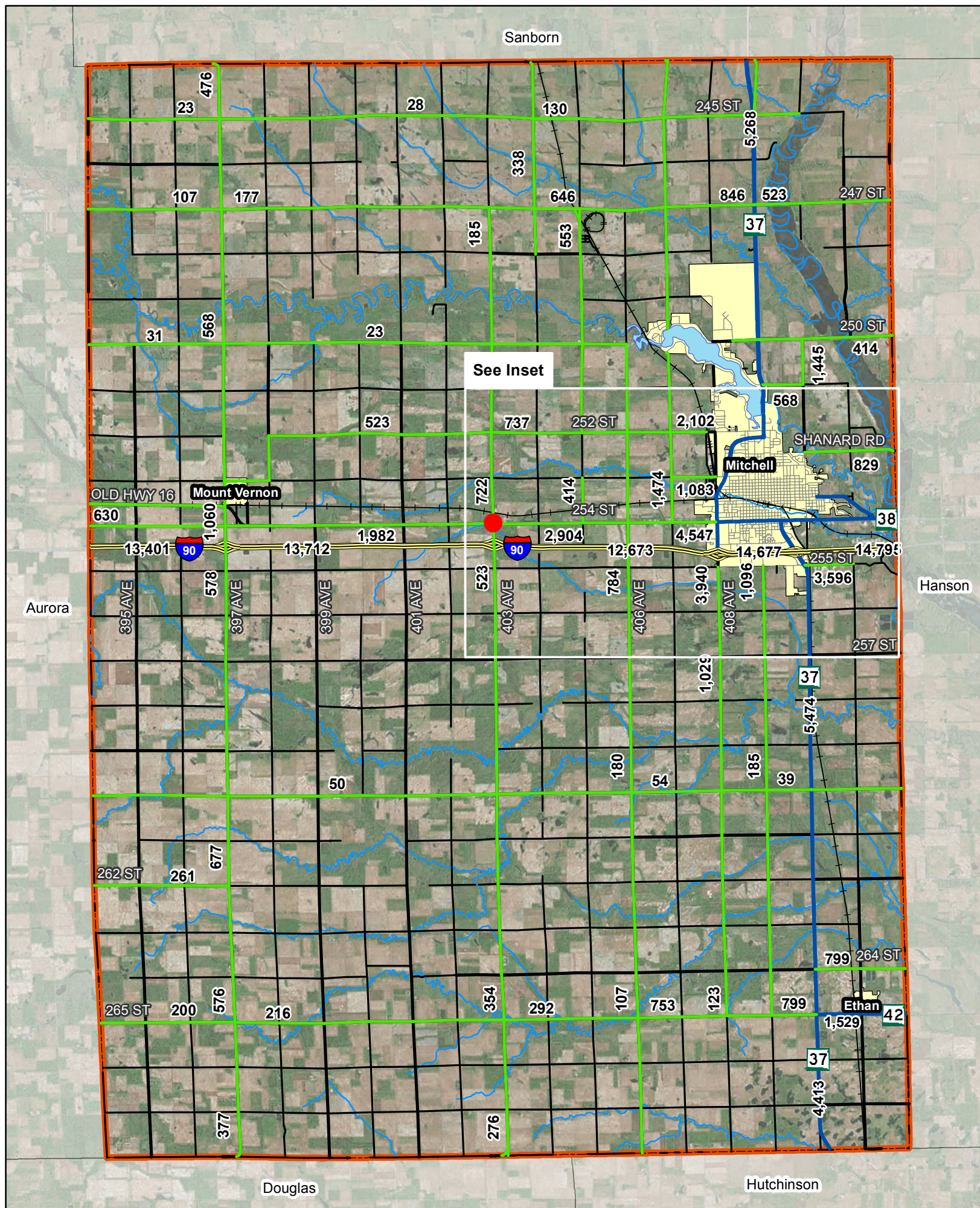
Davison County
MASTER TRANSPORTATION PLAN

0 0.75 1.5 3
Miles
1 inch = 3 miles



Inset





Legend

Volume to Capacity Ratio

Above Capacity Threshold (1.0+)

Between 80% and 100% of Capacity (0.8 - 1.0)

Between 60% and 80% of Capacity (0.6 - 0.8)

Below 60% of Capacity (0.0 - 0.6)

Intersection Studied

X,XXX Forecast Average Daily Traffic (ADT)

Interstate

State Highways

County Roads

Township Roads

Rail Lines

Rivers & Streams

Cities

Study Area (Davison County)

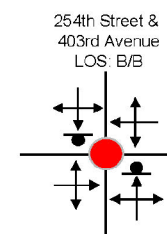
**Figure 4-3:
Forecast (2035) Year Traffic
Volumes & Level of Service**

Davison County
MASTER TRANSPORTATION PLAN

0 0.75 1.5 3
Miles
1 inch = 3 miles



Intersection Studied



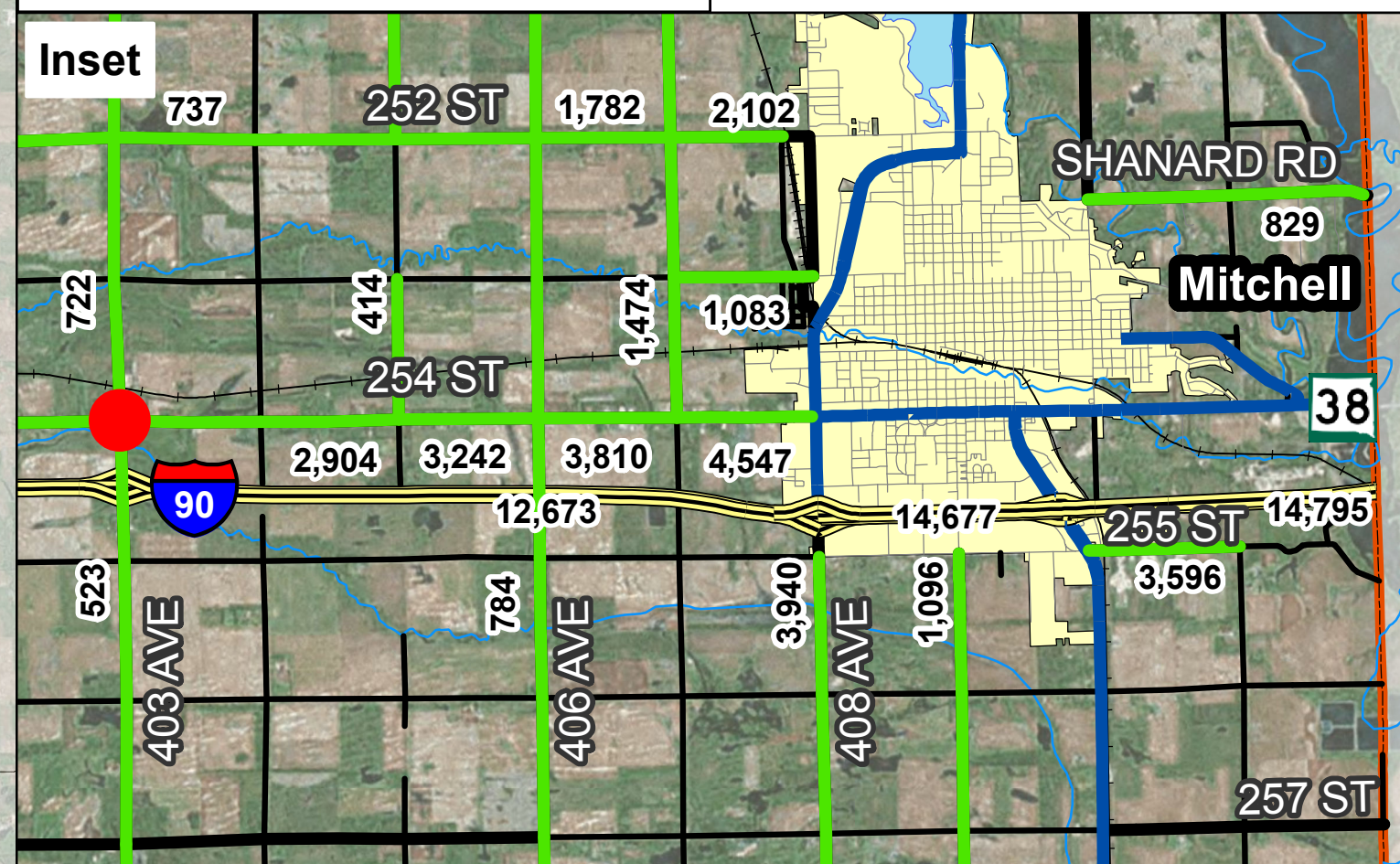
Inset Legend

Intersection

Stop Sign

X/X Existing AM/PM Level of Service

Inset



Traffic Operations Analysis Summary

Three segments were approaching the 60 percent volume-to-capacity threshold of 4,800 vpd: 254th Street between 407th Avenue and the Mitchell city limits, Spruce Street east of SD 37, and 408th Avenue south of I-90. All three locations are located within or extend into the urban fringe growth areas, and should be regularly monitored as development continues outward from Mitchell.

Similarly, the 254th Street and 403rd Avenue intersection will continue to see increasing traffic volumes as Mitchell continues to grow to the west and north. With access to I-90, the 403rd Avenue to 254th Street movement is a western gateway for Mitchell and provides motorists an unofficial bypass route to the north. Further, 254th Street provides the alternate, parallel route to I-90 from cities such as Mount Vernon and Plankinton to the west. The overall makeup of trips through the intersection is a diverse mix. Occurrences such as new development and shifts in travel patterns, both locally and further away from the corridor, will continue to contribute to increasing intersection traffic volumes.

It should be noted, that the quantification and measurement of route volume-to-capacity does not depict peak hour traffic volume impacts or non-recurring type traffic fluctuations such as special events or operational effects from large, slow-moving vehicles. It also fails to differentiate between corridors with significant variations in frequency of access locations and spacing. Further, unforeseen development or shifts in traffic patterns may have significant impact on specific routes in Davison County. As localized congestion or traffic issues arise, these locations may require further analysis with more detailed data collection to assess the specific conditions

Needs Summary

Overall, the Davison County transportation system provides roadway users a well-connected network of roads that are in good condition. Like any transportation network, there are issues that need to be addressed to maintain user mobility, safety, and an acceptable level of service. Within Davison County, there are nine issue areas identified for the Master Transportation Plan to address. The nine issue areas and a summary of the approach to addressing the needs for each area are below:

Bridges:

Bridges in Davison County are in need of repair or replacement to maintain mobility of users traveling within the County. Bridges will be further reviewed in the Bridge Plan included as part of the Master Transportation Plan. In general, bridge improvements will be prioritized to maximize benefit of users while addressing connectivity needs.

Intersections:

The four intersections will be examined to determine additional needs and design standards that may address the issues identified, either sight distance or geometric design. Projects will be recommended for these intersections as part of the implementation of the Master Transportation Plan.

Drainage:

Locations identified as having drainage issues will be reviewed for design standards to determine necessary improvements to address drainage concerns. Design standards will be recommended that will identify drainage areas within or adjacent to County roadways.

Maintenance:

Maintenance issues located throughout Davison County are monitored by the County Highways Department on a regular basis. Recommendations addressing maintenance issues identified by the public will be included in the implementation section of the Master Transportation Plan.

Traffic:

Traffic operational improvements to address traffic-related issues will be identified at issue locations. Recommendations for policy and design improvements will be included in the Master Transportation Plan. Additionally, improvements currently underway in and around issue areas will be included in the Plan for consistency with other planning documents.

Corridor:

Corridor issues impact numerous areas within the County and affect the mobility and safety of many roadway users. Recommendations will be identified to address both general and location specific issues noted. Standards and policies will be identified that will be transferable and adaptable as existing issues are addressed and future issues are identified.

Unofficial Bypass Routes:

Unofficial bypass routes are being utilized to avoid traffic-related issues in and around the City of Mitchell. Priority routes and route function will be reviewed as part of the Major Roads Plan to determine the suitability and need for facility-type changes to enhance these routes or deter additional traffic on the routes. Recommendations will be made for improvements that will maintain mobility and be compatible with adjacent land uses along the routes.

Pedestrian and Bicycle:

Issues related to pedestrian and bicycle facilities will be examined to determine the appropriate approach for providing a safe and connected multi-modal network. The recommended improvements will seek to balance the needs of both recreational and non-recreational facility users, while providing design standards that are adaptable to specific roadway needs.

Urbanized Area Expansion:

As the City of Mitchell continues to grow, the transportation network will continue to transition from rural to urban design standards. The Master Transportation Plan will identify additional areas around the City of Mitchell that may experience the transition during the planning horizon. Recommendations for design and policy of these roadways will be included to insure consistency as the City of Mitchell expands.

5. Major Roads Plan

Davison County Roadway Network

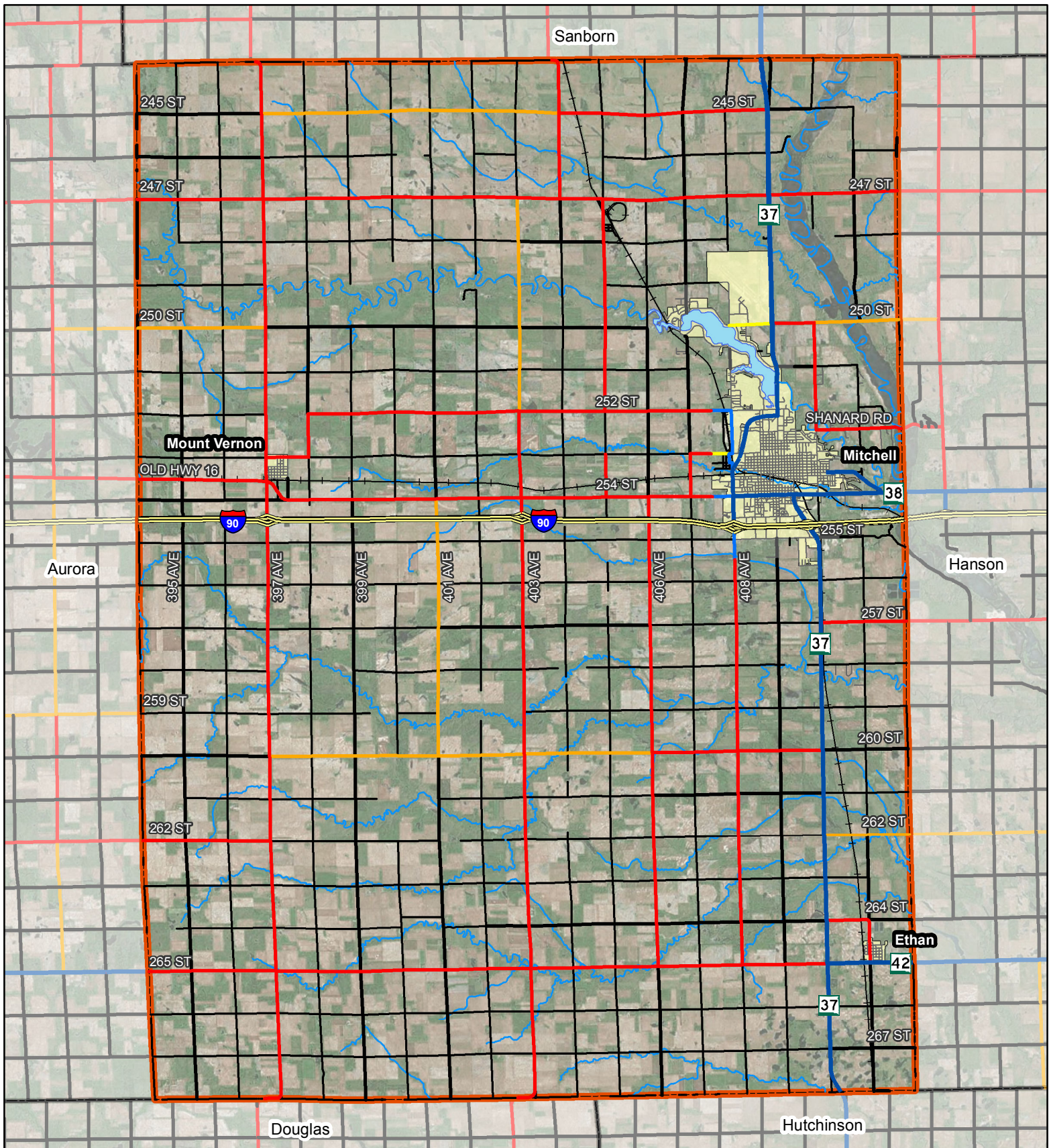
The roadway network in Davison County is an interconnected network of highways and roads, including one Interstate highway (I-90), three State highways (SD 37, SD 38, and SD 42), numerous County roads, and a system of local and township roadways connecting to the primary traffic routes. The County's existing roadway network and roadway Federal Functional Classification (FFC), in conjunction with a regional view of connectivity and continuity with adjacent counties, is shown in Figure 5-1.

The transportation network generally includes a well-connected grid of roadways which effectively serves local and regional traffic; however, there are some limiting issues. Many of the township roads and some of the County roads have gravel or otherwise unimproved surfaces which may not be suitable for all trips, such as heavy truck traffic. This can limit network connectivity in areas where there is demand for this type of service. In addition, the James River and the many creeks that traverse Davison County create barriers to connectivity within the County, limiting the ability to connect the County-wide roadway grid. In an effort to address these issues, the needs identified by the SAT and the public, and promote effective long range planning, the following Major Roads Plan was developed.

Davison County Roadway Classifications

The Major Roads Plan defines a roadway hierarchy to support the collection and distribution of traffic throughout the county and state. The Major Roads Plan is used to guide programming and planning for the more significant roadways within Davison County. The Plan provides a framework for the development and implementation of a system of standards and guidelines to maximize benefits from roadway improvements.

As part of the Major Roads Plan, roadways are classified based on their relative relationship in the roadway network, ranging from emphasis on regional mobility (State highways) to local access (township roads). Roadways with a higher classification generally provide for longer trips, have limited access, and connect larger population center. Roadways with a lower classification generally provide for shorter trips, have more access, and connect to higher functioning roadways. The roadway categories used in the Proposed Davison County Major Roads Plan include State Highways, Major Collectors, Minor Collectors, and Local Roads.



**Figure 5-1:
Existing Federal
Functional
Classification**

Davison County
MASTER TRANSPORTATION PLAN

Legend

County Roads

- Rural Major Collector
- Rural Minor Collector
- Rural Local Road
- Urbanized Minor Arterial
- Urbanized Collector
- Urbanized Local Street

Interstate

State Highways

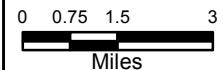
Township Roads

Rail Lines

Rivers & Streams

Cities

Study Area (Davison County)



1 in = 3 miles



State Highways

The State highways classification consists of Interstate, U.S., and South Dakota highways. State highways are the highest functioning roadways within Davison County and are intended to provide the highest level of speed and mobility, connecting large activity centers across the state and region. Davison County has four State highways, including I-90, SD 37, SD 38, and SD 42.

Major Collectors

Major collectors serve medium to long distance trips, connect smaller rural communities, carry intra-county traffic, and provide access from neighborhoods to the State highway system. They supplement the state highway system by emphasizing mobility, but are lower volume roads and provide a higher degree of access than State highways. Major collectors typically have cross road access, but limited private driveway access and medium to high speeds.

Minor Collectors

Minor collector routes provide supplementary interconnection among rural growth centers and connection to major collector and State highways. Minor collectors emphasize land access and generally carry lower volumes than State highways and major collector routes. Minor collectors can be paved or gravel roads, and they typically have no limitation to road or driveway access.

Local Roads

Local rural roads provide access to adjacent land, such as farms and residences, and connect to collectors or State highways. They are generally lower speed than rural collectors, provide service to travel over shorter distances, and often designed to discourage through traffic. Local roads typically carry the lowest traffic volumes of the roadway classifications.

Proposed Major Roads Plan

The proposed Major Roads Plan was developed in partnership with Davison County and SDDOT staff, and aligns with and builds upon the current FFC. The Major Roads Plan uses common terminology and classification characteristics to maintain consistent linkages between roadway type, established design guidance and standards, and future funding opportunities. However, it should be noted that the Major Roads Plan is independent of the FFC, but can be used as recommended adjustments to future classification evaluations. Discussion on the differences between the Major Roads Plan and FFC is provided in Appendix D.

When evaluating the existing FFC and identifying direction in which to drive the proposed Major Roads Plan, the following factors were considered as part of the development process:

- Trip length characteristics of the route as indicated by length of route, type and size of traffic generators served (i.e., freight and farm trucks), and route continuity.
- The ability of the route to serve regional population centers, regional activity centers, and other traffic generators.
- The spacing of the route to serve different functions (need to provide access and mobility functions for the entire County).

- The role of the route in providing mobility or land access (number of access points, access spacing, speed, traffic control, etc.).
- Assign prioritization of parallel routes or duplicate routes.
- Maintain regional connectivity and route continuity of similar facilities.
- The relationship of the route to adjacent land uses (location of towns, growth areas, industrial areas, and neighborhoods, etc.).

Given the agricultural landscape, existing densities, and the limited types of land development planned in Davison County, the road mileage should remain balanced through the County's roadway hierarchy. The Interstate and US/State highway network will continue to serve regional trips entering and exiting the County, while the County roadways are planned to serve shorter trips or key connections based on the classification in the Major Roads Plan. The proposed Major Roads Plan is shown in Figure 5-2.

Priority Routes

Priority routes within Davison County are primarily roadways identified as Major collectors in the County Roadway Classification. These roadways support inter- and intra-county trips and typically carry the greatest traffic volumes amongst County jurisdiction roadways. These routes are well spaced to provide higher levels of mobility throughout the County and connect key destinations within Davison County, including the cities of Ethan, Mitchell, and Mount Vernon. They also support economic generators like the ethanol plant near Loomis and the Spruce Street corridor.

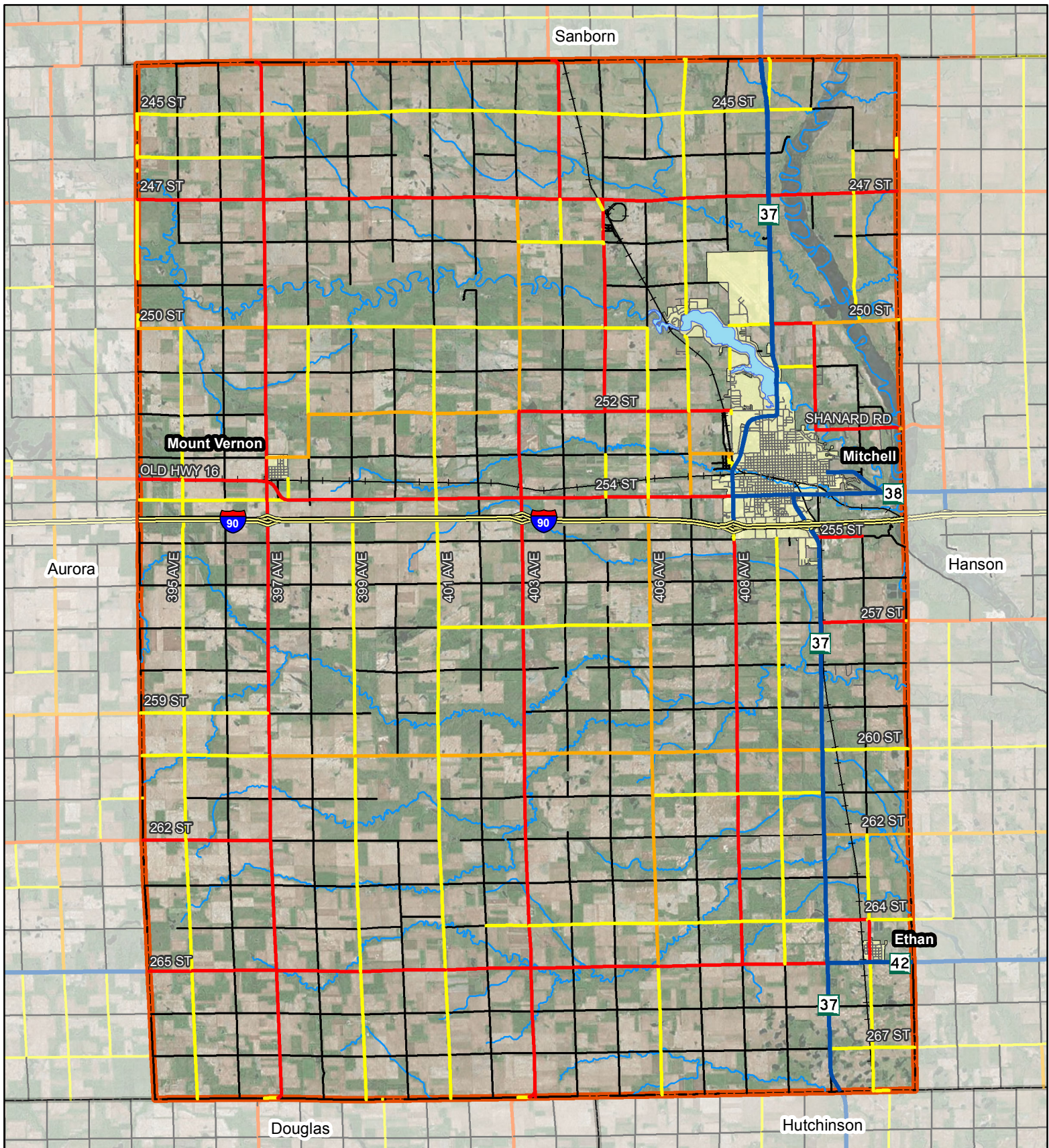
The priority routes also provide continuity along regional roadways for trips destined for counties surrounding Davison County. Maintaining regional corridors as priority routes supports regional economic growth as well as Davison County's economic base.

As the primary traffic carriers within the County roadway system, the identified routes will have priority for improvements and maintenance as the County outlines projects and implementation for the future. Additionally, the priority route improvements will be designed to maintain pavement condition, width, and weight limits in accordance with the Roadway Design and Policy Guide (Chapter 8).

Jurisdictional Realignment

From time to time, it is important to review roadway jurisdiction and maintenance responsibilities along roadway segments as the built environment and urbanized areas continue to evolve. This helps ensure that the transportation network, as a whole, is operating efficiently by reducing overall public cost of infrastructure, services, and maintenance to the roadway. Many factors play into the need to further evaluate jurisdictional transfer, such as expanding urban areas, rural vs. urban roadway mobility and functionality, construction of new roadways, redundant connections, traffic volume thresholds, route connectivity and continuity, and route prioritization due to shifts in traffic patterns, among others.

Figure 5-3 presents potential roadway segments that may be suited for transfer from one jurisdiction to another based on roadway needs, functionality, and changes to surrounding land use. This list has been developed based on discussions throughout the study process, planned projects, and assessment of network needs throughout the County. For each segment, further study and discussion is warranted prior to any transfer taking place, as a mutual agreement needs to be reached between the two parties that detail components of the transfer. It is recommended that process and procedures outlined by the SDDOT be utilized for any study or implementation of roadway jurisdiction realignment.



**Figure 5-2:
Major Roads
Plan**

Legend

County Roadway Classification

- Major Collector
- Minor Collector
- County Local

Interstate

State Highways

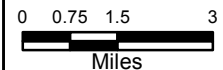
Township Roads

Rail Lines

Rivers & Streams

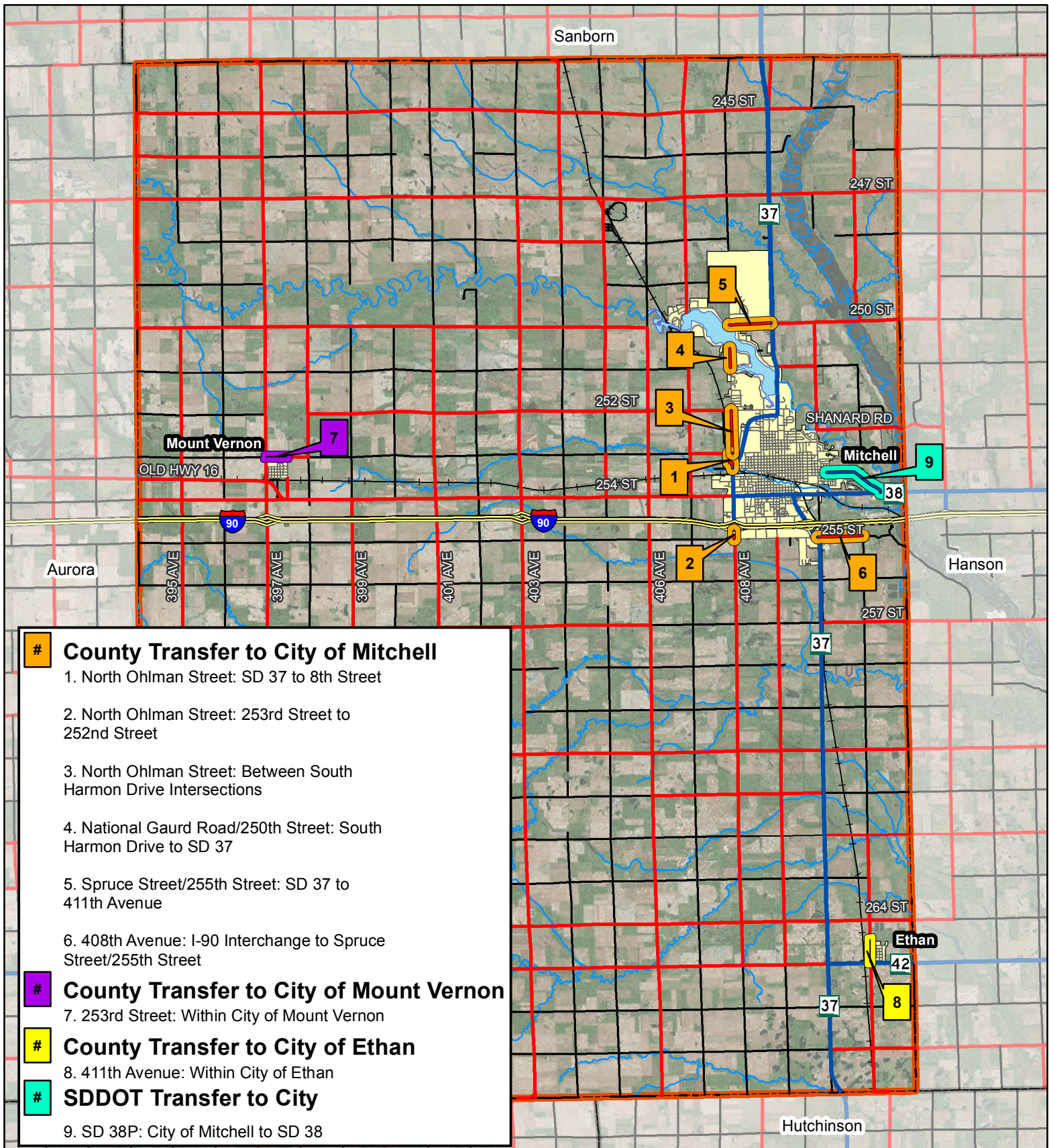
Cities

Study Area
(Davison County)



1 in = 3 miles





**Figure 5-3:
Candidate Roadway
Segments for Future
Jurisdictional Transfer**

Davison County
MASTER TRANSPORTATION PLAN

Legend

Potential Transfers

- County to City of Mitchell
- County to City of Ethan
- County to City of Mount Vernon
- State to City of Mitchell

- Interstate
- State Highways
- County Roads
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)

0 0.75 1.5 3
Miles

1 in = 3 miles



HRGreen

6. Bridge Plan

One of the most frequently noted issues by the public during the existing conditions public meeting was the condition and load restrictions of bridges throughout Davison County. Additionally, the cost of maintaining bridges within the county impacts the planning of transportation improvements into the future. This chapter will outline the condition of bridges within Davison County, examine the cost of bridge repair or replacement, and identify future needs for bridge improvements within Davison County.

Existing Bridge Conditions

Currently, Davison County is responsible for maintaining 88 of the 124 bridges within the County. These 88 bridges are part of a biennial inspection based on Nation Bridge Inventory System standards. When the bridges are inspected, they are rated based on the current level of sufficiency. These levels of sufficiency are used to indicate a measure of the ability of a bridge to remain in service. Each bridge is rated on a scale of zero to 100 percent, with 100 percent representing an “entirely sufficient bridge.”³ Based on the level of bridge sufficiency, Davison County bridges are currently in good condition. The 2014 county-wide bridge sufficiency average is 78.5 percent.

In addition to level of sufficiency, bridges are categorized as functionally obsolete, structurally deficient, or not deficient. These terms are often used to describe the current condition of a bridge, but it can be unclear what is meant by functionally obsolete or structurally deficient. The Davison County Master Transportation Plan adopts the definition provided by the FHWA for these terms.

Functionally Obsolete

Bridges are considered functionally obsolete when the deck geometry, load carrying capacity (comparison of the original design load to the current State legal load), clearance, or approach roadway alignment no longer meet the usual criteria for the system of which it is an integral part. In general, functionally obsolete means that the bridge was built to standards that are not used today.

Structurally Deficient

Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions.

³ *Bridge Preservation Guide: Maintaining a State of Good Repair Using Cost Effective Investment Strategies*, U.S. Department of Transportation, Federal Highway Administration, August 2011.

Within Davison County, 4 of the 88 bridges maintained by the County are considered Functionally Obsolete and 12 are considered Structurally Deficient.

An overview of the 88 bridges maintained by Davison County, with sufficiency rating and whether they are considered Functionally Obsolete or Structurally Deficient, are provided in Figure 6-1.

Weight Restrictions

Maintaining continuous routes with similar vehicular accommodations, such as load, width, and height, is an important part of county-wide mobility, particularly for the shipment of agricultural products and large equipment and structures. When a bridge is no longer able to accommodate a certain vehicle load or other characteristic, it becomes an obstacle within the transportation network requiring a detour that can sometimes lead to several miles of additional travel. It is important that the impacts of posting a bridge for a restricted load, particularly those loads less than what a typical vehicle carries over the bridge, be considered in the long-range planning of major bridge rehabilitation or replacement.

The posted bridges throughout the County, per the 2014 bridge inspection reports, include those identified in Figure 6-2.

In Davison County, one of the top priorities is to maintain a continuous route that accommodates the accepted loads (under the roadway restriction) along major corridors within the County. This includes major collectors, and to a lesser extent minor collectors, under the County's jurisdiction as identified in the Major Roads Plan. A factor has been established in the vetting of bridges eligible for rehabilitation and replacement to account for this importance of continuous routes that accommodate loads consistent with the roadway restrictions.

Bridge Needs

A bridge program is a balance of continual maintenance, preservation, and replacement of structures, maximizing the design life and performance of the existing infrastructure. Unfortunately, these needs often exceed available funding and improvements are often completed to the most urgent need. Further, waiting too long can significantly increase the cost of that improvement as the bridge continues to age and deteriorate. The age of bridges in Davison County are shown in Figure 6-3.

A planning-level assessment of current and future bridge needs within Davison County was developed to identify bridges that will likely require a major activity in the near future based on replacement and rehabilitation funding eligibility criteria under SAFETEA-LU⁴. Three tiers were identified, with bridges eligible for: replacement, rehabilitation, and those that are considered on a 'watch list' as being close to meeting rehabilitation or reconstruction criteria. In order to establish an order of magnitude cost of what these bridges will cost to replace, a planning-level

⁴ Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), signed into law on August 10, 2005. Provides bridge funding eligibility criteria currently used under current transportation bill.

cost estimate based on existing deck area was established for each tier. Additional detail of the calculations is provided in Appendix E.

Table 6-1: Bridge Funding Needs

	Number of Bridges	Reconstruction Cost (2015 \$)
Replacement	7	\$1,850,000
Rehabilitation	8	\$2,310,000
Watch List	7	\$4,400,000

Replacement: Sufficiency Rating of 50 and below AND Structurally Deficient or Functionally Obsolete (meets SAFETEA_LU replacement funding criteria)

Rehabilitation: Bridges eligible for rehabilitation funds; Sufficiency Rating of 80 and below AND Structurally Deficient or Functionally Obsolete (meets SAFETEA_LU rehabilitation funding criteria)

Watch List: Sufficiency Rating of 70 and below not included under replacement or rehabilitation categories

An estimate of per-bridge annual maintenance is approximately \$400 per year per bridge, or approximately \$35,000 per year for all bridges under County inspection. This cost accounts for minor maintenance items such as deck and joint cleaning or crack sealing.

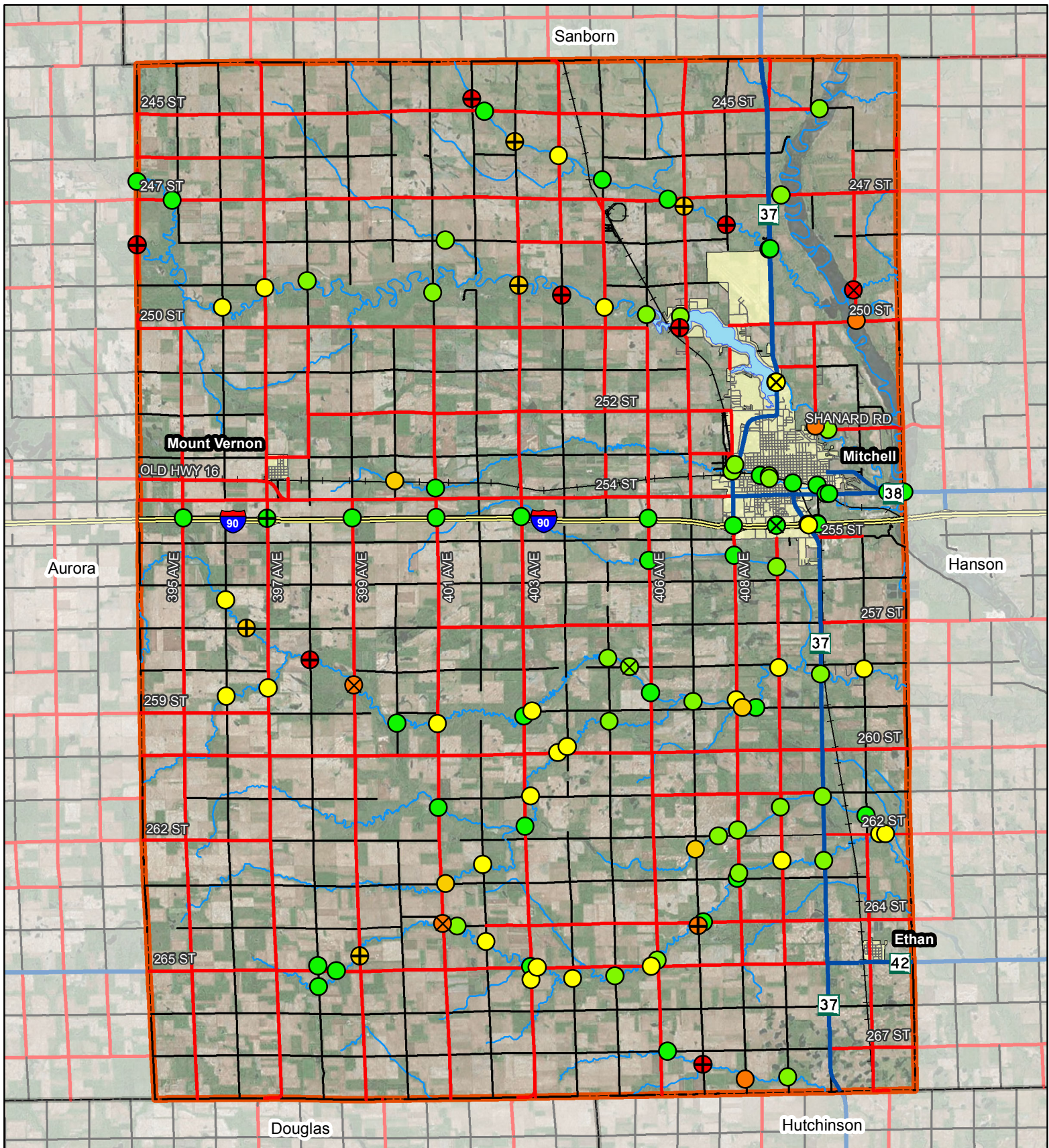
Bridge Priority Rating

A priority rating system for functionally obsolete and structurally deficient bridges in need of repair or replacement was developed from similar DOT priority rating systems, and tailored to the goals and priorities of Davison County. This priority rating system is designed to be used by Davison County to help prioritize and select bridges for improvement, combining the goals of the County's transportation network outlined throughout the Master Transportation Plan with the needs of the existing bridges.

The following criteria were incorporated into the prioritization of existing bridges in Davison County. The detailed breakout of prioritization points and rating of each bridge is provided in Appendix E.

- Sufficiency Rating (20 points possible)
- Estimated Average Daily Traffic (20 points possible)
- Bypass, Detour Length, Out-of-Distance Travel (20 points possible)
- Bridge Posting (15 points possible)
- Bridge Width (5 points possible)
- Bridge Length (15 points possible)
- Located on Priority Route; Major Collectors or Minor Collectors (10 points possible)
- Key Industry/Traffic Generator Route (10 points possible)
- *Total Points Possible = 115*

Current criteria for a bridge to be programmed through the SDDOT, under eligibility outlined through SAFETEA-LU, is a safety rating of 80 or below for rehabilitation, and 50 or below for replacement, and the bridge must be classified as structurally deficient or functionally obsolete.



**Figure 6-1:
Bridge Sufficiency
Rating/Deficiency**

Davison County
MASTER TRANSPORTATION PLAN

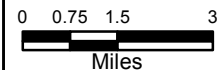
Legend

Sufficiency Rating Bridge Deficiency

- 50 or Below (7)
- 51-60 (6)
- 61-70 (9)
- 71-80 (24)
- 81-90 (20)
- 91-100 (22)
- ✕ Functionally Obsolete (4)
- ⊕ Structurally Deficient (12)
- Interstate
- State Highways

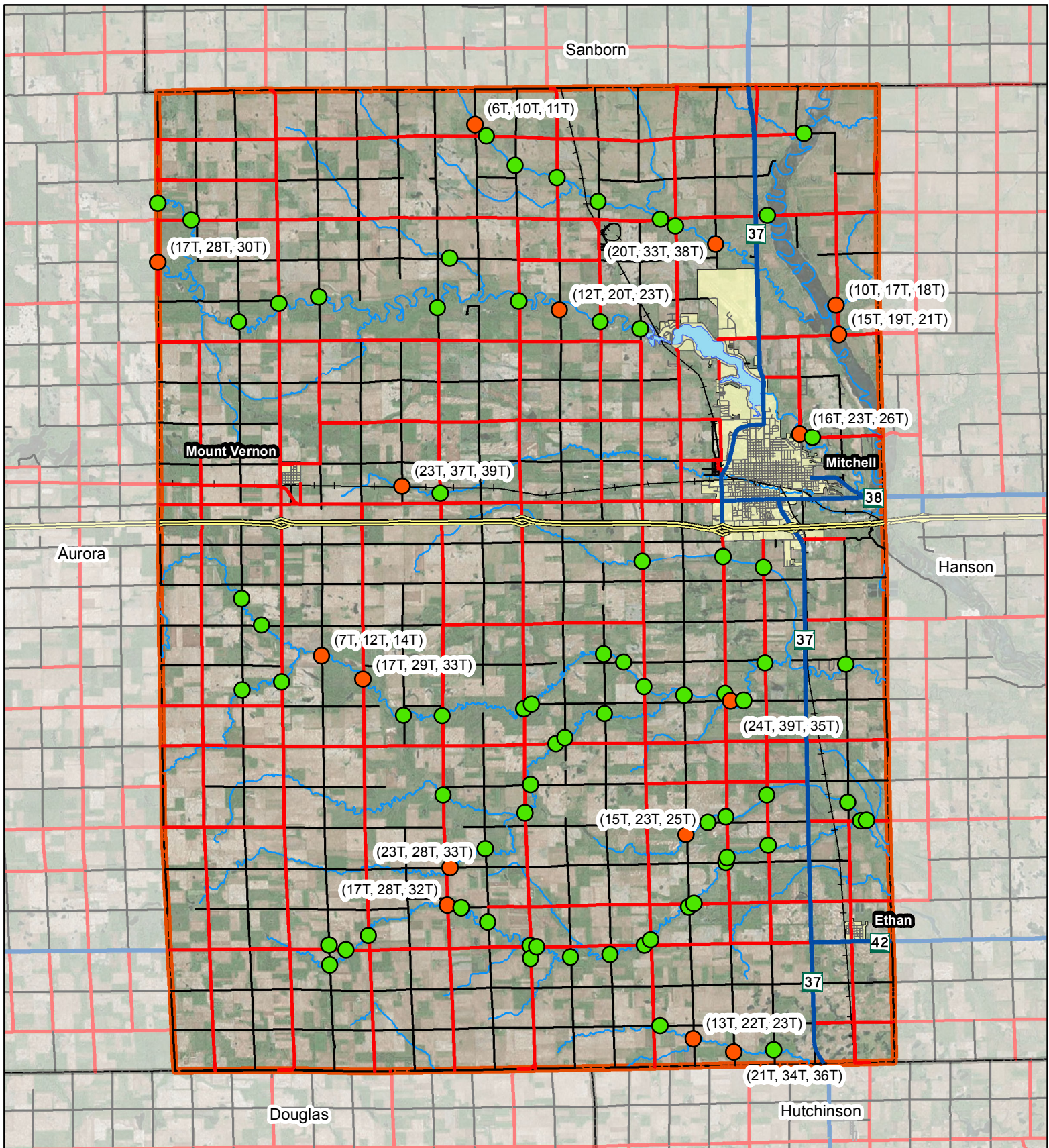
- County Roads
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)

* County inspected bridge counts for sufficiency and deficiency



1 in = 3 miles





**Figure 6-2:
County and Township
Bridge Restrictions**

Legend

Bridge Restrictions

● No Restriction (72)

● Posted Load Restriction (16)

— Interstate

— State Highways

— County Roads

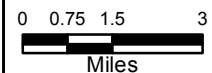
— Township Roads

— Rail Lines

— Rivers & Streams

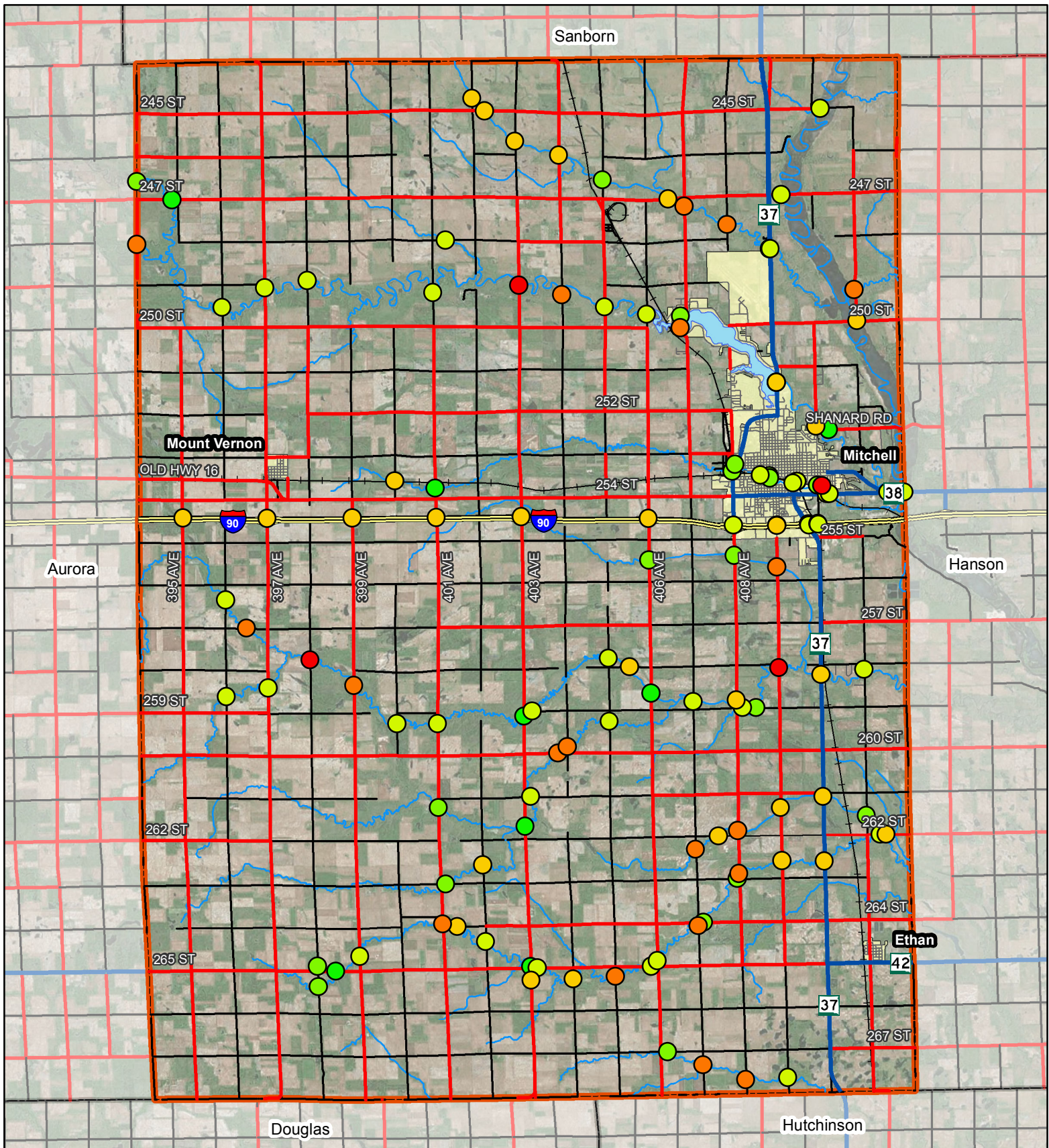
— Cities

— Study Area (Davison County)



1 in = 3 miles





**Figure 6-3:
Ages of Bridges
in Davison County**

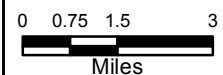
Davison County
MASTER TRANSPORTATION PLAN

Legend

Bridge Age

- Older than 100 Years
- 76 to 100 Years
- 51 to 75 Years
- 26 to 50 Years
- 11 to 25 Years
- 10 Years or Less

- Interstate
- State Highways
- County Roads
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)



1 in = 3 miles



7. Roadway Design, Analysis, & Policy Guidelines

This section covers a range of roadway design standards, guidance, and policy. This includes typical sections, pavement standards, maintenance performance standards, pedestrian and bicycle considerations, and guidance on asset management policy.

Roadway Design Guidelines

Typical Roadway Cross-Sections for New or Reconstructed Roadways

Standard roadway cross-sections for Davison County are based on engineering guidelines presented by the American Association of State Highway and Transportation Officials (AASHTO) Policy on Geometric Design of Highways and Streets 2011 Edition. These guidelines are the basis for the SDDOT Road Design Manual (2015 update) and SDDOT Local Roads Plan (2011 update), from which the typical cross-sectional elements were developed. A supplementary guide for low volume roads, less than 400 vehicles per day, is also applicable for the respective roadway conditions.

Typical cross-sections have been developed to ensure new and reconstructed roadways are built consistently and in a way that meets the needs of the community⁵. The cross-section standards for Davison County are defined in four categories by the Major Road Plan classification: major collector, minor collector, County local or township, and urban (see Chapter 5). The major collector classification is subdivided into two paved cross-sections based on a 1,500 vehicle per day threshold and a gravel cross-section. The minor collector classification provides a cross-section that accommodates either a paved or gravel surface. Figure 7-1 includes typical cross sections for each classification.

According to the SDDOT Local Roads Plan, the right-of-way (ROW) width should not be less than that required for all elements of the design cross sections, utility accommodation, and appropriate border areas; including, ditches for drainage on the sides of the roadway. The SDDOT Local Roads Plan and SDDOT Road Design Manual provide for flexibility in typical ROW widths to accommodate various typical sections.

⁵The typical cross-sections provide guidance, and the designer should use his or her professional judgment when determining the final roadway design. Each manual presents guidelines on roadway and roadside design as well as respective minimum design elements and criteria.

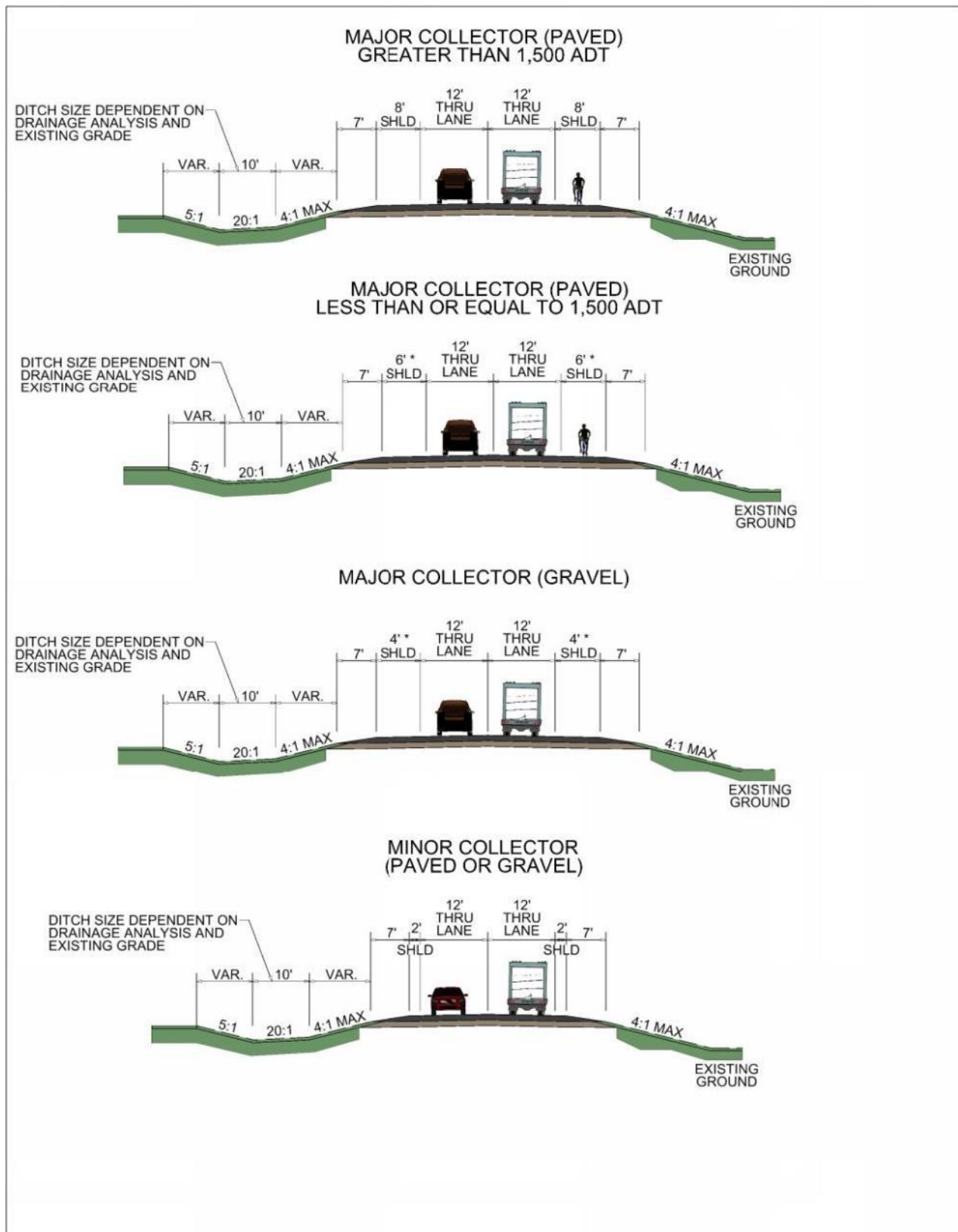


Figure 7-1: Typical Roadway Cross-Sections for Major Roads Plan Designations

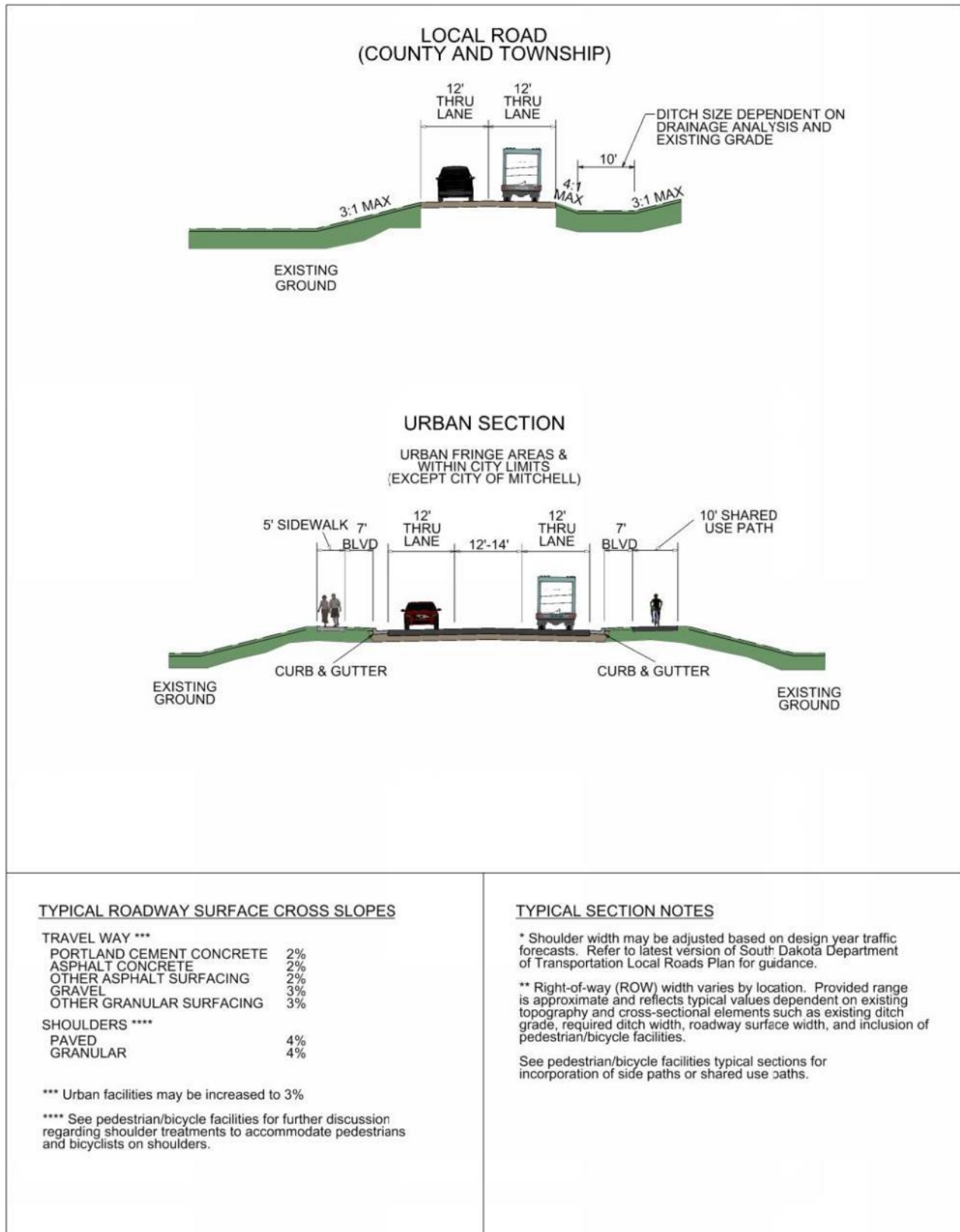


Figure 7-2: Typical Roadway Cross-Sections for Major Roads Plan Designations (cont.)

Roadway Surfacing Standards

Roadway surface type should be carefully considered in all roadway construction or reconstruction projects. The most common roadway surfacing types used in Davison County are asphaltic concrete and gravel. PCC has been used along certain corridors throughout the County. Another surface treatment being utilized by the County is a blotter, or chip seal, surface. The following is a description of key considerations for each roadway surface treatment:

Gravel Roadway Design

Gravel roadways are typically used on the lowest volume roads in Davison County. Gravel roadways should be designed with the most current editions of AASHTO's Guidelines for Geometric Design of Very Low-Volume Local Roadways and the South Dakota Local Transportation Assistance Program (SD LTAP) Gravel Roads Maintenance and Design Manual. Generally, the thickness of the gravel layer depends on equivalent single axle loads (ESAL), number of heavy trucks, quality of gravel available, and the existing soil or subgrade.

Blotter Roadway Design

A blotter surfaced roadway is an intermediate step between a gravel roadway and paved-surface roadway, where a surface treatment is placed on a granular base. A typical application consists of a layer less than one-inch thick asphalt cement placed over the granular base with a top course of aggregate chips. The asphalt cement coating can significantly reduce dust, loose material, and washboard issues of a low-volume gravel road. A blotter surface may not be suitable for routes with high traffic volumes or notable truck volumes, as it provides minimal structural stability and may break down relatively quickly.

Asphaltic Concrete and Portland Cement Concrete Roadway Design

Design of pavement thickness for arterial, collector, and local roads in both urban and rural areas should be based on AASHTO's Guide for Design of Pavement (latest edition). For traffic conditions where the equivalent 18 kip/single axle loading is less than 1,000,000, the low-volume road design method may be used and should be based on AASHTO's Guidelines for Geometric Design of Very Low-Volume Local Roadways.

Roadway Surface Design Considerations

The type of roadway surface is an important component to the operations of a particular roadway. Roadway surface determinations have implications on regional mobility, quality of life, safety, and economic growth throughout the County. Financial impacts of the initial investment and construction, annual maintenance, future preservation, and reconstruction costs to the County should be considered when determining a roadway surface type.

Recommended minimum pavement thickness for PCC, asphaltic concrete, and blotter surfacing on local and collector roadways, in relation to the Major Roads Plan, are noted in Table 7-1. These recommended minimums apply both as a minimum design and basis for estimation of future project costs, but are not intended to supplant a pavement design analysis. A geotechnical exploration and engineering design should be performed by a qualified geotechnical engineer to establish the soil type in the area and provide recommendations for

the proposed pavement section on a project-by-project basis. Subgrade conditions, existing and future traffic volumes, and heavy vehicle volumes and loads will all affect a final design recommendation.

Table 7-1: Minimum Pavement Thickness Requirements

	Local Roads	Collector Roads
Portland Cement Concrete over Aggregate Cushion	6" PCC* 6" Aggregate	8" AC 6" Aggregate
Asphaltic Concrete with Aggregate Base	4" AC 6" Aggregate	6" AC 12" Aggregate
Blotter with Aggregate Base	Blotter surface 12" Aggregate	Blotter surface 14" Aggregate

Reflects a typical minimum pavement thickness for new and reconstructed facilities.

Site conditions will dictate actual pavement thickness on project by project basis.

**SDDOT minimum PCC thickness is 8"*

AASHTO developed a 10-step process for the design of gravel thickness, shown in Figure 7-3, typically referred to as the 'AASHTO method.' This method outlines a standard process of data collection, calculations, and determination of sub-base thickness. Utilizing regional conditions and assumptions, two supplemental tables have been developed that incorporates much of the data required in the AASHTO method. These thickness design tables are based on traffic and truck volumes or equivalent single axle loads and subgrade conditions, as shown in Tables 7-2 and 7-3 respectively. Similar to the pavement design, a geotechnical exploration should be completed for new or reconstructed gravel roadways to determine a final surface design.

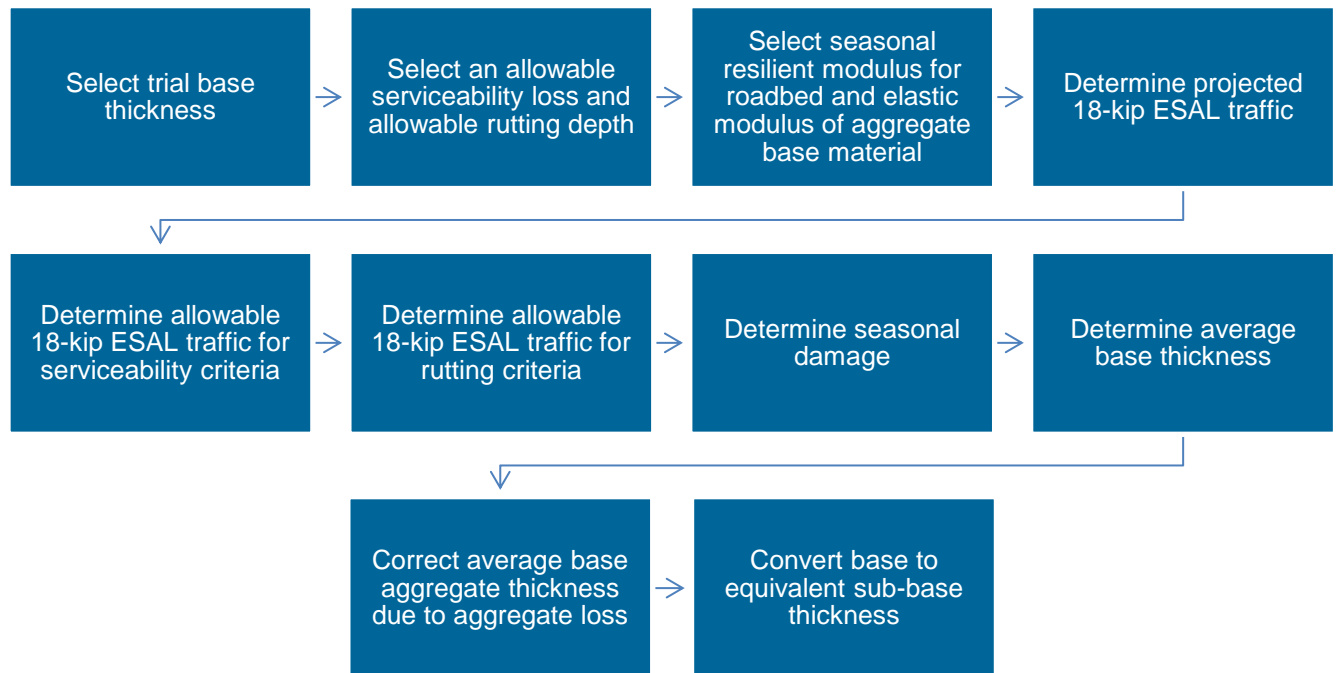


Figure 7-3: AASHTO Gravel Thickness Design Method Process

**Table 7-2: Recommended Gravel Thickness for New or Reconstructed Rural Roads
(Based on Heavy Trucks and Subgrade Support Condition)**

Estimated Daily Number of Heavy Trucks	Subgrade Support Condition (Based on California Bearing Ratio [CBR])	Suggested Minimum Gravel Layer Thickness (in.)
0 to 5	Less than or equal to 3 percent	6.5
	3.1 percent to 10 percent	5.5
	Greater than 10 percent	4.5
5 to 10	Less than or equal to 3 percent	8.5
	3.1 percent to 10 percent	7.0
	Greater than 10 percent	5.5
10 to 25	Less than or equal to 3 percent	11.5
	3.1 percent to 10 percent	9.0
	Greater than 10 percent	7.0
25 to 50	Less than or equal to 3 percent	14.5
	3.1 percent to 10 percent	11.5
	Greater than 10 percent	8.5

Source: SD LTAP Gravel Roads Maintenance and Design Manual (2000)

**Table 7-3: Recommended Gravel Thickness for New or Reconstructed Rural Roads
(Based on ESALs)**

18-kip ESAL Traffic Loads	Subgrade Support Condition	Suggested Minimum Gravel Layer Thickness (in.)
10,000 – 30,000	Very Poor	10
	Poor	9
	Fair	7
	Good	7
	Very Good	6
30,000 - 60,000	Very Poor	Higher Type Pavement Design Recommended
	Poor	Higher Type Pavement Design Recommended
	Fair	12
	Good	12
	Very Good	11
60,000 – 100,000	Very Poor	Higher Type Pavement Design Recommended
	Poor	Higher Type Pavement Design Recommended
	Fair	17
	Good	17
	Very Good	15

Source: SD LTAP Gravel Roads Maintenance and Design Manual (2000), U.S. Climatic Region III

Several resources are available that provide guidance in the selection of roadway surface type. The SD LTAP Gravel Roads Maintenance and Design Manual presents ten elements for consideration and preparation when deciding on roadway surface treatment, particularly for when to pave a gravel roadway. The SDDOT completed a Local Road Surfacing Criteria study in 2004 that outlines recommendations for surfacing criteria for local roads. It also provides a detailed cost model to aid local agencies in selection of appropriate road surfacing criteria.

In order to facilitate decisions regarding type of roadway surfacing, the following outlines a recommended process to determine appropriate surfacing for a given roadway segment using both quantitative and qualitative measures to reflect the unique nature of individual roadway segments.

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Identify Road Section Limits <ol style="list-style-type: none"> a. Project Limits and Logical Termini b. Average Daily Traffic (ADT) c. Integration and Continuity with Major Roads Plan 2. Determine Design Alternatives <ol style="list-style-type: none"> a. Consideration of segment issues and needs b. Design components, standards, and improvements for each alternative | <ol style="list-style-type: none"> 3. Determine Agency Costs 4. Determine User Costs 5. Summarize and Compare Total Costs 6. Evaluate Non-Economic Factors <ol style="list-style-type: none"> a. Growth rates and urbanized expansion b. Residential concentration c. Mail and bus routes d. Agriculture, industry, and truck traffic e. Political factors f. Public feedback |
|---|--|

Railroad Crossings

Railroad crossings play a significant role in mobility, travel time reliability, and safety at the numerous crossings throughout the Davison County transportation network. Delay and crossing reliability (frequency of a crossing being blocked by a train) are important quality of life issues to local and regional roadway users. Those factors also contribute to safety impacts as the vehicle-train conflict is present for a sustained period of time when a train is blocking a crossing.

While a blocked crossing is sometimes inevitable, steps can be taken to ensure public safety and emergency response is not compromised. Davison County should continue to provide multiple crossing or access locations to provide alternate routes for emergency access to residences, businesses, and other locations that may require assistance. In many instances, the existing grid network provides the parallel, supplemental route. Additional measures for consideration include grade separation and real-time communication of blocked crossings to emergency personnel.

While only two vehicle-train crashes have been reported within Davison County since 2005, these types of crashes can often entail random circumstances, often the case on a series of low-volume crossings. Similarly, while there may not be a significant number crashes at a particular crossing (often due to limited train-vehicle exposures), the underlying safety issues may still be present creating a potential danger for roadway users and trains.

It is recommended that continual improvements be applied to existing and any new crossings in the future due to the often random-nature of these crashes. New proven safety measures and technology improvements are continuously evolving through research and implementation. One aspect of a continual railroad improvement program is identification of potential vehicle-train, pedestrian-train, and vehicle-vehicle conflict points. Consideration to frequent causal factors of vehicle-train crashes should be accounted for in future designs, and typically includes deficiencies regarding the following:

- Crossing geometrics: Intersection skew, sight distance, proximity to driveways, etc.
- Crossing control: Gates, flashing lights, cross-bucks, etc.
- Pavement markings.
- Pavement condition/crossing condition.
- Excessive vehicle speeds.
- Traffic signal preemption timing.
- Detection of blocked crossings for emergency responders.
- Pedestrian crossings.

Roadway Safety Improvements

The evaluation of existing conditions identified crashes that occurred throughout Davison County between 2009 and 2013. Select intersections and roadway corridors were identified for further analysis based on number of total crashes and crash rates. While nearly 50 percent of the identified crashes involved vehicle-animal crashes, the other 50 percent were due to other factors. On roadway segments, roadway departure-type crashes were a common occurrence. At intersections, angle crashes were most frequent.

In February 2014, the SDDOT released the South Dakota Strategic Highway Safety Plan to provide a comprehensive, statewide approach to addressing roadway and roadside safety. The plan utilizes a data-driven, multi-year framework to reduce fatal and serious injury crashes. Seven safety emphasis areas were identified, regarding respective issues, goals, actions, and priority safety strategies:

- Roadway Departure
- Intersections
- Motorcycles
- Unbelted Vehicle Occupants
- Speeding-Related
- Drug- and Alcohol-Related
- Young Drivers

Davison County will continue to partner with the SDDOT and South Dakota Department of Public Safety to integrate safety improvement efforts with the process, guidelines, and strategies identified in the latest version of the South Dakota Strategic Highway Safety Plan. In collaboration with other local agencies, these partnerships will assist in providing a comprehensive approach to preventing and reducing the severity of crashes on all roadways throughout Davison County. With regard to infrastructure improvements, Davison County should continue to improve roadway safety throughout the County's network through a combination of upgrading roadway segments to meet current design standards, spot safety improvements, or safety improvements integrated into larger maintenance, preservation, and reconstruction projects. Further guidance on safety strategies is available at the following:

- SDDOT Strategic Highway Safety Plan (<http://sddot.com>)
- FHWA Office of Safety (<http://safety.fhwa.dot.gov>)
 - FHWA Proven Safety Countermeasures
- FHWA Local and Rural Road Safety Program (http://safety.fhwa.dot.gov/local_rural)
- AASHTO Roadside Design Guide

Traffic Analysis Guidelines

The following are common components to traffic operations and warrant analyses in rural and transitioning areas:

Traffic Operations Analysis Thresholds

In both an analysis of existing or planning-year traffic conditions, it is recommended that Davison County establish minimum acceptable operational thresholds using methodology consistent with SDDOT guidelines. The most current edition of the Highway Capacity Manual Standard quality-of-service measures of highway facilities under a traffic demand is described through a LOS rating.

The two most common operational measures beneficial to Davison County include the assessment of rural/urban fringe highway segments and intersections. The Highway Capacity Manual 2010 (HCM 2010) calculates the estimated percent time spent following a vehicle along a certain 2-lane highway segment and relates it to LOS thresholds. The HCM 2010 measures intersection operations in terms of control delay (average delay per vehicle, in terms of seconds per vehicle) for signalized, two-way stop controlled (TWSC), all-way stop controlled (AWSC), and roundabout intersections. At signalized intersections, the operational threshold is based on the overall average delay of the intersection. At stop-controlled and roundabout intersections, the operational threshold is based on the worst-case stop-controlled approach.

A distinction is typically made between urban, urban fringe or developing areas, and rural settings. Urban fringe and rural settings are applicable to Davison County studies. Urban fringe is typically characterized as the developing outward expansion of urban areas, ranging from low density acreage development to more dense urban residential, commercial, or industrial development. Urban fringe roadways are typically rural cross-sections, but are beginning to feel the effects of development and increased traffic volumes.

For traffic analysis and studies in Davison County, under either existing and future planning or design analysis, the recommended minimum operating conditions are as follows:

Highway Segments (Collector roads)

- Rural: LOS C
- Urban Fringe: LOS C

Intersections (Collectors and Local roads)

- Rural Stop-Controlled Approach: LOS C
- Urban Fringe Stop-Controlled Approach: LOS C
- Urban Fringe Signalized: LOS C
- Rural and Urban Fringe Roundabout Approach: LOS C

Traffic Impact Studies

A Traffic Impact Study (TIS) is a comprehensive analysis of before and after operational impacts to the surrounding roadway system due to additional traffic volume or shifts in travel patterns of new development or modified land use. The preparation of a TIS will assist Davison County in properly assessing these impacts and identifying roadway improvements or other mitigation measures to continue to provide safe and efficient mobility throughout the County.

The magnitude of expected impacts to the surrounding roadway from a proposed or new development network triggers the need for a TIS based on established criteria. This trip generation may be developed using trip generation rates from the latest version of the Institute of Transportation Engineers (ITE) Trip Generation Manual or from previous experience or traffic counts of similar facilities at the discretion of Davison County. Recommended peak hour trip generation thresholds that trigger a TIS are as follows:

- Generation of 100 or more added (new) peak hour trips to or from the site.
- Generation of 750 or more added (new) vehicle trips per day to or from the site.
- When additional traffic volume is expected to adversely impact county roadways, at the discretion of Davison County.
- When changes in access (redistribution of existing traffic) are expected to adversely impact operations on County roadways, at the discretion of Davison County.

Examples of the type and size of development that would trigger a TIS are provided in Table 7-4. For developments that have a seasonal peak, such as grain handling facility, the seasonal peak traffic generation shall be evaluated. Consideration for a study should also be made to high truck volumes turning into and out of the development regardless of total generated traffic volume.

Table 7-4: Approximate Development Size for Trip Generation Thresholds

Development Type (ITE trip generation code)	Development Size +100 Peak Hour Trips	Development Size +750 Daily Trips
Single Family Homes (210)	100 units	80 units
Apartments (220)	160 units	115 units
General Office (710)	64,000 sf	68,000 sf
Fast Food w/Drive Thru (934)	2,200 sf	1,500 sf
Light Industrial (110)	110,000 sf	108,000 sf

Based on ITE Trip Generation Manual, 9th Edition (2012)

Reflects greatest of AM or PM peak hour

Square footage based on gross floor area

The TIS should follow process and procedures and contain components as outlined by the latest edition of the SDDOT Road Design Manual or as approved by Davison County staff. The study should provide Davison County with an assessment of the proposed development's impacts on the local transportation network and proposed improvements to mitigate those impacts. Recommended thresholds that prompt mitigation occur when LOS, 95th percentile

queue lengths, volume/capacity ratios, or other operational measures identified by Davison County fall outside of SDDOT Design Manual guidelines.

Traffic Control Warrants and Design

The Manual on Uniform Traffic Control Devices (MUTCD) contains the basic principles that govern the design and use of traffic control devices for all streets and highways. The latest version of the MUTCD should be used to evaluate and design the proper traffic control device for each intersection and each roadway. The SDDOT Road Design Manual provides criteria for traffic signal control and should be used when designing signal control.

Turn Lane Warrants

The SDDOT Road Design Manual details considerations for the installation of a left- and right-turn lane at unsignalized intersections. Inclusion of a turn lane at unsignalized intersections improves intersection operations and safety by addressing speed differential concerns in the through travel lane by separating turning traffic from the through movement. These considerations are applicable at all types of roadway or driveway intersections and work hand-in-hand with established access management policies and County ordinances.

At unsignalized intersections, the following items are recommended for consideration in the determination of whether a left-turn lane is warranted:

- Traffic volume
 - Left-turn volume (vehicles per hour)
 - Opposing and advancing volume (in design hour)
- Crash history
- Special cases, when applicable
 - Railroad crossings
 - Geometric/Safety concerns
 - Presence of non-traversable medians

For the evaluation of right-turn lane warrants, the following items are recommended for consideration:

- Traffic volume
 - Right-turn volume (vehicles per hour)
 - Approaching volume in outside lane (in design hour)
- Crash history
- Special cases, when applicable
 - Railroad crossings
 - Geometric/Safety concerns

At signalized intersections, it is typically advantageous to install a left-turn lane in terms of traffic operations and safety, while a right-turn lane is generally determined based on signal capacity needs or operational/safety improvements by removing turning vehicles from the through lane.

In all instances, access spacing and current roadway design standards apply to the design and installation of a turn lane. The design shall safely accommodate the necessary process of the turning movement to not create new and unforeseen safety issues. The process for application

and assessment of turn-lane warrant criteria is outlined in greater detail within Chapter 15, Traffic, of the SDDOT Road Design Manual.

Event Traffic Management Action Plan

Dakotafest is an annual event that draws nearly 30,000 individuals over three consecutive weekdays each August to a location off of Spruce Street, east of SD 37 and MTI. While the peak traffic volumes occur during the actual three-day event, the traffic-related impacts are felt over a three-week period, with the week before the event being the peak setup and delivery period and the week after being teardown and removals of displays and equipment. Dakotafest-generated traffic significantly taxes the existing infrastructure and compounds concerns stemming from typical daily traffic volumes. The three-week period usually coincides at some point with the beginning of the fall semester at MTI, which adds upon traffic generated by typical operations at the Mitchell Livestock Auction and concrete batch plant east of SD 37.

Alternative access routes to the Dakotafest grounds are limited, as I-90 is a barrier to the north and a township road that is not designed to accommodate higher traffic extends east of Spruce Street. The lone alternative access is via 411th Avenue to the south, which provides a connection to 256th Street (gravel) one mile south and 257th Street (paved) two miles to the south.

To date, local agencies have done a good job accommodating traffic within the corridor constraints off of Spruce Street during Dakotafest. Local law enforcement provides a notable traffic operations presence within the area throughout the event. Typically, an officer is stationed at the SD 37 and Spruce Street intersection to manage traffic and engage the traffic signal manual control during heavy event traffic movement periods. But as the event continues to grow and more individuals attend the event, it continues to push the transportation mobility and safety limits accommodated by the existing infrastructure and event traffic management.

The following provides a recommended list of short term and long term components to an Event Traffic Management Action Plan. While developed with Dakotafest in mind, many of these short term components are applicable to other event conditions while the long term projects are specific to the Spruce Street corridor and Dakotafest. These recommendations are intended to supplement current activities, which may already be occurring, providing additional considerations each year in terms of traffic management as well as longer-term infrastructure improvements in the area.

Short Term

- Utilize multiple entrances/exits and routes
- Post slower speeds along SD 37 during event between 256th/257th and Spruce Street
- Minimize cross-traffic conflict points along Spruce Street that interrupts progression of traffic
- Prohibit parking on/along Spruce Street, with enforcement
 - Evaluate an internal circulation plan at stockyards to try and remove vehicles from Spruce Street, reducing risk of parking issues during Dakotafest or MTI events

- Signals at SD 37 and Spruce Street intersection
 - Provide an arrival and departure event signal timing plan.
 - Allow law enforcement manual control/override.
- Evaluate possibility of 1-way in and 1-way out circulation to gain additional capacity of second lane in direction of travel
- Event traffic management coordination: local law enforcement, state law enforcement, City, County, Dakotafest organizers, Spruce Street property owners;
- Maintain law enforcement presence during event

Long Term

- Spruce Street improvements (5-lane cross-section, see Implementation Plan chapter)
- Improve alternative southern route from Spruce Street/Dakotafest grounds (see Implementation Plan chapter)
 - Via 411th Avenue or new access road between SD 37 and 411th Avenue
 - RR crossing improvements (active control, widen cross-section to accommodate channelization prior to the RR intersection)
 - SD 37 intersection improvements with turn lanes at 256th if chosen as a primary access to SD 37
 - Other possible SD 37 corridor improvements affected by increased traffic volumes such as turn lanes at 258th Street
- Reconfigure (permanent or temporary) SD 37 and Spruce Street intersection to accommodate dual left-turns (or right-turns) for predominant traffic movements.

Davison County Access Management Guidelines

Access management is the process of providing safe, efficient ways of getting on and off our roads and highways.⁶ It entails the planning, design and implementation of land use and transportation strategies in an effort to maintain a safe flow of traffic while accommodating the access needs of adjacent development. Management of roadway access, both in terms of cross-street spacing and driveway placement, is a critical means of preserving and enhancing a roadway's intended function and its efficient operation. In addition, providing access management in some form – grade-separated crossings, frontage and backage roads, or right-in/right-out access – reduces the number of vehicle conflict points resulting in improved safety.

A number of studies have demonstrated a direct relationship between the number of access points and the rate of crashes, showing a positive correlation between access density (access points per mile) and the frequency of crashes (crash rates).⁷ Given this relationship, access management is an important roadway safety tool and can provide multiple benefits to the roadway, such as the following:

- Reduce crashes
- Preserve road capacity and postpone the need for roadway widening or other improvements

⁶ South Dakota DOT Roadway Design Manual, Chapter 17 – Access Management, pg. 17-2

⁷ FHWA Access Research Report No. FHWA-RD-91-044

- Improve travel times for the delivery of goods and services
- Ease movement between destinations
- Support local economic development

Access Spacing and Corner Clearance

Access management guidelines provide a means to balance private property interests with the need for a safe and efficient transportation system. Standardized guidelines facilitate clear communications between the agencies and individuals involved (developers, agency staff, and landowners) throughout the access permitting process.

With regards to traffic operations, standard access management guidelines can be used to improve communication, enhance safety, and maintain the capacity and mobility of the important transportation corridors. Good access management practices include items such as:

- Aligning access with other existing access points
- Providing adequate spacing to separate and reduce conflicts
- Encouraging indirect access (frontage roads, consolidated driveways, etc.) over direct access on high-speed, high-volume arterial routes

The access spacing guidelines developed as part of this planning process reflect the guidelines adopted by SDDOT as reported in the SDDOT Road Design Manual. SDDOT guidelines for urban fringe and rural roadways were applied to Major Collectors, Minor Collectors, and Local roadways identified in the Major Roads Plan (Chapter 5). The following table presents the Davison County Access Spacing Guidelines, including direction for signal spacing, intersection spacing, driveway access density, and direct property access.

Table 7-5: Davison County Access Spacing Guidelines

	Signal Spacing (miles)	Minimum Unsignalized Access Spacing (feet)*	Access Density	Direct Access
Major Collector (urban fringe/rural)	1/4	1,000 (full/partial)	5 accesses/side/mile	Yes
Minor Collector (urban fringe/rural)	1/4	1,000 (full/partial)	5 accesses/side/mile	Yes
Local (rural)	N/A	1,000 (full/partial)	5 accesses/side/mile	Yes

**Full' denotes a standard full-movement intersection. 'Partial' denotes a restricted movement intersection (i.e., right-in/right-out).*

Source: Adapted from South Dakota DOT Roadway Design Manual, Chapter 17 – Access Management, Figure 17-1

Maintaining adequate separation between private driveways and the nearest roadway intersection is another important component of access management. This minimum separation is referred to as the minimum corner clearance and defines the distance between radius return points of the intersection and first driveway. The minimum corner clearance concept accounts for a motorist's perception-reaction time of downstream conflicts, which is an integral component to stopping sight distance requirements in roadway design.

Minimum clearance between a cross-street and driveway also helps minimize private access breaks and conflict points within an intersection's functional area. The functional area of an intersection is representative of the area in which upstream and downstream maneuvers are influenced or impacted by activity within the intersection. This area includes intersection lane channelization and associated storage length and the taper/maneuver area for separate turn lanes. Overall, the functional area is considered much larger than the physical area of the intersection.

Minimum upstream corner clearance guidelines, the distance between private access driveway to roadway intersection in the direction of travel, is provided in Table 7-6.

Table 7-6: Davison County Minimum Upstream Corner Clearance Guidelines

Speed (mph)	Corner Clearance (feet)
30	200
35	225
40	250
45	280
50	350
55	425

*South Dakota DOT Roadway Design Manual,
Chapter 17 – Access Management*

Access Management Best Practices

Roadways in urban fringe (areas positioned for future development) and rural areas typically serve low-density land uses and usually have lower traffic volumes and, therefore, should be treated differently than roadways in urban areas. Access management in these areas should focus on increasing/maintaining safety (i.e., sight distance, number of conflict areas, and severity of crashes when vehicles run off the road) and minimizing operational/maintenance costs such as snow removal, resurfacing and drainage. Access management best practices for these areas should be cognizant of the potential future urbanization and the impacts an access granted today will have on tomorrow. Industry best practices for access management and access consolidation in urban fringe and rural areas include the following:

Access Management Best Practices – Urban Fringe and Rural Areas

- Develop a formal policy that ensures an agency has processes in place to determine the need for and evaluate the use, location, spacing and design characteristics of the requested access points.
- Encourage coordination of roadway access during the zoning and platting process.
- Give access permits for a specific use.
- Encourage adequate spacing of access points.
- Protect the functional area of intersections.
- Ensure adequate sight distance at entrances.
- Avoid offset or dogleg intersections and entrances.

- Encourage development of turn lanes at entrances.
- Encourage good driveway and intersection design characteristics (i.e., driveway width and turning radii, corner clearance, approach grade, intersection alignment/skew, entrance in-slopes and culvert openings, sight triangles, clear zones, etc.).
- Consider consolidating access or relocating existing access.

Access Consolidation Guidelines

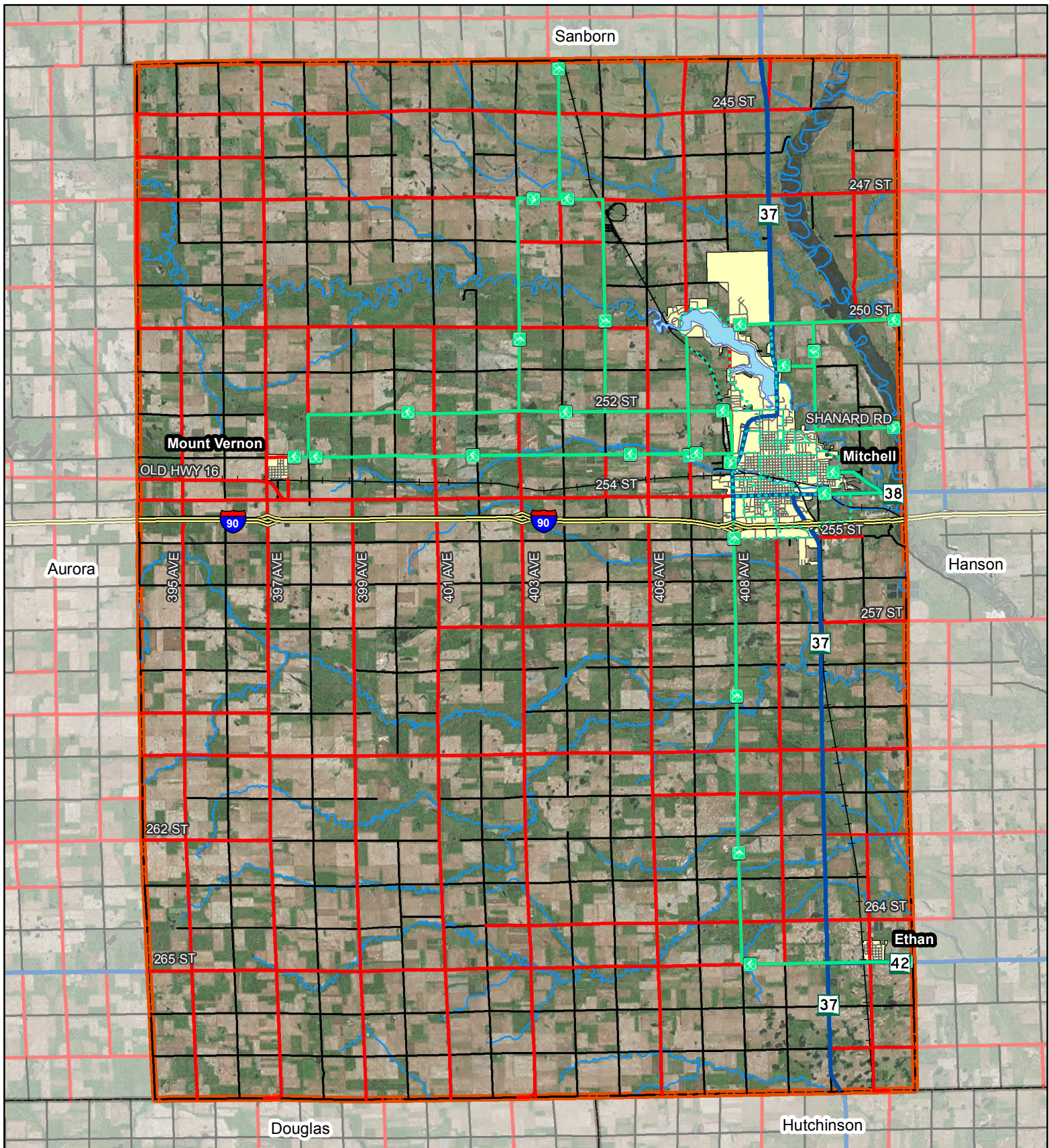
- Close driveways.
- Create alternative access ways.
- Create shared driveways.
- Relocating entrances to side streets.
- Promote cross access (access points direction across from each other).
- Turn restrictions from driveway.
- Turn restrictions from roadway.

Pedestrian and Bicycle Facilities Design Guidelines

One objective of the Davison County Transportation Plan is to ensure safe and efficient movement of people and goods throughout the County. This includes not only traditional automobile and freight mobility, but also non-motorized transportation such as walking and biking. To that end, Davison County should actively strive to promote walking and bicycling as viable alternative modes of transportation. In Davison County, this means supporting the development of a well-connected bicycle network in rural areas and installing proper pedestrian and bicycle facilities where appropriate in urban and developing urban areas. Further, the urban and rural networks should be interconnected to provide a safe route between Davison County and City of Mitchell facilities. In order to achieve this goal, the County should pursue the following:

- Provide an interconnected system of paths, trails, lanes and routes that are multipurpose, accessible, convenient, and connected to activity centers such as towns, residential neighborhoods, parks, schools, workplaces, major open spaces, and other destinations.
- Form mutually beneficial partnerships with and among the public, cities and townships, and private sector partners to expand and improve the provision of multi-modal services and facilities.
- Sustain and improve the quality condition and attractive appearance of public areas and facilities with a maintenance program in order to support and encourage multi-modal transportation.
- Provide safe connectivity between the City of Mitchell trail system and other bicycle/pedestrian facilities and routes in Davison County.

Through the public and stakeholder component of the Master Transportation Plan, a series of County routes were identified as primary routes for bicyclists outside of the City of Mitchell. These routes are shown in Figure 7-4. Popular destinations outside of Mitchell include the neighboring towns of Letcher, Mount Vernon, and Ethan, as well as ‘scenic’ loops that ride through the James River Valley into Hanson County.



**Figure 7-4:
Bicycle Facilities
& Common Routes**

Davison County
MASTER TRANSPORTATION PLAN

Legend

- | | | |
|---|----------------|-----------------------------|
| Frequently Traveled Routes | Interstate | Rail Lines |
| City of Mitchell Bike Facilities (Existing & Planned) | State Highways | Rivers & Streams |
| | County Roads | Cities |
| | Township Roads | Study Area (Davison County) |

0 0.75 1.5 3
Miles

1 in = 3 miles



HRGreen

Design

Pedestrian and bicycle facilities should also be a consideration in the planning and design for all roadway construction and reconstruction projects, and dedicated non-motorized facilities should be included where there is demand. Pedestrians and bicyclist may use shoulders and travel lanes where specific facilities do not exist. However, in many cases the use of shoulders and travel lanes are not appropriate and a designated facility for pedestrians and bicyclists should be considered. Below is guidance on the development of pedestrian and bicycle facilities recommended for the Davison County transportation network.

Typical cross-sections of an independent shared-use path, a shared-use path parallel to a roadway, and shoulder widths for accommodation of bicycles are provided in Figure 7-5.

Shared-Use Path

A shared-use path is a designated facility separated from traffic. When built adjacent to roadways, this separation should be considered in the alignment and offset from the roadway edge of travel lane. Access to adjacent land use, driveway and cross-street intersections, warning signs and pavement markings, sight distance (both motorist and bicyclists/pedestrians), and design standards are all considerations in the design of a shared-use path. Two typical cross-sections of a shared-use path are provided in Figure 7-5: one of an independent shared-use path (such as one along an abandoned rail line), and a second that parallels a roadway. Recommended minimum shared use path thickness is provided in Table 7-7.

Table 7-7: Minimum Pavement Thickness Requirements – Shared-Use Path

Shared-Use Path	
Asphaltic Concrete with Aggregate Base	2.5" AC 4" Aggregate
Portland Cement Concrete with Aggregate Base	4" PCC (jointed) 4" Aggregate
Shoulder	Turf or aggregate

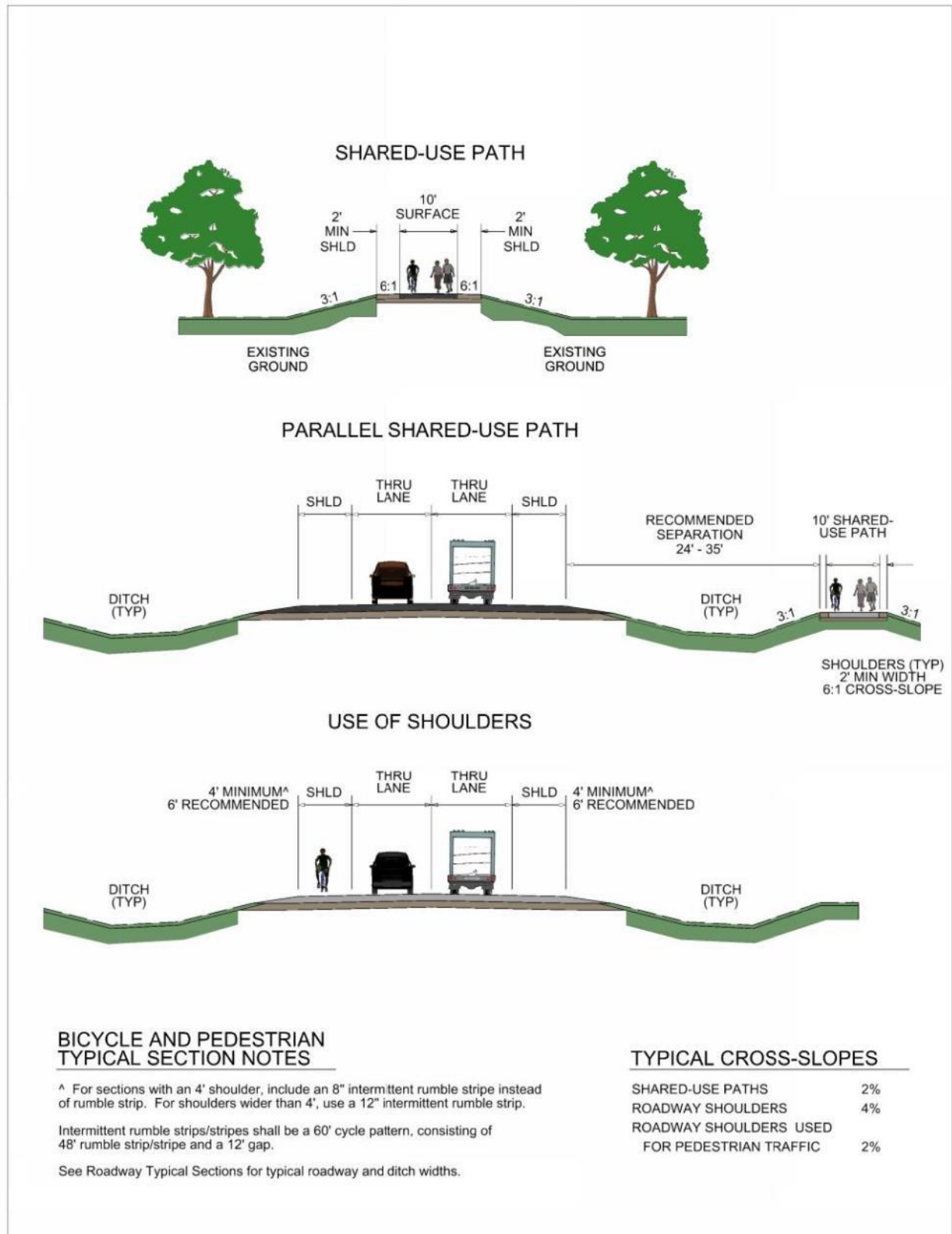


Figure 7-5: Shared-Use Path Typical Cross Section

Shoulder Bikeways

Shoulder bikeways are bikeways along paved roadways with striped shoulders, distinguishing between the edge of travel lane and shoulder. Shoulder bikeways should be located along common bicycle routes throughout Davison County, particularly near urban areas or where there are higher vehicular traffic volumes. A typical cross-section of a shoulder bikeway is provided in Figure 7-5, tying into appropriate roadway typical sections previously shown in Figure 7-1.

A minimum of four feet of smooth, rideable paved shoulder width should be provided for a shoulder bikeway. On roadway facilities where rumble strips/stripes are to be included, the following guidance is provided for shoulder bikeway facilities:

- Shoulder width of 4 feet or less
 - 8-inch wide rumble stripes, placed on edge of travel lane
- Shoulder width of greater than 4 feet
 - 12-inch wide rumble strip, placed adjacent to edge of travel lane on shoulder

In all instances, rumble strips/stripes on bicycle routes should consist of a 60-foot cycle pattern of 48 feet of rumble strip/stripe and a 12-foot gap.

If pedestrian traffic is expected on the roadway shoulder, the shoulder should maintain less than a two percent cross-slope to meet accessibility requirements.

Design Considerations

It is recommended that bicycle/pedestrian facilities be constructed independently and as part of larger, major investment projects along identified popular bicycle routes throughout Davison County, with priority given to those routes within the urban fringe area surrounding the City of Mitchell. This was the area identified by the bicycle community with the greatest risk of vehicle-bicycle and vehicle-pedestrian conflicts due to higher volume of vehicles, trucks, other large vehicles, and bicyclists/pedestrians.

As part of a long-term comprehensive approach, it is recommended that bicycle/pedestrian facilities be evaluated for construction at the time of major investment (overlay, reconstruction, or new construction) along roadways surrounding the Mitchell urbanized area. Beyond the Mitchell urbanized area, vehicular traffic volumes are typically at a level where shared right-of-way travel (bicyclist in travel lane, pedestrian on edge of travel lane⁸) is not detrimental to safety or roadway operations. These rural roadways should also be evaluated for bicycle and pedestrian facilities at the time of major investment, but should not take priority over roadways within the urbanized area.

For further guidance and best practices in the design of shared-use paths and shoulder bikeways, refer to AASHTO's A Policy on Geometric Design of Highways and Streets (AASHTO Green Book), latest edition when designing pedestrian and bicycle facilities. AASHTO's Guide for Planning, Design and Operation of Pedestrian Facilities and Guide for the Development of Bicycle Facilities, and the SDDOT Road Design Manual.

⁸ Not the recommended situation, but difficult to address in all circumstances in rural areas.

Policy and Operations Recommendations

It is recommended that many of the components within this section be integrated into Davison County's permit process and ordinances where appropriate. This will help provide the guidance for future development within the County as well as to continuously improve the existing transportation network. Davison County currently utilizes a Driveway Access Permit for new and relocated access locations onto the County network. They also have zoning ordinances in place to guide and facilitate new development in the County. As part of both of these review processes, the County reviews applications internally incorporating local best practices and experience with the documented guidance and ordinances.

New Development

As part of the review and approval of new development and access to the County network, it is recommended that the following items, as identified in this chapter, be added to the existing Davison County Road Approach Permit and Davison County Zoning Ordinance:

- Access Management Guidelines
- Traffic Impact Study Requirements
- Traffic Study Guidelines
- Turn-Lane Warrant Guidelines

Where development will include future public facilities, additional design guidance may also be included in the Zoning Ordinance, such as:

- Typical Section Information
- Minimum Roadway Surfacing Criteria
- Bicycle and Pedestrian Design Guidelines

Change in Access

When evaluating a change in access or change in use of an existing access to a County roadway, that may or may not include additional traffic volumes from the requesting site, the following is recommended for inclusion in the change in access request:

- Develop additional guidance for a change in access/change in use permit, noting a different process between a change in access/change in use and a new access
- Access Management Guidelines
- Traffic Impact Study Requirements
- Traffic Study Guidelines
- Turn-Lane Warrant Guidelines

Continuous Activities

It is recommended that several activities entail a continuous approach to improving the transportation network within Davison County, including a periodic, systematic review of existing conditions and needs throughout the network. This allows for the planning and implementation of improvements in a timely manner, yet receptive to available resources and system-wide needs. Further, good needs assessment and planning practices allows for a series of improvements to be combined to a single project or smaller needs integrated into a larger preservation or reconstruction project. The following provides additional guidance to facilitate a continuous evaluation of needs, implementation, and monitoring of conditions throughout the network:

Access Management Implementation

Access management guidelines and practices should generally be implemented at the County and local levels (cities and townships with active land-use planning programs) as these agencies are typically involved at the planning stages of development proposals. However, effective access management requires mutual support and effective communication at all governmental levels. Therefore, it is important to consider how access management guidelines are implemented as part of City planning and development review procedures. The following are key considerations when implementing access management guidelines:

- Access management guidelines apply primarily to routes with a collector functional classification or above; however, the guidelines may also be used on some local roads.
- Access management guidelines should be used as long-term goals, not as absolute rules. Maintaining some flexibility is important in promoting access consolidation. Existing physical barriers or constraints need to be considered.

Implementation of access management practices in rural areas differs from urban areas. Access management efforts in urban areas typically focus on addressing mobility concerns while balancing access needs of local businesses and residents. In these areas, new access points should be minimized while existing access points are consolidated or reduced as development occurs. Developing areas include areas where roadways and services have already been improved to serve current and planned development.

Safety Improvements

Safety improvements are tied to many aspects within this chapter, from access management to roadway design. The review, assessment, and identification of potential improvements are an integral part of the daily maintenance and capital improvement projects on a well-functioning transportation network. It is recommended that Davison County continue to be proactive in addressing safety concerns on the County's transportation network. This includes a periodic, systematic review of facilities throughout the County, so that identified improvements can be planned and addressed as funding allows. This will also position the County to seek and apply for safety funding assistance through SDDOT and other agency safety programs. In addition to the periodic reviews, safety aspects of facilities should be reviewed during preservation and reconstruction activities to address issues as part of a larger project.

Asset Management and Systematic Coordination

A system of Asset Management preservation tools will be an important step for Davison County to preserve and protect its roadway system investments. It will be important for the County to review existing management tools and create modifications to inventory and classification hierarchy and performance systems. The following key methods can be adopted to implement such an improvement:

Asset Management Rating System:

If not already in place, the County should adopt a condition rating system for like segments of the various elements (i.e. benchmark) such that a minimum target service condition rating can be established, based on functional classification, or service level assigned to the roadway facility. For example, a minimum service level of 70 of 100 points for arterial roadways would be assigned as an acceptable level of performance, depending on the standards set for the facility.

Systematic Coordination:

Coordination of GIS system improvements and electronic mapping should occur to develop a systematic means of sorting and organizing future improvements. This approach can then be applied to encourage a systematic means of identifying, prioritizing, and programming improvements associated with the following.

- a. Cost estimating tracking systems
- b. Source and reliability of funding streams
- c. Prioritization of improvements

8. Roadway Preservation & Maintenance Plan

This section covers typical preservation and maintenance activities for Portland Cement Concrete, asphaltic concrete, blotter, and gravel-surfaced roadways within Davison County. This includes the identification of preservation and maintenance activity, frequency, and cost which is applied to the identified needs of the system over the next 20 years.

Roadway Preservation and Maintenance Planning

The Preservation and Maintenance Plan, to accompany and guide the development of a 5-year Capital Improvement Plan, looks at the long-range aspect of incorporating new construction, reconstruction, preservation, and maintenance to extend the useful life of County infrastructure investments. This plan maps out the preservation and maintenance activities for each roadway investment, along with their respective frequency and estimated costs, through the anticipated design life of the asset.

For planning and design purposes, a typical design life is attached to each type of investment. The realized design life can vary widely between separate segments consisting of the same element based on location-specific conditions, such as, traffic and truck volumes, subgrade conditions, environmental factors, and quality of construction and materials. The following lists planning-level design lives for various roadway elements assuming appropriate preservation and maintenance activities:

- Bridges and concrete culverts – 75 years
- Asphalt pavement – 20 years
- Concrete pavement – 40 years (jointed) to 50 years (continually reinforced)
- Gravel surfacing – 4 to 6 years
- Signs – 5 to 8 years
- Pavement markings – 1 year for paint, 3 years (sprayable durable, grooved) to 7 years (plastic, grooved) for others

Planning-level preservation and maintenance activities are identified for asphaltic concrete, PCC, blotter, and gravel-surfaced roadways. The following tables outline typical activities based on surface type, with associated activity frequency and unit cost. The activities follow industry guidance and specific activities completed as part of on-going work by Davison County. Activity frequencies are based upon industry guidance for the recommended treatment under average conditions. Unit costs reflect typical prices for contractor-performed work between 2012 and 2015 with consideration for historical and recent prices from Davison County, SDDOT statewide average, and other local input.

Table 8-1: Asphaltic Concrete Preservation and Maintenance Schedule and Unit Cost

Activity	Frequency	Unit Cost
Blow and Seal or Rout and Seal	5 years	\$5,000/mile
Crack Filling	5 years, as needed (typ. older pavement)	\$10,000/mile
Chip Seal	5 years (year 2, 7, 12, 17)	\$20,000/mile
Mill 1" and Overlay 2"	20 years	\$180,000/mile + structures
3" Overlay – Recycled	20 years	\$200,000/mile + structures
Pavement Markings	Annual	\$500/mile
Patching/Annual Pavement Maintenance	Annual	\$2,000/mile

Approximate Mileage (Davison County jurisdiction only): 138 miles

Table 8-2: Blotter Surfacing Preservation and Maintenance Schedule and Unit Cost

Activity	Frequency	Unit Cost
Blotter Reapplication	5 years	\$50,000/mile + structures

Approximate Mileage (Davison County jurisdiction only): 35 miles

Table 8-3: Gravel Maintenance Schedule and Unit Cost

Activity	Frequency	Unit Cost
Gravel Resurfacing 2"	5 years	\$50,000/mile
Blading	24 times/year	\$1,500/mile
Dust Control	2 years, as needed	\$2,000/mile
Spot Gravel/Annual Surface Maintenance	Annual	\$500/mile

Approximate Mileage (Davison County jurisdiction only): 153 miles

Table 8-4: Portland Cement Concrete Maintenance Schedule and Unit Cost

Activity	Frequency	Unit Cost
Pavement Markings	Annual	\$500/mile
Patching/Annual Pavement Maintenance	Annual	\$2,500/mile

Approximate Mileage (Davison County jurisdiction only): 6 miles

Table 8-5: Miscellaneous Item Maintenance Schedule and Unit Cost

Activity	Frequency	Unit Cost
Sign Replacement	8 years	\$300,000 for blanket replacement
General Maintenance*	Annual, as needed	\$4,000/mile

**General maintenance includes snow removal, mowing, and other internal activities*

20-Year Roadway Preservation and Maintenance Needs

In order to assess the needs of Davison County to preserve and maintain County-jurisdiction roadways over the next 20 years, a life cycle cost assessment was conducted. A review of the existing roadway surfacing provided a baseline to establish major rehabilitation projects in the next 20 years. The end result is a total and annualized planning-level cost estimate for roadway preservation and maintenance needs for Davison County to 2035.

Roadway Preservation – Recent Activities

The current roadway surface and most recent preservation activity has been identified for all County, hard-surfaced roadways within Davison County. A County-wide overview of the most recent hard-surfaced roadway preservation activities and year completed are presented in Figure 8-1.

This figure provides the baseline in establishing each pavement section's respective life cycle. Based on the baseline life cycle for each section, the next major preservation activity can be planned for one of four 5-year asphaltic concrete overlay timeframes. This is reflective of a 20-year design life of the current asphaltic concrete pavement or any issues noted by Davison County staff regarding a deviation from the 20-year design life.

Roadway Preservation – Evaluation of Future Roadway Surface Changes

As noted in the Existing Conditions and Needs Assessment chapters of this report, multiple roadway segments have been identified as candidates for roadway surface change. These segments should be evaluated for surface changes as the roadway approaches the end of the current pavement structure's life cycle. This is the most feasible time to make a change, as it fully utilizes the useful life of the existing investment. The evaluation should consider changes in roadway conditions and traffic needs to identify the most appropriate surface for the next 20 or more years. If no change is warranted, the existing material type will be placed on the segment, and the life cycle restarts.

Locations within Davison County that have been identified as candidates for future roadway surface change evaluations are shown in Figure 8-2. The segment termini and candidate surface change are based on existing conditions along the segment.

Roadway Preservation – Asphaltic Concrete Overlay Timeframe

Asphaltic concrete overlay needs represent significant investments for County roadway segments on an approximate 20-year cycle. The County must carefully plan and anticipate overlay construction of long segments in order to make the preservation activities at the opportune time. In order to provide a baseline approximation of when these needs will occur, Figure 8-3 presents asphaltic concrete overlay needs over the next 20 years on the existing Davison County roadway network. The segments have been separated into 5-year increments to provide flexibility when programming projects addressing similar needs. The three blotter-surfaced segments identified as candidates for conversion to asphaltic concrete in Figure 8-2 have been included to integrate the investment this type of improvement entails into the asphaltic concrete overlay needs planning.

20-Year Roadway Preservation and Maintenance Cost Estimate

Based on the needs for roadway preservation and maintenance within Davison County, costs were developed utilizing the unit costs associated with each improvement type in Tables 8-2 through 8-5. These cost estimates incorporate all aspects required to maintain the current roadway network including: asphaltic concrete overlay, maintenance activities specific to roadway type, and general roadway maintenance (mowing, snow removal, etc.). A more detailed outlay of the Life Cycle Cost analysis is presented in Appendix F.

Two scenarios were developed for the estimation of roadway preservation and maintenance needs for Davison County of the next 20 years:

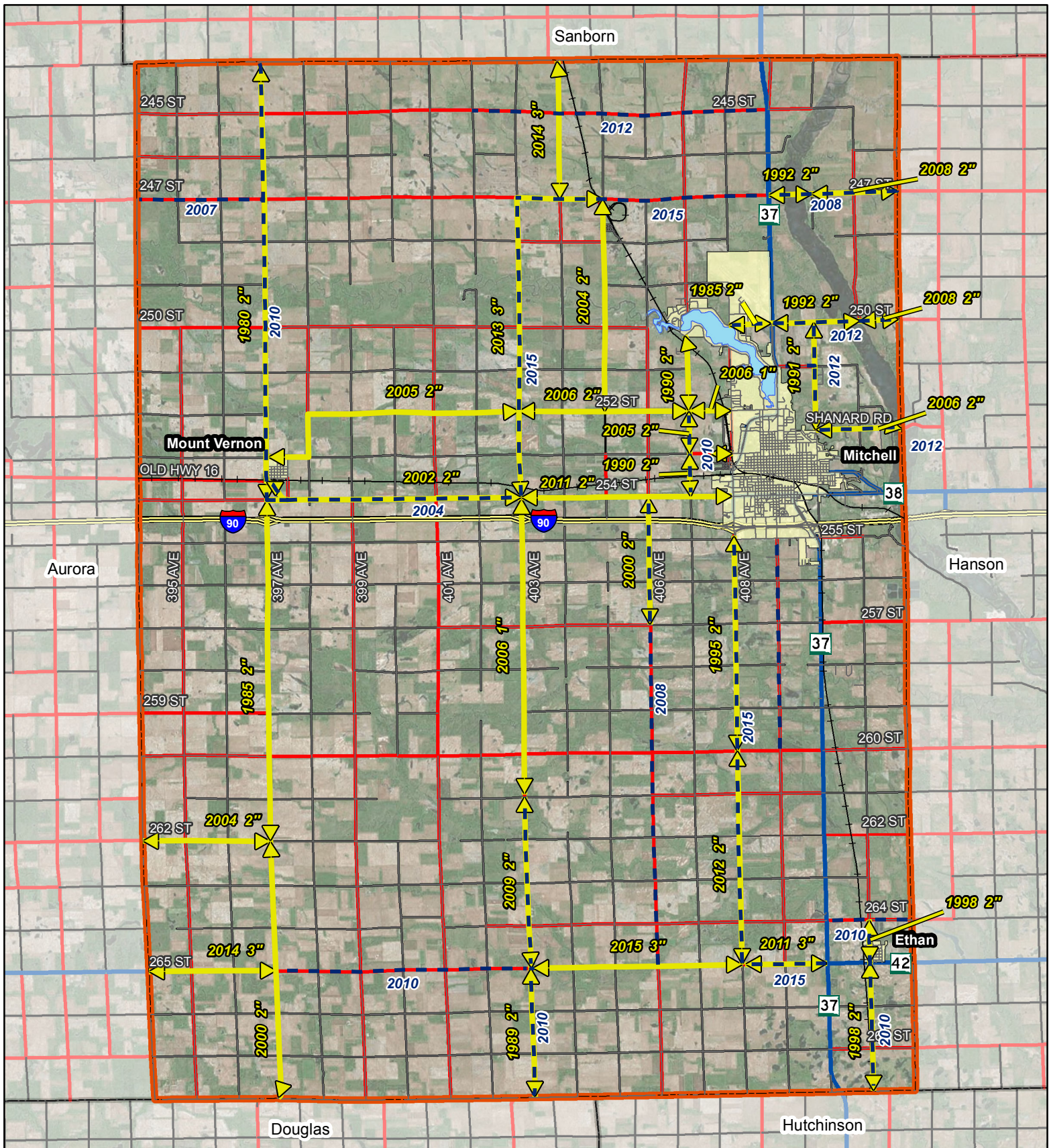
- Maintaining the system as it currently exists
- Maintaining existing system with potential changes
 - Incorporate roadway segments identified for evaluation of surface modification
 - Incorporate changes along proposed jurisdictional transfer segments (see Chapter 5)

Estimated costs for the two roadway preservation and maintenance scenarios are shown in Table 8-6.

Table 8-6: 20-Year Preservation and Maintenance Scenario Costs (2016-2035)

	Cost Summary	Existing System (Costs, 2015 \$)	Modified System with Proposed Changes (Costs, 2015 \$)
Asphaltic Concrete Overlays	Annualized Cost	\$1,290,000	\$1,330,000
Bituminous Surfacing Preservation and Maintenance*	Annualized Cost	\$1,390,000	\$1,150,000
Gravel Resurfacing and Maintenance	Annualized Cost	\$1,840,000	\$2,040,000
PCC Maintenance	Annualized Cost	\$3,300	\$3,300
Signs and General Maintenance	Annualized Cost	\$1,030,000	\$1,010,000
Totals	Total 20-Yr Costs	\$111,000,000	\$110,250,000
	Total Annualized Cost	\$5,500,000	\$5,510,000

* Bituminous surfacing preservation activities excluding asphaltic concrete overlay or mill and overlay



**Figure 8-1:
Existing Pavement
Life Cycle**

Davison County
MASTER TRANSPORTATION PLAN

Legend

Chip Seals

Year
Completed

Overlays

Year
Completed

Interstate

State Highways

County Roads

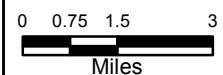
Township Roads

Rail Lines

Cities

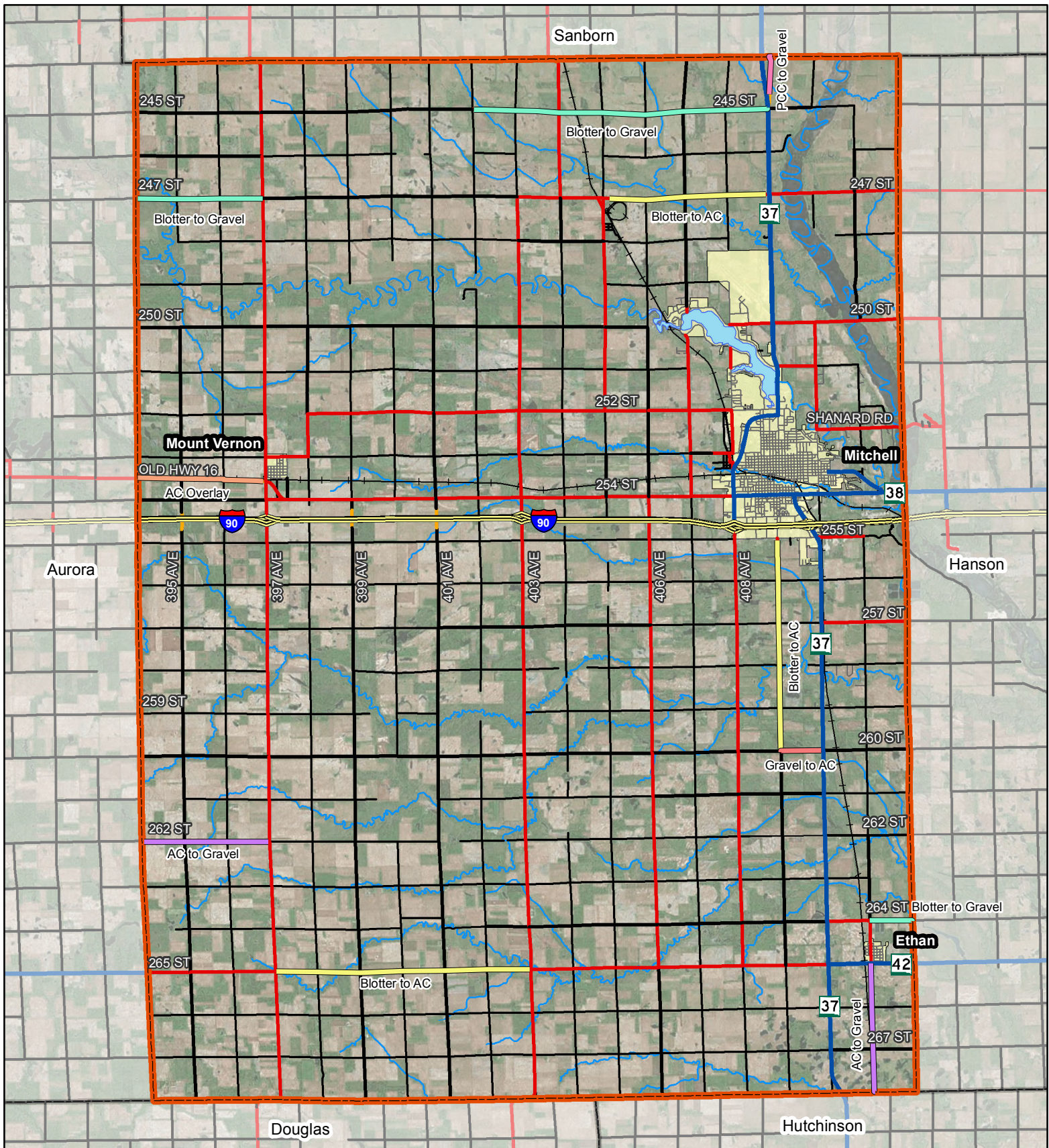
Study Area

(Davison
County)



1 in = 3 miles





**Figure 8-2:
Future Evaluation
of Roadway Surface
Modifications**

Davison County
MASTER TRANSPORTATION PLAN

Legend

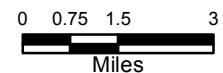
**Recommended
Change**

- Gravel to AC
- Blotter to Gravel
- Blotter to AC
- PCC to Gravel
- AC to Gravel
- AC Overlay

**County Roads
Surface Type**

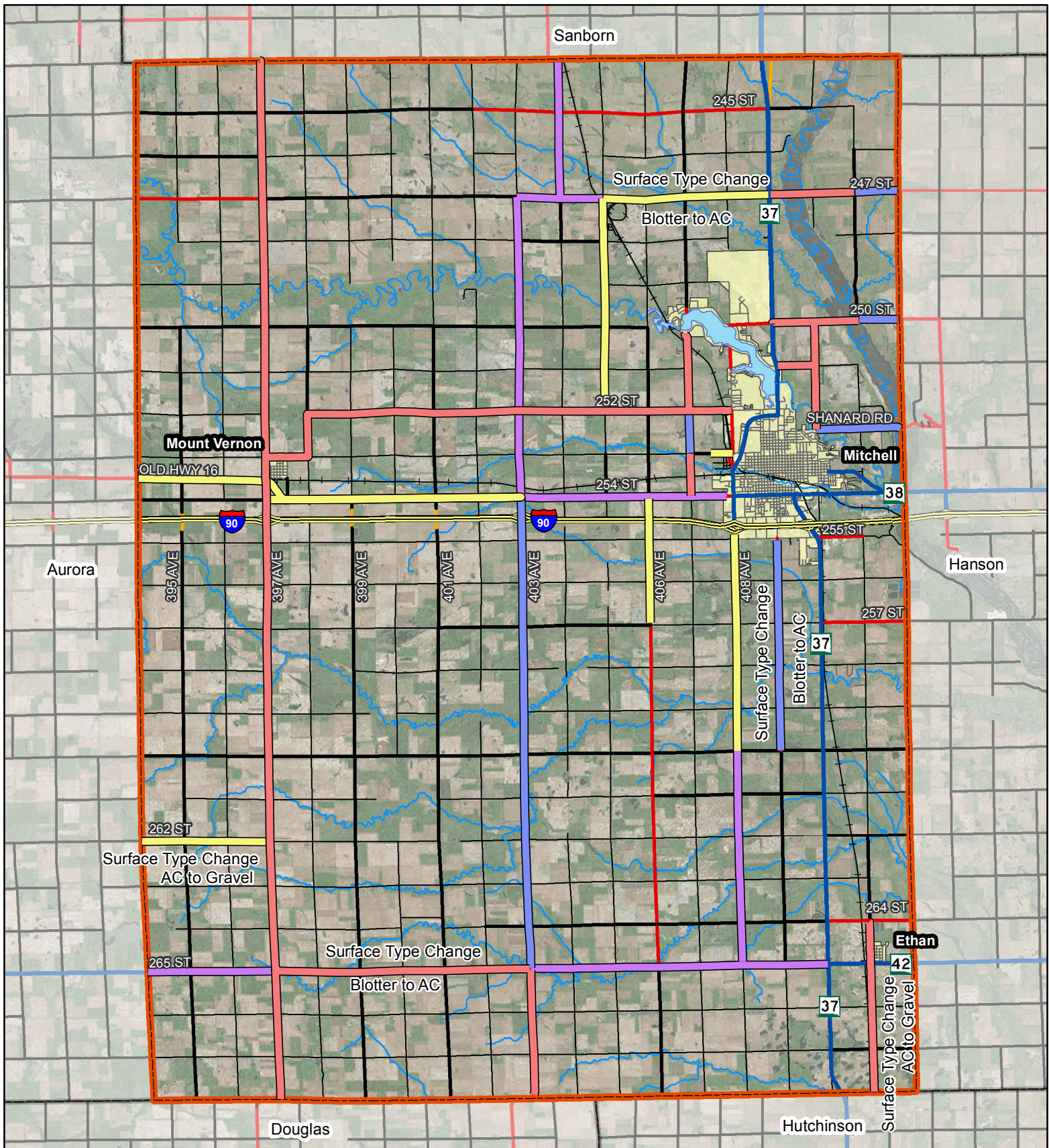
- Gravel
- Bituminous
- Concrete
- Interstate
- State Highways
- Township Roads

- Rail Lines
- Rivers & Streams
- Cities
- Study Area
(Davison County)



1 in = 3 miles





**Figure 8-3:
Asphaltic Concrete
Overlay Needs
Timeframe**

Davison County
MASTER TRANSPORTATION PLAN

Legend

Timeframe

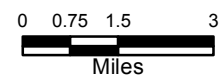
- 2016-2020 (60 mi)
- 2021-2025 (30 mi)
- 2026-2030 (20 mi)
- 2031-2035 (32 mi)

County Roads

- Gravel
- Bituminous
- Concrete

Interstate

- State Highways
- Township Roads
- Rail Lines
- Rivers & Streams
- Cities
- Study Area (Davison County)



1 in = 3 miles



9. Transportation Funding

One of the more critical aspects to addressing transportation issues and needs is the understanding of available transportation funding and the prioritization of improvements to maximize the investment in the infrastructure. The following outlines the historical and future funding availability to Davison County as well as how the funding is able to address the identified issues and needs on the County's transportation system.

Annual Funding Need

The Davison County Master Transportation Plan outlines current and future needs throughout the Davison County transportation system over the next 20 years. Planning-level costs were applied to these needs and applicable recommendations in several chapters throughout the Master Transportation Plan.

An annualized funding need to preserve and maintain the existing transportation system, annually reconstruct 1 to 2 bridges (or \$600,000), and annually implement 10 percent of the proposed short-term priority projects (proposed implementation in next 10 years) was developed to bring the various components of the transportation system together to a County-wide need assessment. Table 9-1 outlines the annual funding needs, in terms of 2015 dollars.

Table 9-1: Annual Funding Need (2015 Dollars)

	Estimated Annual Cost (2015 \$)
Asphaltic Concrete Overlays	\$1,290,000
Bituminous Surfacing Preservation and Maintenance	\$1,390,000
Gravel Resurfacing and Maintenance	\$1,840,000
Signs and General Maintenance	\$1,030,000
Two Bridge Reconstruction Projects	\$600,000
Annual Bridge Maintenance	\$35,000
'Short-Term' Priority Projects	\$1,490,000
Total	\$7,675,000

Transportation funding needs will continue to increase into the future as to keep pace with annual increases in construction costs. In order to estimate funding needs at the planning horizon, year of expenditure costs were estimated for 2035 using a 4.75% annual inflation rate. As shown in Table 9-2, the estimated annual funding need more than doubles by the year 2035.

Table 9-2: Estimated Year of Expenditure Funding Need (2035)

	Estimated Annual Cost (2035)
Asphaltic Concrete Overlays	\$3,260,000
Bituminous Surfacing Preservation and Maintenance	\$3,520,000
Gravel Resurfacing and Maintenance	\$4,650,000
Signs and General Maintenance	\$2,610,000
Two Bridge Reconstruction Projects	\$1,520,000
Annual Bridge Maintenance	\$90,000
'Short-Term' Priority Projects	\$3,770,000
Total	\$19,420,000
Total 20-Year Costs (2016-2035, with inflation)	\$259,000,000

Historical Budget and Expenditures

Historically, Davison County has expended between approximately \$2.7 million and \$3 million annually from the County Road and Bridge fund. For 2015, the approved budget was approximately \$3.25 million. An overview of expenditures from the County Road and Bridge fund between 2011 and 2015 is shown in Table 9-3.

**Table 9-3: Yearly County Road and Bridge Fund Expenditures 2011-2014
(Year of Expenditure Dollars)**

	2011 Expenditures (YOE \$)	2012 Expenditures (YOE \$)	2013 Expenditures (YOE \$)	2014 Expenditures (YOE \$)	2015 Budget (2015 \$)
Highways, Roads, and Bridges	\$2,708,976	\$2,970,173	\$2,970,284	\$2,770,064	\$3,088,481
Intergovernmental Expenditures	-	-	\$2,123	\$2,138	TBD
Debt Service	-	-	\$38,647	\$121,702	\$159,484
Total Expenditures	\$2,708,976	\$2,970,173	\$3,011,054	\$2,893,904	\$3,247,965

(Source: South Dakota Department of Revenue)

Transportation Needs and Available Funding

Utilizing the total of annualized identified needs throughout the Davison County transportation network, it can be compared to the existing budget to visualize and assess the implications of limited funding and need for prioritization. The following presents a scenario that addresses the basic maintenance and minor roadway preservation activities first (general maintenance and

signs, bituminous surfacing maintenance and preservation, and gravel resurfacing and maintenance) followed by asphaltic concrete overlays, bridge reconstruction, and identified short-term' priority projects. The illustrative scenario does not consider state funding for a

Under this scenario, considering the budgetary limits from the County's 2015 budget and prioritization of activities, the figure shows that the current budget will only support approximately 40 percent of the annual needs throughout the County transportation network.

The figure illustrates that General Maintenance and Signs, Bituminous Surfacing Preservation and Maintenance, and Annual Bridge Maintenance can be completely funded, while Gravel Resurfacing and Maintenance activities can be partially funded. Items that would be left out include Asphaltic Concrete Overlays, Bridge Reconstruction (est. 2/year) and Short-Term Priority Projects.

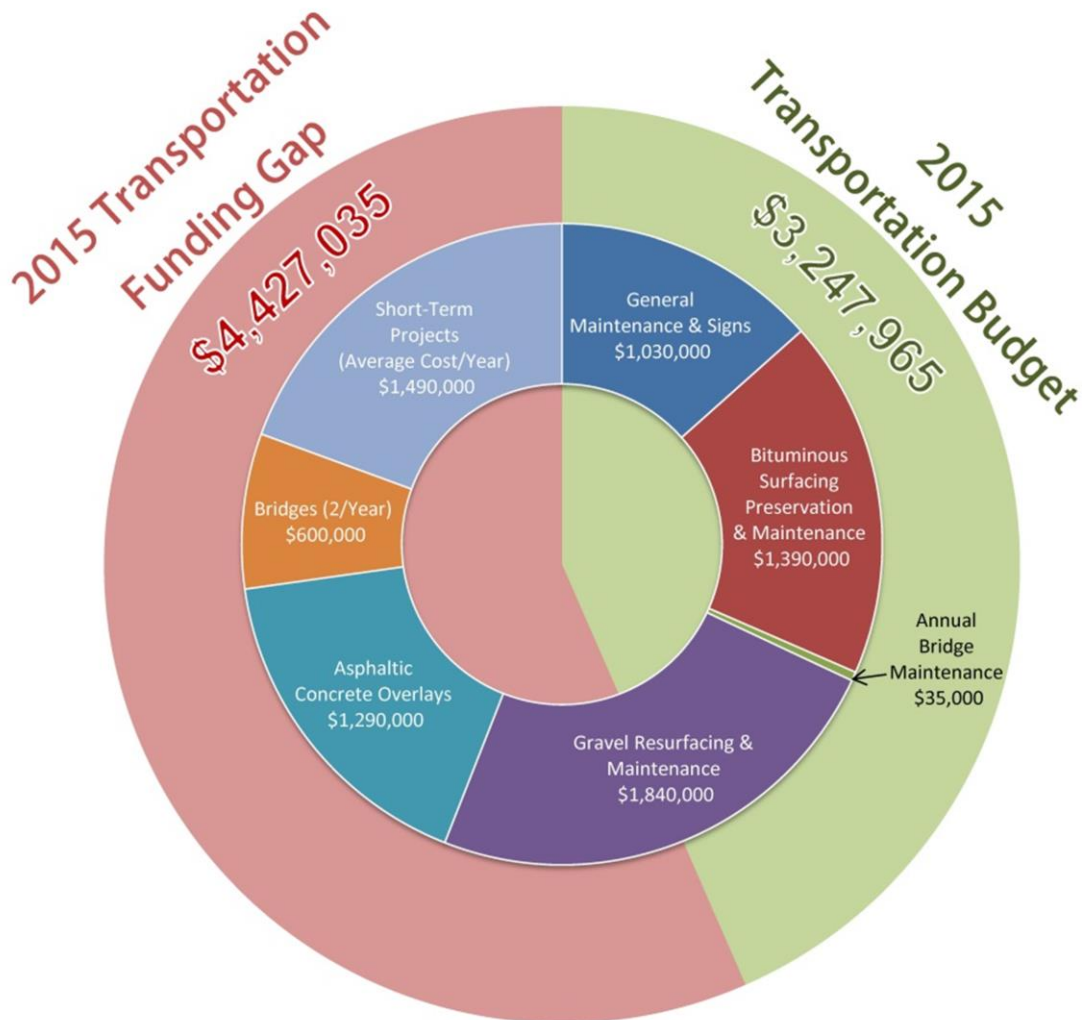


Figure 9-1: Transportation Funding Needs vs. 2015 Road and Bridge Budget

specific project or any grant-based funded projects, which would cover or supplement a portion of the funding gap. Further, it does not consider partial funding of various activities, selective deferred maintenance, or a one-time spike in project costs due to situations like a large bridge project. Many of these items are addressed annually, presenting the importance and opportunity for maintenance, preservation, and network improvement prioritization.

County Road and Bridge Fund Revenue Sources

The primary sources of County road and bridge funding is through the County Wheel Tax, Motor Vehicle License Fees, and Prorate License Fees, accounting for over 80 percent of the revenue into the County Road and Bridge Fund. The remaining 20 percent is made up of smaller or one-time funding sources such as the motor fuel tax, mobile home fees, project grants, maintenance contracts, and supplemental state funding. In many years, the County Road and Bridge Fund is supplemented by a County General Fund transfer in order to help fill the gap between the prioritized needs for that year and available funding.

The current, 2015, Davison County Wheel Tax is \$2.00 per wheel up to 4 wheels per vehicle, for a maximum total per vehicle of \$8.00. This tax is retained by Davison County and deposited into the County Road and Bridge Fund. The tax is then apportioned at 99 percent to the County and 1 percent to municipalities and townships within Davison County based on a miles of road basis.

Motor Vehicle License Fees are collected by Davison County. Of the total fee, 41.5 percent is retained by Davison County and divided into three funds:

- 22.5% County Road and Bridge Fund
- 14.0% Townships
- 5.0% Cities

The remaining 58.5 percent is sent to the State of South Dakota, of which is divided into the following four funds:

- 54% Local Highway and Bridge Fund, of which is allocated to:
 - 77.13% Counties
 - *Davison County apportionment: 1.635%*
 - 18.55% Cities
 - *City of Mitchell apportionment: 0.684%*
 - *City of Ethan apportionment: 0.013%*
 - *City of Mt. Vernon apportionment: 0.023%*
 - 4.32% Townships
 - *Davison County Townships apportionment: 0.043%*
- 2.5% State License Plate Revolving Fund
- 1.75% State Motor Vehicle Fund
- 0.25% County Treasurer

Prorate License Fees are collected by the State of South Dakota and distributed to similar funds as the Motor Vehicle License Fees. 58.5 percent are distributed to the following three funds:

- 57% Local Highway and Bridge Fund
- 1.0% State License Plate Revolving Fund
- 0.5% State Motor Vehicle Fund

The remaining 41.5 percent is sent to local agencies as follows:

- 22.5% County Road and Bridge Fund
- 14.0% Townships
- 5.0% Cities

The State of South Dakota Motor Fuel Tax is primarily a funding source for the South Dakota State Highway Fund. Regardless of the total tax revenue received by the State of South Dakota, \$700,000 is distributed to counties and townships annually through a Motor Fuel Tax Adjustment. The adjustment distribution formula is based on truck registrations, population and total road mileage. Of the total amount received by Davison County, 60 percent is for the County Road and Bridge Fund and 40 percent is distributed to Townships.

A series of other small funding sources, maintenance contracts, and one-time funding sources such as grants complete the annual revenue into the County Road and Bridge Fund. The following summarizes the revenue between 2012 and 2014.

Table 9-4: Yearly County Road and Bridge Fund Revenue 2011-2014
(Year of Revenue Dollars)

	2011 (YOR \$)	2012 (YOR \$)	2013 (YOR \$)	2014 (YOR \$)
County Wheel Tax	\$201,703	\$210,288	\$213,802	\$214,545
Motor Vehicle License Fees	\$1,043,275	\$1,295,320	\$1,341,166	\$1,501,556
Prorate License Fees	\$66,272	\$68,787	\$64,027	\$68,443
Motor Fuel Tax Adjustment	-	\$8,246	\$7,490	\$7,401
Other	\$458,426	\$419,079	\$355,870	\$363,763
General Fund Transfer	\$1,600,000	\$350,000	\$1,900,000	\$600,000
Total Revenue (less General Fund Transfer)	\$1,769,676	\$2,001,720	\$1,982,355	\$2,155,708

Source: South Dakota Department of Revenue

Future County Road and Bridge Funding Sources

In early 2015, the South Dakota Legislature adopted Senate Bill 1 which was later signed into law and became effective April 1, 2015. Additional components of the bill become effective July 1 and October 1, 2015. Senate Bill 1 is a highway funding bill that provides a series of modifications to current funding sources and adds a property tax levy option for Counties and Townships. A summary as provided by the South Dakota Department of Revenue is shown in Figure 9-2.

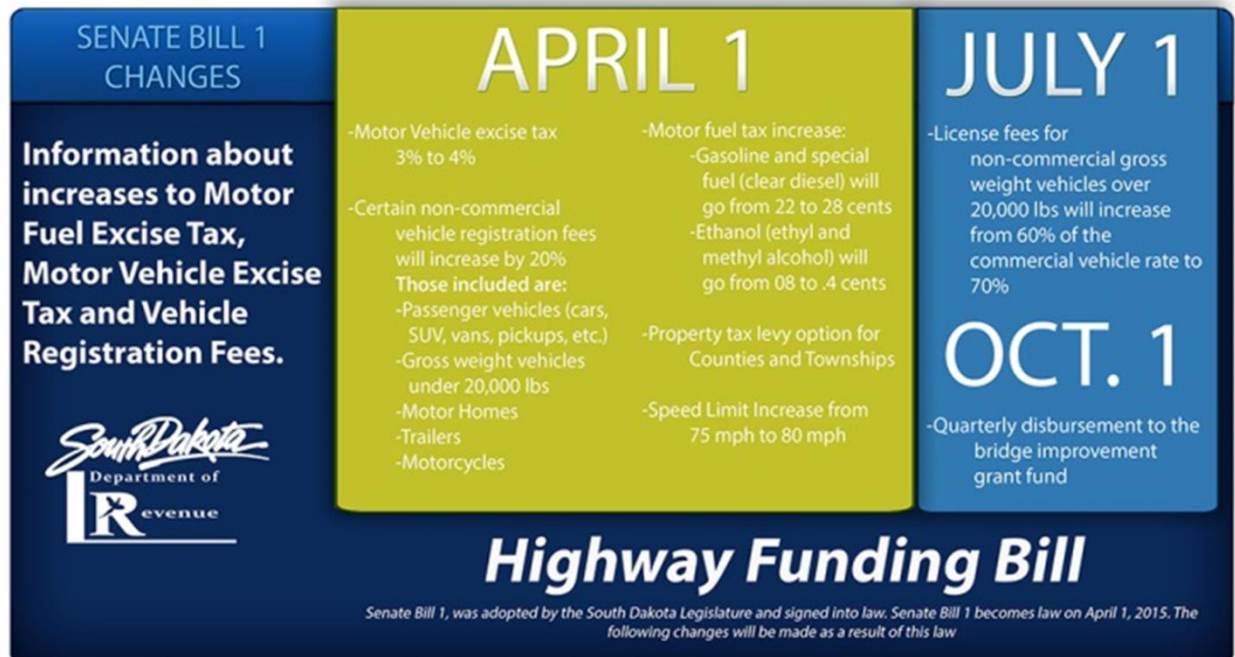


Figure 9-2: 2015 Highway Funding Bill (Senate Bill 1)

The components within the highway funding bill that include the opportunity to directly impact revenue into the Davison County Road and Bridge Fund include:

- County Wheel Tax
 - Allows fee increase to a maximum of \$5.00 per wheel and 12 wheels per vehicle
 - *Projected to provide approximately \$340,000 in additional County highway and bridge funding*
- Motor Vehicle License Fees
 - Provides 20 percent increase
 - *Projected to provide approximately \$300,000 in additional County highway and bridge funding*
- Property Tax Levy Option for Counties and Townships
 - Counties may levy an annual tax of the following, depending on a county's total taxable valuation:

- Not to exceed \$1.20 per \$1,000 of taxable property valuation if total taxable valuation of the county is \$1 billion dollars or less.
 - Not to exceed \$0.90 per \$1,000 of taxable property valuation if total taxable valuation of the county is more than \$1 billion dollars and less than \$2 billion.
 - Not to exceed \$0.60 per \$1,000 of taxable property valuation if total taxable valuation of the county is \$2 billion or more.
- Townships allowed to assess up to \$0.50 per \$1,000 of taxable property valuation, depending on county's total taxable valuation
- Davison County taxable valuation approximately \$1.38 billion, which allows for an assessment of \$0.90 per \$1,000 of taxable property valuation under this funding bill
 - *At \$0.90 per \$1,000, this option would equate to approximately \$1.24 million in additional County highway and bridge funding*
- The SDDOT will swap state road funds for federal Surface Transportation Program (STP) road funds for local governments
 - Lessens restrictions for Davison County to use highway funds
 - Provide annual allocation for use on any road or bridge repair or maintenance
 - *Estimated allocation to Davison County around \$125,000 and \$150,000 annually, based on historical STP fund allocations*

Prior to the 2015 Highway Funding Bill, South Dakota STP funds were allocated to all 66 counties. When enough STP funding was accumulated under the County's balance to fund a project and the County was prepared to meet the funding match requirements, a County Commission could request a project be programmed into the Statewide Transportation Improvement Program. Counties also had the option to exchange their STP funds for state funds on a 90:10 ratio. Historically, Davison County has been allocated \$143,374.87 annually beginning in fiscal year 2013. This was a decrease from the allocations in fiscal year 2011 and 2012 at \$149,706.97.

As part of the 2015 Highway Funding Bill, all STP funding will be swapped for state road funds and current, accumulated county balances are being paid out through 2015. Under the 2015 Highway Bill, these STP funds will be swapped for state funds and allocated to each county in the form of a check that the County can use on any road or bridge project, including repair or maintenance. Therefore, the funding is not necessarily 'new' funding, rather it is a similar funding mechanism that now permits greater flexibility for the counties in project implementation with that funding. Based on historical STP fund allocations to Davison County, planning level estimates account for around \$125,000 to \$150,000 annually to Davison County through the federal and state road funds swap.

Another potential, future funding source is a County Sales Tax. Currently, the option is not available as a funding mechanism to South Dakota counties and would require legislative action before implementation. A County Sales Tax is currently being utilized by certain local, county, and/or state agencies outside of South Dakota.

The vast majority of taxable sales occur within the three municipalities in Davison County, particularly the City of Mitchell. All three municipalities currently report a 2 percent city tax rate. In calendar year 2014, the reported taxable sales within the three municipalities subject to the city tax rate were approximately \$553 million⁹ and equated to just over \$11.87 million in collected city tax. Based on this taxable sales total from 2014 and a 1 percent county sales tax rate, approximately \$5.9 million would have been generated in 2014. Projecting to current-year, this would equate to approximately \$6.1 million in additional funding for roads and bridges.

Based on the 2014 funding and projections by Davison County, the Table 9-5 outlines potential funding opportunities as part of the 2015 Highway Funding Bill and implementation of a County Sales Tax. A planning-level estimate of the 20-year revenue benefit for the county wheel tax (incorporating the increase), motor vehicle license fees (incorporating the increase), implementation of a property tax levy, and implementation of a county sales tax is also provided to illustrate the order of magnitude each component brings over the next 20 years.

Table 9-5: Projected Potential Increases in Revenue

	2014 Road and Bridge Fund Revenue (2014 \$)	Estimated Additional Annual Revenue from Tax/Fee Increases (2015 \$)	20-Year Benefit of Revenue* Existing + Additional (2016-2035)
County Wheel Tax	\$214,545	+ \$340,000	\$11,875,000
Motor Vehicle License Fees	\$1,501,556	+ \$300,000	\$38,160,000
Prorate License Fees	\$68,443	-	-
Motor Fuel Tax	\$7,401	-	-
Property Tax Levy	\$0	+ \$1,300,000	\$39,650,000
County Sales Tax (1%)	\$0	+ \$6,100,000	\$152,200,000
Other STP Fund Swap	\$363,763 -	- + \$150,000	- -
General Fund Transfer	\$600,000	Not estimated	-

Source: South Dakota Department of Revenue and Davison County

*20-year benefit of revenue illustrates the total revenue accumulated over 20 years between 2016 and 2035 if the additional revenue from potential tax/fee increases are incorporated (summation of the first two columns, 2014 and Additional). To project out to 2035 funding forecasts, this calculation incorporates the following annual straight-line increases reflective of funding components within each respective tax/fee: County Wheel Tax (0.57% annually based on historical population), Motor Vehicle License Fees (0.57% annually based on historical population) Property Tax Levy (4.75% annually based on 2009-2014 Davison County total valuation), and County Sales Tax (2.36% annually based on 2009-2014 calendar year taxable sales in Davison County).

⁹ South Dakota Municipal Tax Report (2014 Calendar Year): Statistics for ALL Cities by Standard Industrial Classification (SIC, Major Group, and Division. Published 1/13/2015 by South Dakota Department of Revenue.

Under this scenario, considering the budgetary limits from the County's 2015 budget, prioritization of activities, and estimated revenue increases under the 2015 Highway Funding Bill, the figure shows that the current budget and funding increases will support approximately 68 percent of the annual needs throughout the County transportation network. Not shown is the 1% sales tax increase estimated at \$6.1 million annually in 2015 dollars.

The figure illustrates that General Maintenance and Signs, Bituminous Surfacing Preservation and Maintenance, Annual Bridge Maintenance and Gravel Resurfacing and Maintenance activities can be completely funded, while Asphaltic Concrete Overlays can be partially funded. Items that would be left out include Bridge Reconstruction (est. 2/year) and Short-Term Priority Projects.

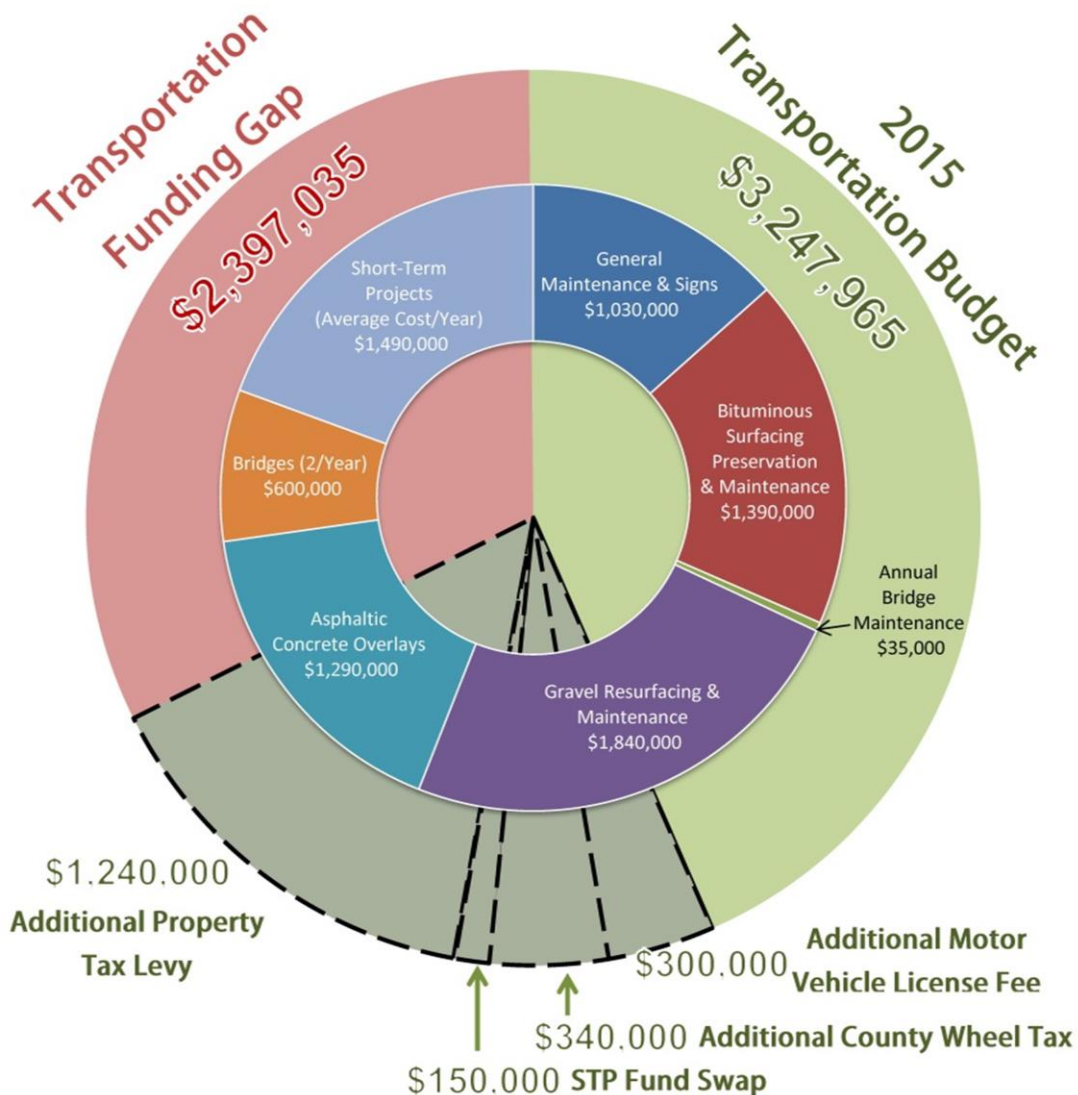


Figure 9-3: Transportation Funding Needs vs. 2015 Budget & Estimated Revenue Increases

Other Potential Funding Sources

As noted in the comparison of transportation needs and available funding sources, there is a gap in being able to meet those needs on an annual basis even with the additional funding afforded by the 2015 Highway Funding Bill. Strictly maintaining the existing infrastructure already exceeds the available funding and will need to be prioritized itself. Thus, the areas that will likely feel the shortage of available funding are the capital investment/new infrastructure type projects such as new road surface upgrades, widened roadway cross-sections, bicycle/pedestrian trails, etc. that are not part of a preservation or maintenance activity.

It is recommended that Davison County leverage alternative funding and agency assistance opportunities as feasible, such as Federal programs, grants, research, and multi- or cross-program opportunities. In many instances these programs are competitive for award of funding, thus the County should research and evaluate each program prior to submittal.

Administered through South Dakota Department of Transportation

- Bridge Improvement Grant (BIG) Fund
- Transportation Alternatives
- Highway Safety Improvement Projects (HSIP), in conjunction with the South Dakota Strategic Highway Safety Plan
- State Planning and Research Program (programs for STP Recipients or Small Communities; for planning related activities)
- Transportation Economic Development Grants

Project and Funding/Effort Assistance

- South Dakota State University
- Mitchell Technical Institute or Dakota Wesleyan University
- Local Transportation Assistance Program (LTAP)
- Planning and Development District III

Multi-Modal and Other Funding Opportunities

- U.S. Department of Transportation (including Federal Highway Administration) Discretionary Programs
 - *Many of these were discontinued with the latest Federal funding bill, but something to consider in the future when new bills are approved*
- Federal Bicycle and Pedestrian Funding Opportunities
 - http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm
- Bicycle/Pedestrian Grants
 - Many are available, competitive, and fund projects at various levels
 - Recommend working with Palace City Pedalers or other bicycle/pedestrian groups for grant applications
 - Example grant-based organization includes People for Bikes : <http://www.peopleforbikes.org/>

10. Project Implementation Plan

This implementation plan was developed based on stakeholder and public input and the needs analysis completed as part of the planning process. The goal of this implementation program is to provide recommendations which balance stakeholder needs with regulatory requirements and technical constraints.

Project Development

Through an assessment of the existing Davison County transportation network, the future needs, available resources, and public input throughout the process, the Davison County Master Transportation Plan identifies nine overarching categories of transportation needs throughout the existing network, each often encompassing multiple specific needs. These nine need categories are as follows:

- Bridges
- Intersections
- Drainage
- Maintenance
- Traffic
- Corridors
- Unofficial Bypass Routes
- Pedestrians and Bicycles
- Urbanized Area Expansion

The Major Roads Plan, Bridge Plan, Roadway Design, Analysis, and Policy Guidelines, and Preservation and Maintenance Plan provide a systematic means for evaluating existing conditions, laying the groundwork for project prioritization and selection, and ultimately providing recommendations for implementation. Using this systematic approach to project identification, evaluation, and selection, coupled with public and stakeholder involvement throughout the process, a series of proposed projects were identified for implementation over the next 20+ years.

Project Implementation

The following pages include a series of tables (Tables 10-1 through 10-6) summarizing the implementation plan project recommendations, as well as maps (Figures 10-1 and 10-2) illustrating the location of the proposed capital projects. The project recommendations are organized into the five categories. Within each category, recommendations are tied to a need as identified in the issues and needs analysis phase of the planning process. Definitions for the recommendations and needs are provided as follows:

Project Recommendation Categories and Need Definitions

- A. **Intersection Projects** – Capital projects to address safety and operational issues at a specific location or intersection.

Needs Addressed

- a. Geometric Deficiency – Improvements to correct potential safety and operational issues due to geometric deficiencies (i.e., intersection skew, sight-lines, etc.).
- b. Traffic Control – Intersection control improvements to improve safety and operations (i.e., new intersection control, signal timing updates, etc.).
- c. Access – Access improvements or modifications to correct potential safety and operation issues (i.e. relocating or combining driveways).
- d. Visibility – Lighting improvements to improve intersection visibility (i.e. installing or improving intersection lighting).

- B. **Roadway Segment Projects** – Capital projects to improve roadway safety and mobility along roadway segments.

Needs Addressed

- a. Capacity Constraints – Improvements to capacity to enhance operations and minimize congestion (i.e., through lanes, turn lanes, new routes, etc.).
- b. Connectivity – Improvements to local or regional connectivity by enhancing mobility on significant county and local routes (i.e., new through routes, pave gravel road, etc.).
- c. Safety – Improvements to roadway segments or spot locations along a corridor to address identified safety needs and issues; integral with other roadway segment needs.
- d. Geometric/Roadside Design – Improvements to correct potential safety and operational issues due to geometric and/or roadside deficiencies (i.e. install guardrail, shoulder widening or addition, slope flattening, etc.).
- e. Urban Growth Area – comprehensive improvements to address needs from urban into rural fringe areas (i.e. urban cross-sections with storm sewer, accommodation of bicycle/pedestrian facilities, improved capacity, etc.).
- f. Access – Access improvements or modifications to correct potential safety and operation issues (i.e. relocating or combining driveways).
- g. Roadway Surfacing – Evaluation of surfacing needs at time of next major preservation activity (gravel, blotter, and asphaltic concrete surfaced roadways).

- C. **Multi-modal Network Enhancement Projects** – Capital projects and planning/policy initiatives to improve safety and mobility for pedestrians and bicyclists.

Needs Addressed

- a. Pedestrian/Bicycle Safety – Providing a new facility or enhancing/upgrading an existing facility to improve mobility and safety along a route.
- b. Route Connectivity – Improvements to mobility by enhancing existing routes or providing a new connection between established routes or popular destinations.

- c. Access – Improvements to provide access to recreational areas, residential/commercial/industrial destinations, and other property along a route.
- D. **System Management and Policy Recommendations** – Policy level recommendations to identify and prioritize projects and to implement best practices with regard to development policy.
 - Needs Addressed*
 - a. Funding and Maintenance – Strategies to leverage outside funding opportunities.
 - b. System Inventory, Prioritization, and Standards – Strategies to improve asset management and capital planning.
- E. **Potential Bridge Projects** – Prioritized list of capital projects to address issues related to bridge crossings over other transportation infrastructure (roads, railroads) or waterways.
 - Needs Addressed*
 - a. Structural Deficiencies – Improvements to address structural deficiencies, repairs/rehabilitation, or replacement of bridges and approach roadways.

The implementation tables include planning level cost estimates based on current industry planning-level estimating procedures, combined with SDDOT and Davison County input on recent project costs and locality adjustments. Estimated costs are provided for all projects except those found in the System Management and Policy Recommendations, comprised of largely administrative or technical analysis rather than capital projects. Also included is a proposed priority level regarding projected timeframe of implementation for each recommendation. The priority levels are defined as follows: Short Term (S): 0 – 10 years, Medium Term (M): 11 – 20 years, and Long Term (L): 20+ years.

Table 10-1: Intersection Projects

No.	Intersection	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Comments
1	255th Street & SD 37	-	S	Geometric Deficiency	Planned reconstruction as part of SDDOT project PH 0037(130)72
2	253rd Street & 398th Avenue	Study: \$5,000 Reconstruction: \$400,000	S	Geometric Deficiency, Traffic Control	Conduct traffic control, sight distance, and route priority evaluation; extend paved surface approaches on eastern and southern legs, possible removal of 'free right'
3	252nd Street & 398th Avenue	Study: \$2,000 ROW: varies	S	Geometric Deficiency	Evaluate ROW needs to provide intersection sight distance
4	265th Street/SD 42 & SD 37	\$75,000	S	Access and Visibility	Add intersection lighting; consolidate and relocate driveway access away from intersection functional area
5	247 th Street & SD 37	\$200,000	S	Geometric Deficiency	Construct left-turn lane in median from northbound SD 37 to 247 th Street
6	258 th Street & SD 37	Turn Lanes: \$1,250,000	S	Geometric Deficiency	Construct left-turn lanes from SD 37 to 258 th Street
7	250 th Street & Airport Road	\$15,000	S	Geometric Deficiency	Culvert extension and increase corner radius between 250 th Street and Airport Road
8	254th Street & Haynes Street	\$300,000 - \$3,000,000	M	Geometric Deficiency, Traffic Control	Reconstruct Haynes Street approach (gravel); combine Haynes Street, 254th Street, and Old Hwy 16 intersection
9	264th Street & 411th Avenue	\$200,000	M	Geometric Deficiency, Traffic Control	Remove 264th Street EB to SB free right-turn; intersection improvements
10	254th Street & 403rd Avenue	\$15,000	M	Visibility	Add intersection lighting
11	251st Street & SD 37	\$1,250,000	L	Geometric Deficiency	Reconstruct 251st Street approaches for perpendicular intersection with SD 37 and raise westbound 251 st Street approach grade

Table 10-2: Roadway Segment Projects – Short Term Priority

No.	Route	Termini		Length (miles)	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Comments
		From	To					
1	247th Street	397th Avenue	403th Avenue	6	Maintain Gravel: \$300,000 Convert to Blotter: \$540,000 Convert to AC: \$1,950,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
2	262nd Street	Davison/Aurora County Line	397th Avenue	3	Maintain AC: \$555,000 Convert to Blotter: \$270,000 Convert to Gravel: \$90,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
3	264th Street	411th Avenue	Davison/Hanson County Line	1	Maintain Blotter: \$50,000 Convert to Gravel: \$25,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
4	411th Avenue	SD 42	Davison/Hutchinson County Line	3	Maintain AC: \$555,000 Convert to Blotter: \$270,000 Convert to Gravel: \$90,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
5	247 th Street	405 th Avenue	SD 37	4	Maintain Blotter: \$200,000 Convert to AC: \$1,200,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
6	265 th Street	397 th Avenue	403 rd Ave	6	Maintain Blotter: \$300,000 Convert to AC: \$1,800,000	S*	Roadway Surfacing Needs	Conduct Surface Material Analysis
7	Shanard Road	Barber Place	Davison/Hanson County Line	2	Safety Study: \$25,000 Safety Improvements, ea.: \$10,00 - \$125,000	S	Safety Issues	Conduct Corridor Safety Audit; Safety improvements may include guardrail, shoulders, and additional curve signage
8.a	254th Street	403rd Avenue	SD 37	5	Safety Study: \$30,000	S	Safety, Access, Urban Growth Area, and Roadside Design	Conduct Corridor Safety Audit and Access Study
9.a	265th Street	Davison/Aurora County Line	SD 37	16	Safety Study: \$35,000	S	Safety, Access, Geometric Deficiencies, and Roadside Design	Conduct Corridor Safety Audit Spot safety improvements; may include guardrail, shoulder/surface widening, flatten slopes
10.a	403rd Avenue	260th Street	261st Street	0.5	Study: \$5,000	S	Safety, Roadway Surfacing Needs	Conduct geotechnical study for long-term solution regarding frequent heaving issues; Construct drain tile and other improvements
11	255 th Street	411 th Avenue	Davison/Hanson County Line	0.5	Safety Study: \$15,000 Safety Improvements, ea.: \$10,000 - \$75,000	S	Safety	Safety study and implementation of improvements, including guardrail, additional signage, and culverts
12	Spruce Street (255th Street)	SD 37	411th Avenue	1.25	2,500,000	S	Safety, Access, Urban Growth Area	Construct 5-Lane Section with access; railroad crossing, and bicycle/pedestrian access and connectivity improvements; <i>In conjunction with City of Mitchell</i>
13	N Ohlman Street	23rd Avenue	8th Avenue	1	\$5,000,000	S	Safety, Geometric/Roadside Design, Capacity, Connectivity, Urban Growth Area	Reconstruct to urban 3-lane section with bicycle/pedestrian improvements; <i>In conjunction with City of Mitchell</i>

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years) * Priority based on need for major rehabilitation or replacement of existing surface.

Table 10-3: Roadway Segment Projects – Short Term Priority (Continued)

No.	Route	Termini		Length (miles)	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Comments
		From	To					
14	403rd Avenue	254th Street	I-90	0.5	\$325,000	S	Safety, Geometric Deficiencies, and Roadside Design	Widen roadway surface by adding shoulders
15	407th Avenue	249 th Street	North Harmon Drive	0.5	\$650,000	S	Urban Growth Area, Roadway Surfacing Needs	Construct asphaltic concrete roadway with bicycle/pedestrian improvements
16	411th Avenue & 253 rd Street	253rd Street Foster Street	Shanard Road 411 th Avenue	1.25	In development	S	Safety, Urban Growth Area	Roadway surface and roadside design improvements
17	Old Highway 16	Davison/Aurora County Line	397 th Avenue	3	\$600,000	S	Roadway Surfacing Needs	Asphaltic concrete overlay of existing Portland Cement Concrete surface

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years)

* Priority based on need for major rehabilitation or replacement of existing surface.

Table 10-4: Roadway Segment Projects – Medium Term Priority

No.	Route	Termini		Length (miles)	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Comments
		From	To					
18	245th Street	402nd Avenue	SD 37	7	Maintain Blotter: \$350,000 Convert to Gravel: \$175,000	M*	Roadway Surfacing Needs	Conduct Surface Material Analysis
19	247th Street	Davison/Aurora County Line	397th Avenue	3	Maintain Blotter: \$150,000 Convert to Gravel: \$75,000	M*	Roadway Surfacing Needs	Conduct Surface Material Analysis
20	409th Avenue	255th Street	260th Street	5	Maintain Blotter: \$250,000 Convert to AC: \$150,000	M*	Roadway Surfacing Needs	Conduct Surface Material Analysis
8.b	254th Street	403rd Avenue	SD 37	5	Safety Improvements, ea.: \$10,000 - \$125,000	M	Safety, Access, Urban Growth Area, and Roadside Design	Conduct Corridor Safety Audit and Access Study
9.b	265th Street	Davison/Aurora County Line	SD 37	16 0.25, ea.	Safety Improvements, ea.: \$10,000 - \$125,000	M	Safety, Access, Geometric Deficiencies, and Roadside Design	Conduct Corridor Safety Audit Spot safety improvements; may include guardrail, shoulder/surface widening, flatten slopes
10.b	403rd Avenue	260th Street	261st Street	0.5	Improvements: \$200,000	M	Safety, Roadway Surfacing Needs	Conduct geotechnical study for long-term solution regarding frequent heaving issues; Construct drain tile and other improvements
21.a	254th Street	403rd Avenue	SD 37	5	Feasibility Study: \$75,000	M	Safety, Access, Urban Development, and Roadside Design	Conduct Corridor Feasibility Study and Needs Assessment for future reconstruction as 3-lane urban section; Reconstruction of urban 3-lane section
22	411th Avenue (vicinity)	Spruce Street (255th Street)	257th Street	2	Feasibility Study: \$15,000 New Connection (Gravel): \$1,200,000 411th Ave AC to 257th: \$2,600,000	M	Capacity Constraints, Connectivity Issues	Conduct corridor and traffic needs study on 257th Street and 411th Avenue for feasibility as alternate route to Spruce Street
23	260th Street	409th Avenue	SD 37	1	Convert to AC: \$325,000	M	Roadway Surfacing Needs	Southern paved east-west connection between 409th Avenue and SD 37; In conjunction with future 409th Avenue projects

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years)

* Priority based on need for major rehabilitation or replacement of existing surface.

Table 10-5: Roadway Segment Projects – Long Term Priority

No.	Route	Termini		Length (miles)	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Comments
		From	To					
24	250th Street	SD 37	Davison/Hanson County Line	3	\$3,900,000	L	Safety, Connectivity, Geometric/Roadside Design, Urban Growth Area	Reconstruct to accommodate increasing truck and vehicular traffic as key connection into Hanson County; <i>Recommended coordination with Hanson County</i>
25	Shanard Road	Foster Street	Hanson County Line	2	\$9,000,000	L	Safety Issues, Urban Development	Reconstruct as 3-lane urban section with roadside safety and bicycle/pedestrian improvements. Evaluate roadway elevation to decrease impacts during flood events; See multi-modal projects for other corridor projects <i>Recommended coordination with Hanson County</i>
8.c	254th Street	403rd Avenue	SD 37	5	Safety Improvements, ea.: \$10,000 - \$125,000	L	Safety, Access, Urban Growth Area, and Roadside Design	Conduct Corridor Safety Audit and Access Study
21.b	254th Street	403rd Avenue	SD 37	5	Reconstruction: \$22,500,000	L	Safety, Access, Urban Development, and Roadside Design	Conduct Corridor Feasibility Study and Needs Assessment for future reconstruction as 3-lane urban section; Reconstruction of urban 3-lane section
26	Foster Street (vicinity) and North-South I-90 Crossing	Spruce Street (255th Street)	SD 38	2	Feasibility Study: \$50,000 Crossing of I-90: \$14,000,000	L	Safety, Access, Urban Growth Area	Feasibility study for alternate access opportunities between SD 38 and Spruce Street; Crossing over I- 90 with local street connections
27	255th Street (Spruce Street)	403rd Avenue	408th Avenue	5	\$22,500,000	L	Access, Urban Growth Area	Construct 3-lane urban section, from A) 406th Avenue to 408th Avenue, and B) 403rd Avenue to 406th Avenue;
9.c	265th Street	Davison/Aurora County Line	SD 37	16 0.25, ea.	Safety Improvements, ea.: \$10,000 - \$125,000	L	Safety, Access, Geometric Deficiencies, and Roadside Design	Conduct Corridor Safety Audit Spot safety improvements; may include guardrail, shoulder/surface widening, flatten slopes

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years)

* Priority based on need for major rehabilitation or replacement of existing surface.

Table 10-6: Multi-Modal Network Enhancement Projects

No.	Route	Termini	Planning Level Estimated Cost (2015 \$)	Priority	Need Addressed	Improvement	Comments
1	Foster Street	Shanard Road to 250th Street	\$1,100,000	S	Pedestrian/Bicycle Safety, Access, and Route Connectivity	Share-Use Path	Urban fringe area, prominent route north out of Mitchell
2.a	I-90 Crossing at Foster Street (vicinity)	Spruce Street Corridor and SD 38 Corridor	Feasibility Study: \$25,000	S	Pedestrian/Bicycle Safety, Access, Connectivity	I-90 Crossing Feasibility Study and Improvements	Provide connectivity across I-90 between Spruce Street and SD 38 corridor
3	E 1st Avenue (SD 38P)	Connection in City of Mitchell to SD 38	Path: \$1,100,000 Lighting: \$265,000	S	Pedestrian/Bicycle Safety, Access, and Route Connectivity	Share-Use Path; Roadway Lighting	Provide safe route and access along E 1st Avenue <i>Recommended coordination with City of Mitchell</i>
4	252 nd Street	N Ohlman Street to 405th Avenue	Add Signage: \$5,000 Path: \$1,650,000 Add Shoulders: \$525,000	S	Pedestrian/Bicycle Safety and Route Connectivity	Share-Use Path	Urban fringe area, prominent route west out of Mitchell; segment part of route to Letcher and Mount Vernon
5.a	405th Avenue	252nd Street to 247th Street	Add Signage: \$5,000	S	Pedestrian/Bicycle Safety and Route Connectivity	Shoulders; Sign Route	Urban fringe area, prominent segment along route between Mitchell and Letcher
-	County-wide	-	\$5,000	S	Pedestrian/Bicycle Safety	Public Service Announcement	Provide annual public service announcement at the onset of fall harvest season to remind motorists and bicyclists/pedestrians the rules of the road and to be aware of potential vehicle-bicycle conflicts
6	Shanard Road	Foster Street to Riverside Drive	\$1,100,000	M	Pedestrian/Bicycle Safety and Route Connectivity	Share-Use Path, Sign Route	Urban fringe area, prominent gateway between Hanson County and City of Mitchell <i>Recommended coordination with Hanson County</i>
2.b	I-90 Crossing at Foster Street (vicinity)	Spruce Street Corridor and SD 38 Corridor	Crossing: \$550,000 - TBD	M	Pedestrian/Bicycle Safety, Access, Connectivity	I-90 Crossing Feasibility Study and Improvements	Provide connectivity across I-90 between Spruce Street and SD 38 corridor
7	408th Avenue & 265th Street to Ethan	408th Avenue: City of Mitchell Connection to 265th; 265th St. & SD 42 to Ethan	Add Shoulders: \$2,100,000	M	Pedestrian/Bicycle Safety and Route Connectivity	Shoulders in Urban Fringe Areas; Sign Route	Urban fringe area along north half of 408th Avenue, prominent route between Mitchell and Ethan <i>Recommended coordination with City of Mitchell</i>
8	250th Street	Lake Mitchell to Foster Street	\$650,000	M	Pedestrian/Bicycle Safety, Access, Connectivity	Paved Shoulder	Urban fringe area, prominent route between Lake Mitchell and Foster Street/east side of Mitchell
9	254th Street	403rd Avenue to Connection in City of Mitchell	\$2,750,000	L	Pedestrian/Bicycle Safety, Access	Share-Use Path	Provide safe route and access along 254th Street; Shared use-path included in corridor reconstruction estimate, this estimate applicable if shared-use path constructed separately <i>Recommended coordination with City of Mitchell</i>
5.b	405th Avenue	252nd Street to 247th Street	Add Shoulders: \$875,000	L	Pedestrian/Bicycle Safety and Route Connectivity	Shoulders; Sign Route	Urban fringe area, prominent segment along route between Mitchell and Letcher

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years)

Table 10-7: System Management and Development Recommendations

Recommendation	Estimated Cost	Priority	Need Addressed	Comments
Integrate traffic studies, warrant analysis, access requirements, and design standards into Davison County Ordinances and Permit Application Processes	TBD	S	Funding & Maintenance	Utilize guidance identified in the Master Transportation Plan to assist in providing analysis, access, design
Asset Management Strategy/GIS Coordination	TBD	S	System Inventory, Prioritization & Standards	Integrate GIS into all data collection and management systems, integrate asset management strategies of roadway engineering/public works decision-making
County Road Inventory and Assessment	TBD	S	System Inventory, Prioritization & Standards	Conduct systematic inventory and condition assessment of all County Roads. Develop a project list with prioritization of safety issues and roadway conditions.
Design Standardization and Review Procedures	TBD	S	Funding & Maintenance	Merge the guidance developed in the Major Roads Plan, Typical Sections, Access Management, and Bridge Prioritization into County Design Standards.
Township Road Inventory Assessment	TBD	M	System Inventory, Prioritization & Standards	Conduct systematic inventory and condition assessment of all County Roads. Develop a project list with prioritization of safety issues, roadway conditions, and Township needs.

Priority: S = Short Term (0-10 years) M = Medium Term (11-20 years) L = Long Term (20+ years)

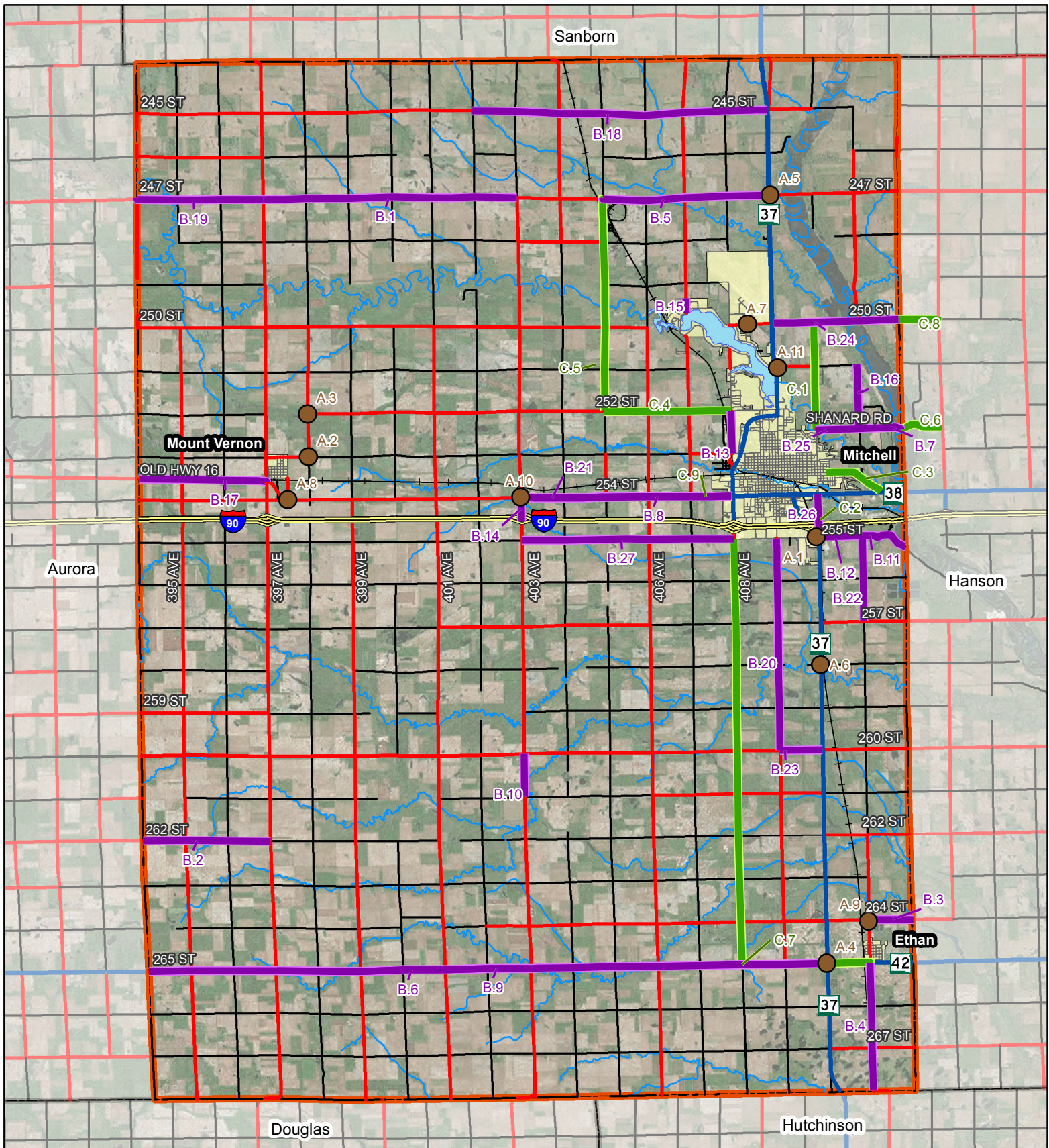
Table 10-8: Bridge Projects

No.	Bridge #	Location	Roadway Jurisdiction (Major Roads Plan Designation)	Planning Level Estimated Reconstruction Cost (2015 \$)	Sufficiency Rating	Deficiency	Priority Rating	Comments
1	18169060	250th Street (James River)	County (Minor Collector)	\$2,500,000	55.5	-	1	
2	18160084	410th Avenue (Firesteel Creek)	County (Major Collector)	\$670,000	57	-	2	
3	18100052	404th Avenue (Firesteel Creek)	Township	\$345,000	30.8	S	3	
4	18000041	394th Avenue (Firesteel Creek)	County (Local)	\$350,000	45	S	4	
5	18040137	398th Avenue (Enemy Creek)	Township	\$230,000	33.9	S	5	
6	18130234	407th Avenue (S Fork 12 Mile Creek)	Township	\$235,000	40	S	8	
7	18170053	411th Avenue (Creek)	County (Local)	\$265,000	41	F	15	
8	18130183	407th Avenue (N Branch 12 Mile Creek)	Township	\$225,000	62.8	-	17	
9	18140037	408th Avenue (Dry Run Creek)	Township	\$220,000	44	S	18	
10	18090051	403rd Avenue (Firesteel Creek)	County (Minor Collector)	\$480,000	63.7	S	23	
11	18050143	399th Avenue (Enemy Creek)	County (Local)	\$315,000	50.1	F	24	
12	18070198	401st Avenue (N Branch 12 Mile Creek)	County (Local)	\$270,000	56.4	F	25	Culvert
13	18142150	259th Street (Enemy Creek)	Township	\$265,000	66.1	-	29	
14	18140237	408th Avenue (S Fork 12 Mile Creek)	Township	\$210,000	58.3	-	32	
15	18025130	257th Street (Enemy Creek)	Township	\$210,000	60.8	S	34	
16	18130202	407th Avenue (N Branch 12 Mile Creek)	Township	\$230,000	55.7	S	40	
17	18080007	402nd Avenue (Morris Creek)	Township	\$215,000	48.8	S	46	Culvert
18	18090017	403rd Avenue (Dry Run Creek)	Township	\$235,000	62.8	S	48	Culvert
19	18050206	399th Avenue (N Branch 12 Mile Creek)	County (Local)	\$255,000	62.7	S	53	
20	18072190	263rd Street (Enemy Creek)	Township	\$240,000	65.5	-	65	
21	18130032	407th Avenue (Morris Creek)	County (Local)	\$335,000	60.5	S	67	
22	18060095	400th Avenue (Creek)	Township	\$225,000	67.4	-	68	

Based on 2014 bridge inspection reports

Priority Rating based on methodology presented within Chapter 6

Deficiency: S = Structurally Deficient F = Functionally Obsolete

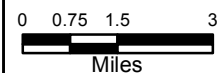


**Figure 10-1:
Intersection,
Roadway, and
Multimodal Projects**

Davison County
MASTER TRANSPORTATION PLAN

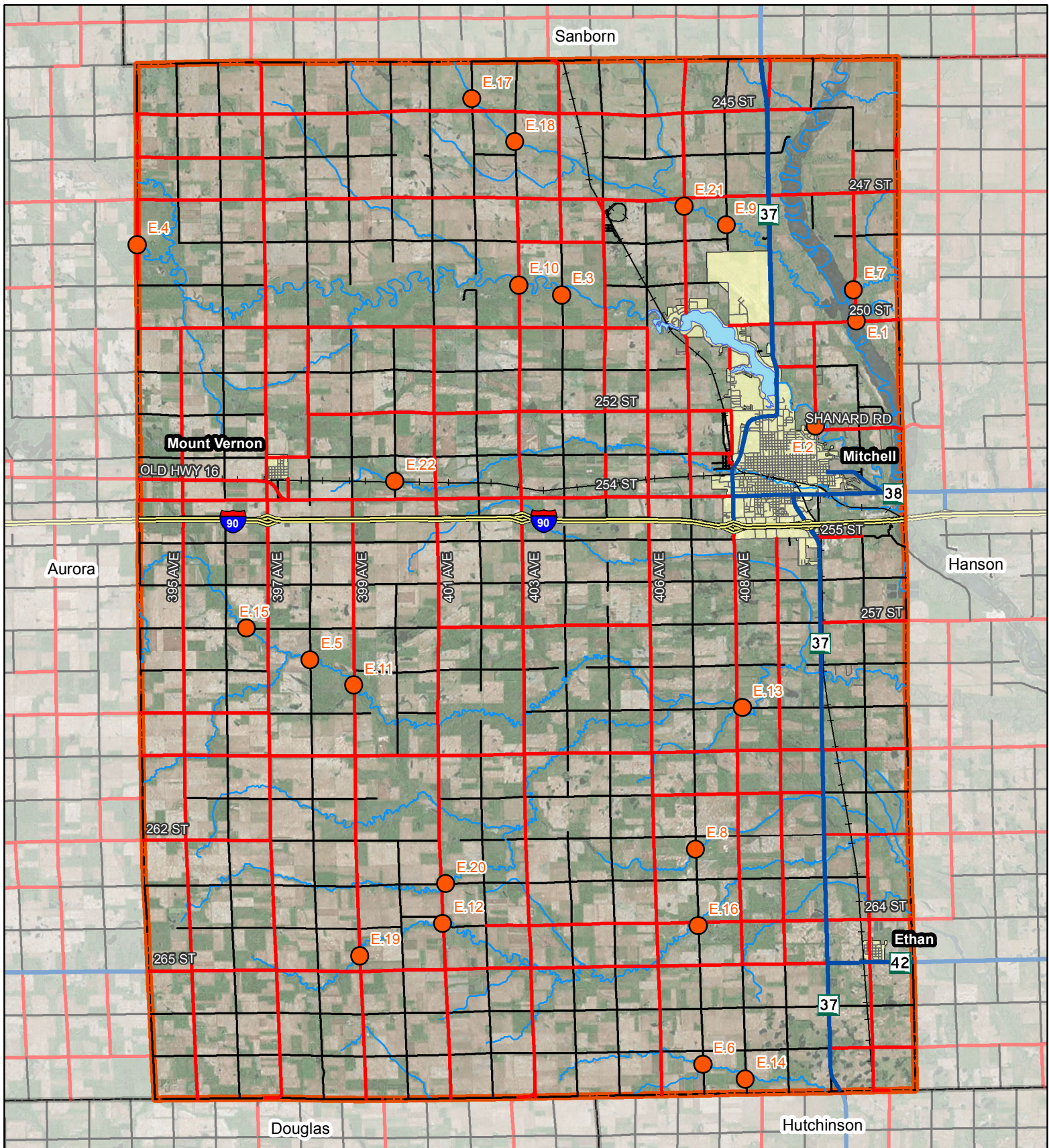
Legend

- | | | |
|--|------------------|-------------------------------|
| ● A. Intersection Projects | — Interstate | — Rail Lines |
| — B. Roadway Segment Projects | — State Highways | — Rivers & Streams |
| — C. Multimodal Network Enhancement Projects | — County Roads | — Cities |
| | — Township Roads | — Study Area (Davison County) |



1 in = 3 miles



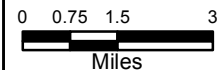


**Figure 10-2:
Bridge
Projects**

Davison County
MASTER TRANSPORTATION PLAN

Legend

- E. Bridge Projects
- Interstate
- Rail Lines
- State Highways
- Rivers & Streams
- County Roads
- Cities
- Township Roads
- Study Area (Davison County)



1 in = 3 miles



11. Conclusion and Recommendations

The Davison County Master Transportation Plan provides a comprehensive framework for guiding the County's transportation network over the next 20+ years. Beginning with an introduction of the background and challenges facing Davison County, the Master Transportation Plan provides a comprehensive, multi-modal understanding of the existing and future issues and needs before transitioning into recommendations and solutions. Existing and future traffic volumes, intersection and corridor crash history, multi-modal needs, current infrastructure conditions, and historic and/or recurring problematic locations were among the items noted and evaluated as part of the existing conditions analysis. With each specific issue and need in mind, nine overarching need categories were identified and included:

- Bridges
- Intersections
- Drainage
- Maintenance
- Traffic
- Corridors
- Unofficial Bypass Routes
- Pedestrians and Bicycles
- Urbanized Area Expansion

To address these needs, a series of 'plans' and guidelines were developed to provide a systematic approach to the planning, prioritization, and implementation of future transportation projects and preservation and maintenance activities. These plans take the issues and needs and provide the road map to implement recommended solutions for the next 20+ years. These plans include:

- Major Roads Plan
- Bridge Plan
- Roadway Design, Analysis, and Policy Guidelines
- Roadway Preservation and Maintenance Plan
- Project Implementation Plan

Each of the plans consider the associated issues and needs and quantifies the effort needed to address those issues and needs, whether it is through routine maintenance, preservation, or capital improvement-type projects. Associated implementation guidance is provided to help Davison County deliver the proposed recommendations as well as react to changing conditions and future challenges as they arise.

Public and stakeholder involvement has been a key part of shaping the Master Transportation Plan, identifying several issues and needs throughout the County and providing recommendations for implementation of the Plan. Through these discussions, it was found that maintaining the existing system and infrastructure is one of the top priorities of the public as they depend on a safe and efficient County-wide transportation network.

Providing a reliable network of priority routes and accommodating consistent vehicle width and weight safely is important to the agriculture community. This includes the priority farm-to-market type routes that safely accommodates two-way traffic when large equipment is being moved or bridges that provide vehicle weight consistent with the rest of the corridor.

One of the more significant components affecting the implementation of the Master Transportation Plan is the availability of transportation funding. The established needs of Davison County were quantified and compared to historic budgets and potential, future funding sources to highlight a funding gap of over \$4 million annually. This gap emphasizes the importance of prioritizing the selection of future improvements, preservation and maintenance to maximize the useful life of the current investments, as well as the functionality of each route within the County's network. The gap also highlights the importance of the 2015 Highway Funding Bill and the benefits it provides counties as well as being proactive and developing additional funding strategies into the future.

In conclusion, the Davison County Master Transportation Plan provides the framework by which Davison County will be able to prioritize, select, and implement improvements to the transportation network over the next 20+ years. It also provides the flexibility to react to changing conditions and shifts in the County's transportation needs as they arise. The Plan is an important step in working towards maintaining the viability of the County's transportation network into the future, in addition to recognizing the hurdles facing the implementation of this Plan. Ultimately, the Plan provides solutions to address existing and future issues and needs while promoting a livable community that will enhance the economic and social well-being of Davison County residents.

Recommendations

The following provides general recommendations for the implementation of the Davison County Master Transportation Plan, incorporating the evaluation of existing and future conditions, identification of issues and needs, recommendations and guidance included in each specific plan, and public involvement and recommendations throughout the process:

1. Maintain and preserve the existing transportation system and infrastructure.
 - a. Maximize the existing transportation infrastructure investment through proactive preservation and maintenance.
 - b. Utilize the guidance within the Master Transportation Plan to assist in the identification, prioritization, and selection of projects, and allocation of funding.
 - c. When faced with major investment decisions, evaluate potential changes to roadway surfacing, closures of bridges, and jurisdictional transfers based on systematic and long-term need-driven evaluation criteria.

2. Prioritize roadways to guide investment decisions.
 - a. Promote the highest level of County-jurisdiction mobility on the major collector network that compliments the State highway system.
 - i. Facilitate reliable, efficient and safe intra- and inter-county travel.
 - ii. Minimize or eliminate continuity barriers on priority routes.
 - b. Utilize route prioritization guidance identified in the Major Roads Plan.
 - c. Utilize bridge prioritization guidance identified in the Bridge Plan.
3. Continue to seek and evaluate new and additional funding opportunities for road and bridge projects.
 - a. Incorporate funding provisions set forth in the 2015 Highway Funding Bill.
 - b. Evaluate the potential for outside grants and assistance when applicable.
 - c. Provide an annual summary for the public regarding what was able to be completed with the additional funding.
4. Provide a comprehensive approach to address current and future issues and needs throughout the County's transportation network.
 - a. Facilitate a program that blends roadway preservation and maintenance of the existing infrastructure with capital improvement, reconstruction, capacity expansion, and multi-modal improvement projects based on the Master Transportation Plan.
 - b. Consider the long-range series of improvement needs along a corridor to provide a systematic, planned approach to address issues and needs over the next 20+ years.
 - i. In many instances, corridors have multiple, yet exclusive, identified needs. The County should plan to address these needs along the corridor in a systematic and cost-effective means.
 - c. Begin planning for large, long-term projects well in advance to assess avenues of funding and coordination.
 - d. Consider improvements to all modes of travel throughout the County during major preservation and maintenance activities as well long-term capital improvement projects.
5. Maintain a Master Transportation Plan that is compatible with other planning documents and adaptable to address unforeseen needs and the evolving transportation network.
 - a. The Davison County Master Transportation Plan is intended to be a living document, updated by Davison County as needed in the future.
 - i. Ultimately, the Plan provides information to be either selected for or directly inserted into the Davison County Five-Year Highway and Bridge Improvement Plan.
 - b. Use the Master Transportation Plan to link other planning documents within Davison County, the City of Mitchell, SDDOT-jurisdiction roadway planning, and

- adjacent counties, promoting route connectivity and continuity of a regional transportation network.
- c. Incorporate guidance from the Plan into Davison County permits, ordinances, and future studies.
6. Continue to partner with surrounding agencies to address multi-jurisdictional transportation issues, needs, and challenges presented by a regional transportation network, particularly:
- a. Inter-county and intra-county route continuity.
 - b. Unofficial bypass routes.
 - c. Urbanized area expansion around the City of Mitchell.
 - d. Multi-modal transportation.

Appendix A – Methods & Assumptions

Appendix B – Traffic Operations

Appendix C – Public Participation

Appendix D – Major Roads Plan Development

Appendix E – Bridge Priority Rating

Appendix F – Life Cycle Costs
