

Davison County
MASTER TRANSPORTATION PLAN

Traffic Technical Memorandum

**Davison County Master
Transportation Plan**

Federal Highway Administration
South Dakota Department of Transportation
Davison County

Final Report

March 2, 2015



Introduction

The Davison County Master Transportation Plan provides for an assessment of existing and forecasted traffic operations and safety throughout the County. This included a safety evaluation of intersections, roadway corridors, and railroad crossings throughout the County. Existing traffic volumes were evaluated to provide baseline traffic operations conditions. These volumes were also forecasted to a 2035 Planning Year, and subsequently evaluated for projected traffic operations.

Historical Crash Data Analysis

One method of assessing the performance of an existing roadway network is measuring traveler safety through the review of crash frequency and severity. The objectives are to locate high crash frequency and severe crash locations to reduce the number of crashes and severity through the identification of safety improvements. Crashes were reviewed throughout Davison County to identify crash patterns and problematic locations.

Historical crash data for the most recently available five-year period (2009-2013) was provided by the South Dakota Department of Transportation (SDDOT). A total of 1,444 crashes were reported on County and State facilities within Davison County between 2009 and 2013, which excludes crashes that occurred on City of Mitchell jurisdiction roadways. The crash locations throughout the County, categorized by crash severity, are spatially depicted in Figure 1. They are also summarized in Table 1, further categorized by four crash characteristics: severity, month of the year, lighting conditions, and pavement conditions.

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 four percent of the crashes resulted in an incapacitating injury (41 total) or fatal injury (five total). Three of the five fatal crashes occurred on State routes (two on SD Highway 37 between Mitchell and Ethan, one on Interstate 90). The other two occurred on County routes, one at the intersection of 265th Street and 403rd Avenue and a second at the intersection of 245th Street and 404th Avenue.

The other three categorical presentations of these crashes provide insight into conditions at the time of crash, such as time of the year, light conditions, and pavement conditions. There is a noticeable increase in crashes from October through December, coinciding with the harvest period and initial winter storm events. Conversely, the months of March, April and July involved fewest crashes out of the 12 months.

A total of 727 crashes were recorded as occurring during daylight hours, representing 50 percent of all crashes. The other 50 percent were spread out from dusk through dawn, further broken out during dark conditions by whether the roadway was lighted or not.

1,092 of the 1,444 crashes were recorded as occurring on dry pavement conditions, which represents approximately 76 percent of all crashes. While not necessarily meaning that pavement condition was a contributing factor in the crash, the other 24 percent occurred on non-dry pavement. 220 crashes were recorded as occurring with some type of frozen precipitation on the roadway surface (15 percent).

Table 1 – Davison County Crash History

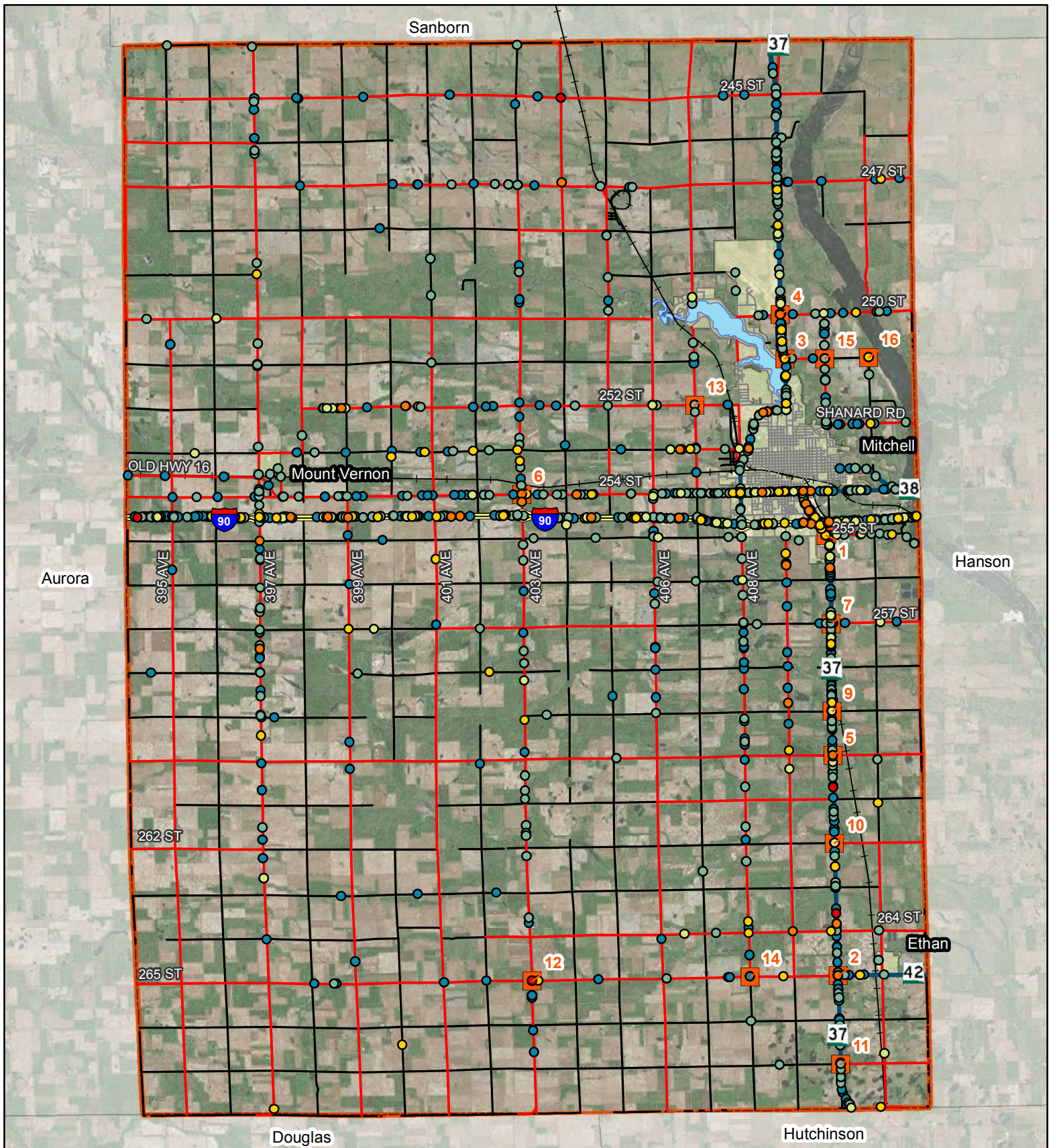
Crash Severity	Total # Crashes
Fatal Injury	5
Incapacitating Injury	42
Non-Incapacitating Injury	91
Possible Injury	125
No Injury	715
Wild Animal Hit	466
Total Crashes	1,444

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

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

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 1:
Crash History**

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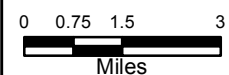
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Crash Severity*

- 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
- Cities
- Study Area (Davison County)

* Crash years 2009 - 2013



1 in = 3 miles



Intersections

A quantification of specific crash locations was also completed for Davison County intersections and roadway corridors. County intersections with the greatest number crashes over the five-year period, excluding City of Mitchell jurisdictional roadways, are outlined in Table 2 and spatially identified in Figure 1. 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 – Intersection Crashes on County and State Roadways (2009-2013)

Location		Total # Crashes	Crash Rate (Crashes/MEV)
North-South Roadway	West-East 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 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 5 were vehicle-animal crashes.

Overall, 10 of the 16 intersections identified in Table 2 involve SD Highway 37, which typically handles the greatest daily traffic volumes of all rural roadways throughout the County (excluding Interstate 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 Highway 37 and Spruce Street Intersection

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 from all four directions of travel, with the northbound and southbound directions being the most frequent. The intersection crash rate was calculated at 0.39 crashes per MEV.

The intersection of SD Highway 37 and Spruce Street is located approximately 0.25 miles south of Interstate 90. It is a skewed intersection, as SD Highway 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 Highway 37 and dual left-turn lanes on eastbound Spruce Street.

Significant traffic generators are located along Spruce Street, including Mitchell Technical Institute, the Mitchell Livestock Auction, Dakotafest to the east of SD Highway 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 Interstate 90, can create unique traffic volume and composition fluctuations depending on time of day, day of the week, and season.

SD Highway 37 and SD Highway 42/265th Street Intersection

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.

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

SD Highway 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 Highway 37 traffic. The other two crashes involved vehicles in the northbound direction failing to yield during a turn and an improper turn. The intersection crash rate was calculated at 0.52 crashes per MEV.

The intersection is located directly east of Lake Mitchell and north of the majority of the City of Mitchell. 251st Street intersects SD Highway 37 on a horizontal curve that is angling from northwest to southeast. 251st Street crosses SD Highway 37 on a straight east-west through the intersection, creating a skewed intersection instead of aligning at a perpendicular angle with the highway. On the eastbound approach, 251st Street exhibits a notable profile grade up to the intersection. SD Highway 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 Highway 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 was calculated at 0.36 crashes per MEV.

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

SD Highway 37 and 260th Street

Crash history at this intersection show 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 Highway 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.

403rd Avenue and 254th Street

All 3 of 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 Interstate 90 and 403rd Avenue (Betts Road) interchange. The intersection is a four-leg, right-angle intersection stop-controlled from the 403rd Avenue approaches. A diverse mix of vehicles traverses through the intersection. 254th Street provides a paved non-Interstate route into and out of Mitchell from the west, running 0.5 miles north of and parallel to Interstate 90. 403rd Avenue includes one of the four total access locations to Interstate 90, and facilitates a western gateway into Mitchell via 254th Street.

Intersection Summary

A total of sixteen intersections were identified within Davison County, outside of the Mitchell corporate limits, which experienced two or more crashes over the previous five years of available data. Eleven of those 16 intersections were located on SD Highway 37.

Six of the 16 intersections exhibited 3 or greater crashes within the analysis time period. The calculated intersection crash rates for those six intersections were typically at or less than 0.52 crashes per MEV. One of the outliers involved the SD Highway 37 and SD Highway 42/265th Street intersection at 0.88 crashes per MEV. At this intersection, five of the six crashes were angle crashes involving crossing or turning vehicles. Contributing causal factors may be greater turning/crossing traffic volumes (in relation to neighboring intersections), high/excessive speeds, roadway lighting, number of large trucks/equipment entering/exiting/crossing SD Highway 37 and number of access locations in the vicinity of the intersection, among others.

The other intersection to note is the 403rd Avenue and 254th Street intersection, which exhibited a calculated crash rate of 0.70 crashes per MEV. All three crashes were angle crashes. The

intersection likely experiences similar contributing causal factors as the SD Highway 37 and SD Highway 42/265th Street as the intersection depicts many of the same conditions.

Corridor Segments

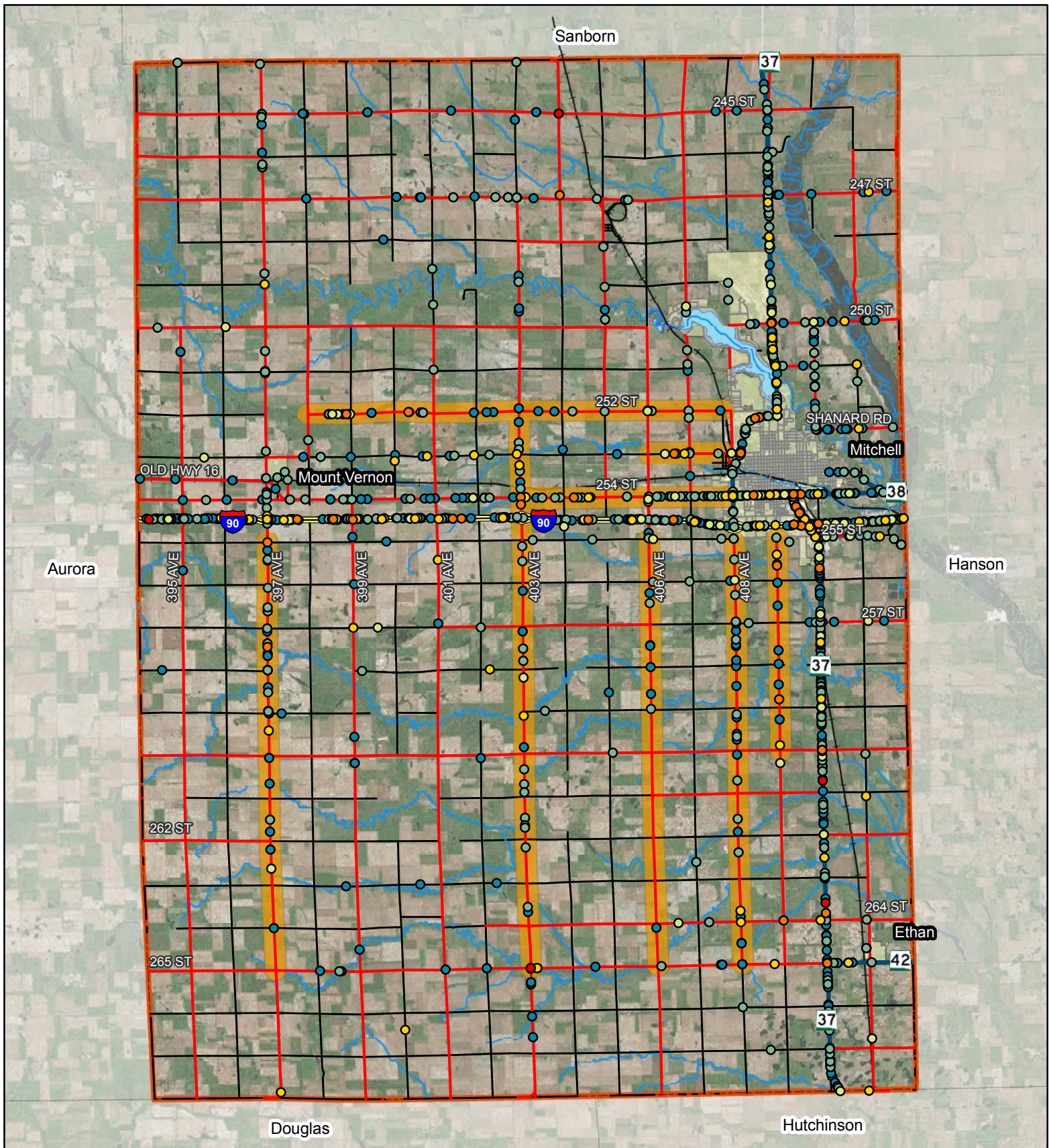
The crash history was also utilized to develop roadway segment crash rates in order to quantify crash frequency in relation to traffic volumes. Segments were selected based on number of recorded crashes and identified safety concerns. Limits were determined by natural break points in the roadway network (such as urban/rural transitions, major roadway intersections, and change in surface). Segmental crash rates are quantified in terms of crashes per hundred million vehicle miles traveled (HVMVT) using the most recently available ADT for a respective roadway segment within the corridor study limits. The 11 selected roadway segments are shown in Table 3 and spatially identified in Figure 2. Additional corridor information, including posted speed limits and ADT volume used in the calculations of crash rates, are provided in Appendix C.

Table 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

Overall, the majority of reported crashes on these 11 corridors involved vehicle-animal crashes, both wild and domestic animals. There were also a number of run-off-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 is a summary of the critical crash factors at each of the 11 roadway segments.



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

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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 ten 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 Interstate 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 Highway 37 to Eastern Dakotafest Driveway

The crash patterns along Spruce Street were evaluated east of the SD Highway 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 Highway 37, including Mitchell Technical Institute, the Dakotafest grounds, and the Mitchell Livestock Auction.

Five of the ten crashes occurred between August 15 and August 19 in the respective year, with four 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.

Corridor Segment Summary

A total of 11 corridor segments were identified for further analysis. Several of those corridors exhibited segmental crash rates in excess of 200 crashes per HMVMT. While the majority of crashes on these segments represented vehicle-animal collisions, there were several other crash types that were common throughout the County.

Run-off-the-road crashes represented the second most common crash pattern. Most of the potential causal factors related to run-off-the-road crashes are applicable to conditions found throughout Davison County on roadways designed decades ago. In many instances, a single causal factor alone doesn't cause a crash, but a series of factors or driver error can exacerbate the situation into a

more dangerous event. Potential causes of this type of crash include: excessive speed, slippery pavement, poor visibility of curves, inadequate roadway lighting, inadequate roadway design, inadequate delineation, inadequate shoulder, and inadequate pavement maintenance.

Railroad Crossing Analysis

Two rail lines traverse across Davison County, briefly joining within the City of Mitchell corporate limits. The BNSF Railway Company (BNSF) owns and operates the north-south line through the region with connections to Yankton and Aberdeen prior to exiting South Dakota. BNSF also owns and operates a line extending east out of Mitchell, connecting to a north-south line along the eastern South Dakota border near Canton. The State of South Dakota currently owns a line extending west of Mitchell to Kadoka, which is operated by Dakota Southern. The primary commodities shipped via these rail lines are agricultural products, thus train frequency is dictated by seasonal fluctuations due to harvest and regional demand.

Two unit train facilities currently exist in Davison County, one at Mount Vernon and a second, and larger, facility on the west side of Mitchell. The ethanol plant located north of Mitchell, near Loomis, also has a connection to a railroad mainline and has recently undergone an expansion to increase railcar storage at the facility. All of these facilities are an integral part of the area's agricultural economy, being able to ship large quantities of products within and outside of the region, and rely on an efficient and reliable local transportation network to bring product and supplies to the distribution locations. In addition to these terminals, other spur lines feed local industrial facilities in the County.

The Federal Railroad Administration Office of Safety Analysis, part of the United States Department of Transportation (US DOT), maintains a national railroad crossing inventory. The 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. 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.

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

Through a review of the highway-rail crash summaries from the US DOT Grade Crossing Inventory, two vehicle-train crashes have occurred in Davison County over the last 10 years (2005-2014) of available data. One occurred in 2009 at a Jones Avenue crossing of the BNSF, and the second in 2011 at the 257th Street crossing of the BNSF track. 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.

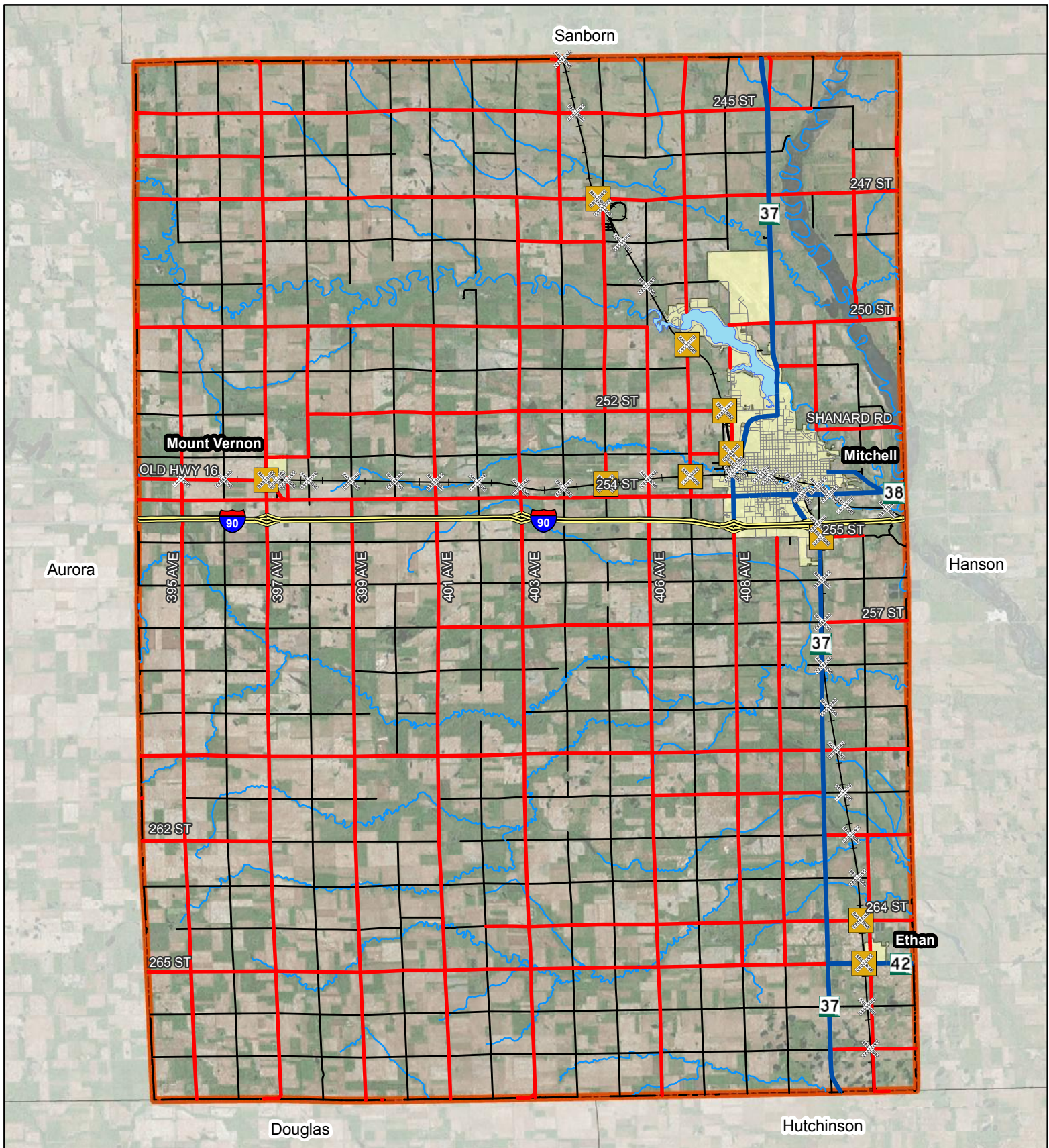
While only two vehicle-train crashes have been reported throughout Davison County since 2005, it is important to understand that these types of crashes can entail random circumstances, which often appears to be the case on a series of low-volume crossings. Similarly, while there may not have historically been 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

the motorist and train. One aspect of a continual railroad improvement program is to identify and address potential issues in the vehicle-train, pedestrian-train, and vehicle-vehicle conflicts.

Table 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
252nd Street (23rd 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
253rd Street (8th Avenue)	BNSF	1,505	Cross-bucks
407th Avenue	BNSF	1,265	Gates, post-mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
264th Street	BNSF	1,125	Cross-bucks, stop bar and advance warning pavement markings
397th Avenue (Earl Street)	Dakota Southern	1,060	Cross-bucks, stop bar and advance warning pavement markings
407th Avenue	Dakota Southern	1,040	Cross-bucks, stop bar and advance warning pavement markings
247th Street	BNSF	910	Gates, post-mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings
405th Street	BNSF	780	Gates, post-mounted flashing lights, cross-bucks, stop bar and advance warning pavement markings

Source: US DOT Grade Crossing Inventory



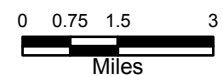
**Figure 3:
Rail Crossings**

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Legend

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

*Top Rail Crossings based on Train-Vehicle Exposures



1 in = 3 miles



Traffic and 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 and commonly used engineering standards. The following is a summary of this analysis.

Operations Analysis Measures

The ratio of volume-to-capacity provides a measure of planning-level congestion along a stretch of roadway and can help identify where roadway improvements may be needed. As a high-level planning analysis tool, congested conditions along the roadway segment are likely to exist when the ratio of traffic volume to roadway capacity approaches or exceeds 1.0. Essentially, as traffic volumes approach planning level capacity, traffic operations are expected to deteriorate to low speeds, significant delay, and unstable operations.

Planning level capacity for a specific route is determined by the number of lanes. As the number of lanes on a roadway increases, so does the roadway capacity. Table 5 summarizes the planning level capacity vehicles per day (VPD) based on number of lanes.

Table 5 – Planning Level Traffic Capacity Thresholds

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

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 and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience measures. LOS A represents traffic that is free flowing on an uncongested roadway while LOS F represents traffic that is creeping or stopped due to a severely congested roadway. With regard to signalized, stop-controlled, and roundabout intersections, LOS is measured by delay a vehicle experiences and subsequent increase in travel time, to traverse through an intersection. Table 6 displays the LOS delay ranges for signalized intersections and 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 6 – 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 ADT counts, were collected over the previous four years through the SDDOT traffic data collection programs. The bulk of the County-jurisdiction roadway traffic data was collected in 2011. For State highways, roadways within the City of Mitchell, and urban fringe areas, the most recently collected traffic volumes occurred in 2013.

All traffic volumes were factored to 2015 existing conditions using an SDDOT provided growth rate derived from the SDDOT Roadway Information System. A growth rate of 2.3 percent (straight-line) was applied to traffic counts on County roadways and State highways. A 2.2 percent (straight-line) growth rate was applied to Interstate 90 traffic volumes.

HR Green provided supplemental intersection turning-movement counts at the intersection of 403rd Avenue and 254th Street, just north of the Interstate 90 interchange. Traffic counts were collected at this intersection on Wednesday October 22, 2014, from 6:00-9:00 AM and 3:30-6:00 PM to capture the AM and PM peak travel periods.

The intersection turning-movement counts at 403rd Avenue and 254th Street were used to establish current year (baseline) intersection operations and to provide the basis to determine future year intersection operations. The 403rd Avenue (Betts Road) interchange was identified by the SAT as an outlying interchange motorists use to access western and northern Mitchell. As development continues to grow northward and westward, it is anticipated that traffic volumes through this intersection will continue to increase.

The 2015 existing conditions traffic volumes throughout Davison County are presented in Figure 4.

2015 Existing Conditions – Route Volume to Capacity

A volume-to-capacity analysis was completed for select roadway segments throughout Davison County. The selected segments were typically the higher-volume and/or priority routes throughout the County that had existing traffic counts. The exceptions included roadways within the City of Mitchell and Interstate 90.

Overall, analyzed Davison County roadways exhibit a planning-level volume-to-capacity ratio of 'Below 60% Capacity,' depicted by a green roadway segment in Figure 4. This reflects that overall, 2015 existing conditions ADT volumes do not exhibit congested conditions at the planning level along the corridor.

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 volumes, this intersection currently measures at LOS A in both the AM and PM peak hours.

Future Conditions Traffic Capacity 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 Interstate 90 traffic volumes. Figure 5 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 6. 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 VPD threshold, representing between 60 and 80 percent of capacity: 254th Street between 407th Avenue and the Mitchell city limits, Spruce Street east of SD Highway 37, and 408th Avenue south of Interstate 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.

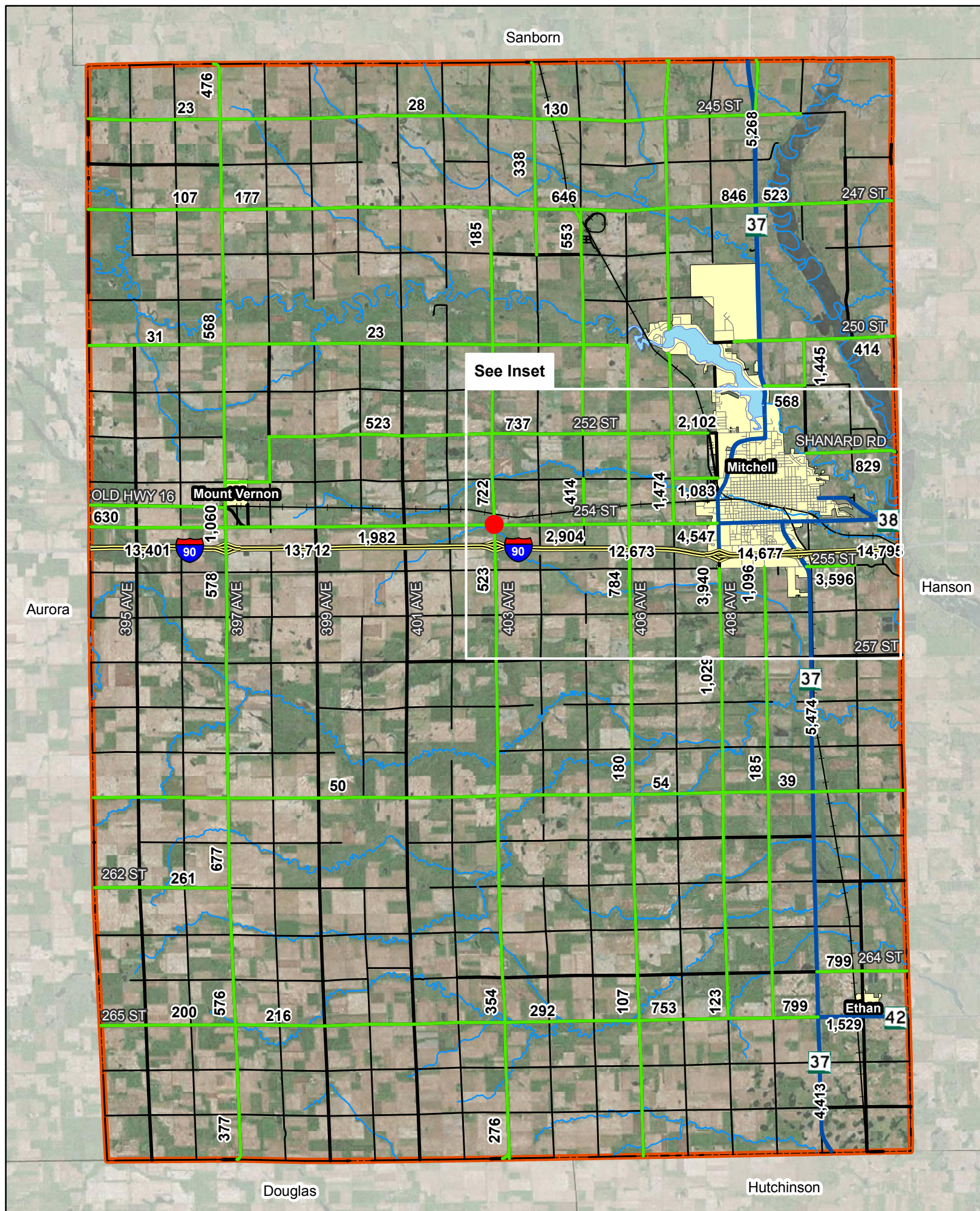
Traffic Operations Analysis Summary

All Davison County roadway segments were found to operate at less than 60 percent of capacity in both the 2015 Existing Conditions and 2035 Planning Year through a planning-level volume-to-capacity ratio analysis.

Three segments were approaching the 60 percent volume-to-capacity threshold of 4,800 VDT: 254th Street between 407th Avenue and the Mitchell city limits, Spruce Street east of SD Highway 37, and 408th Avenue south of Interstate 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.



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 6:
Forecast (2035) Year Traffic Volumes & Level of Service

Davison County
MASTER TRANSPORTATION PLAN

0 0.75 1.5 3
Miles
1 inch = 3 miles



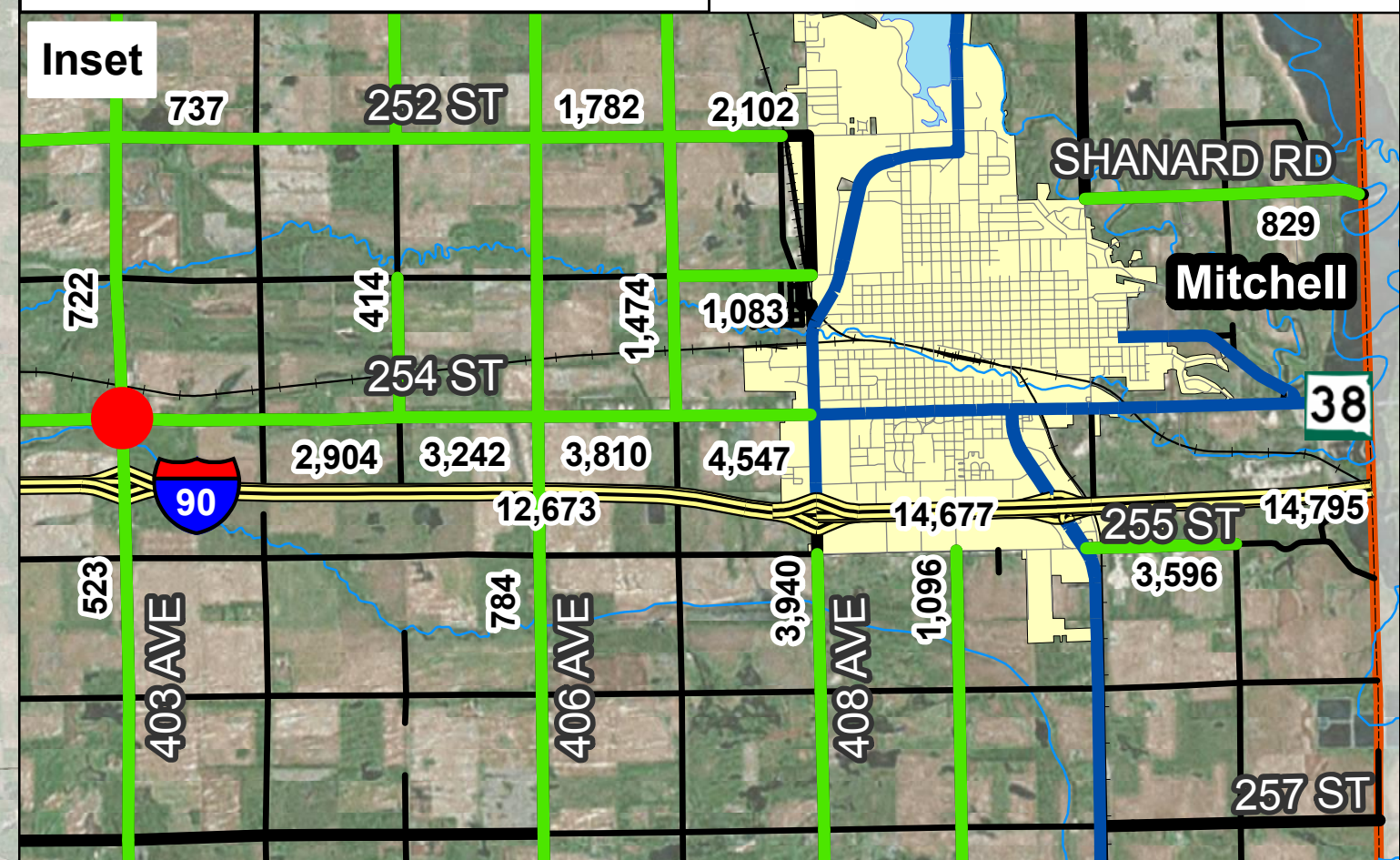
Intersection Studied



Inset Legend

- Intersection
- Stop Sign
- Existing AM/PM Level of Service

Inset



Appendix A – Turning Movement Counts and Traffic Operations Analysis

403rd Ave and 254th St Peak Hour

Manual Traffic Counts

Wednesday October 22, 2014

AM Peak		Eastbound			Westbound			Southbound			Northbound			Total	4-15 Minutes		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	left	Thru	Right		Total Vehicles	Total Trucks	Truck %
6:45	7:00	2	7	8	0	5	14	1	2	0	1	8	2	50			
7:00	7:15	0	9	0	0	1	1	1	4	0	0	2	1	19			
7:15	7:30	0	15	2	3	3	3	0	3	0	1	0	2	32			
7:30	7:45	0	16	0	2	11	1	3	5	0	0	2	6	46	147	10	7%
7:45	8:00	3	21	0	1	6	2	1	4	0	1	4	2	45	142	15	11%
8:00	8:15	1	8	1	2	7	2	0	1	0	0	0	5	27	150	15	10%
8:15	8:30	0	9	0	5	7	1	1	2	2	0	2	2	31	149	18	12%
8:30	8:45	0	6	0	1	10	0	1	1	0	1	3	2	25	128	18	14%
8:45	9:00	0	8	1	5	2	1	0	0	1	0	1	1	20	103	14	14%
Totals		6	99	12	19	52	25	8	22	3	4	22	23	295			
PHF		0.33	0.71	0.38	0.67	0.61	0.67	0.33	0.65	#DIV/0!	0.50	0.38	0.63				
Peak Hour		4	60	3	8	27	8	4	13	0	2	6	15		150	15	10%

PM Peak		Eastbound			Westbound			Southbound			Northbound			Total	4-15 Minutes		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	left	Thru	Right		Total Vehicles	Total Trucks	Truck %
3:00	3:15	0	4	0	4	8	5	3	0	1	1	2	1	29			
3:15	3:30	2	9	1	3	9	2	5	2	4	1	1	4	43			
3:30	3:45	2	5	3	4	16	2	10	7	6	1	2	5	63			
3:45	4:00	0	18	3	0	11	2	6	5	0	0	1	1	47	182	22	12%
4:00	4:15	0	12	0	4	7	0	2	1	2	3	2	1	34	187	22	12%
4:15	4:30	0	6	2	5	12	2	3	0	1	1	4	6	42	186	22	12%
4:30	4:45	0	8	2	1	14	4	12	5	0	0	5	5	56	179	18	10%
4:45	5:00	1	8	2	3	14	0	6	1	0	1	3	0	39	171	21	12%
5:00	5:15	0	8	2	4	25	2	2	1	1	1	2	0	48	185	19	10%
5:15	5:30	1	5	0	1	11	0	0	0	0	1	2	2	23	166	11	7%
5:30	5:45	0	7	2	4	19	2	1	1	0	1	0	3	40	150	11	7%
5:45	6:00	0	8	1	1	20	1	2	1	0	0	3	3	40	151	7	5%
Totals		6	98	18	34	166	22	52	24	15	11	27	31	504			
PHF		0.50	0.61	0.58	0.69	0.67	0.75	0.58	0.54	0.50	0.42	0.75	0.55				
Peak Hr		4	44	7	11	43	6	23	15	12	5	6	11		187	22	12%

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	jdw			Intersection	254th Street and 403rd Avenue			
Agency/Co.	Davison County/SDDOT			Jurisdiction	Davison County			
Date Performed	1/14/2015			Analysis Year	2015 Existing Conditions			
Analysis Time Period	AM Peak Hour							
Project Description <i>Davison County Master Transportation Plan</i>								
East/West Street: <i>254th Street</i>				North/South Street: <i>403rd Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	4	60	3	8	27	8		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	4	60	3	8	27	8		
Percent Heavy Vehicles	10	--	--	10	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LTR			LTR				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	2	6	15	8	22	3		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	2	6	15	8	22	3		
Percent Heavy Vehicles	10	10	10	10	10	10		
Percent Grade (%)	5			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	4	8		23			33	
C (m) (veh/h)	1526	1490		874			783	
v/c	0.00	0.01		0.03			0.04	
95% queue length	0.01	0.02		0.08			0.13	
Control Delay (s/veh)	7.4	7.4		9.2			9.8	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	9.2			9.8		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst		jdw		Intersection		254th Street and 403rd Avenue		
Agency/Co.		Davison County/SDDOT		Jurisdiction		Davison County		
Date Performed		1/14/2015		Analysis Year		2015 Existing Conditions		
Analysis Time Period		PM Peak Hour						
Project Description <i>Davison County Master Transportation Plan</i>								
East/West Street: <i>254th Street</i>				North/South Street: <i>403rd Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	4	44	7	11	43	6		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	4	44	7	11	43	6		
Percent Heavy Vehicles	12	--	--	12	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LTR			LTR				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	5	6	11	23	15	12		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	5	6	11	23	15	12		
Percent Heavy Vehicles	12	12	12	12	12	12		
Percent Grade (%)	5			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	4	11		22			50	
C (m) (veh/h)	1496	1493		839			816	
v/c	0.00	0.01		0.03			0.06	
95% queue length	0.01	0.02		0.08			0.20	
Control Delay (s/veh)	7.4	7.4		9.4			9.7	
LOS	A	A		A			A	
Approach Delay (s/veh)	--	--	9.4			9.7		
Approach LOS	--	--	A			A		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	jdw			Intersection	254th Street and 403rd Avenue			
Agency/Co.	Davison County/SDDOT			Jurisdiction	Davison County			
Date Performed	1/14/2015			Analysis Year	2035 Planning Year			
Analysis Time Period	AM Peak Hour							
Project Description <i>Davison County Master Transportation Plan</i>								
East/West Street: <i>254th Street</i>				North/South Street: <i>403rd Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	6	85	4	11	38	11		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	6	85	4	11	38	11		
Percent Heavy Vehicles	10	--	--	10	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LTR			LTR				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	3	9	21	6	18	0		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	3	9	21	6	18	0		
Percent Heavy Vehicles	10	10	10	10	10	10		
Percent Grade (%)	5			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	11		33			24	
C (m) (veh/h)	1508	1457		824			709	
v/c	0.00	0.01		0.04			0.03	
95% queue length	0.01	0.02		0.13			0.10	
Control Delay (s/veh)	7.4	7.5		9.6			10.3	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.6			10.3		
Approach LOS	--	--	A			B		

TWO-WAY STOP CONTROL SUMMARY								
General Information				Site Information				
Analyst	jdw			Intersection	254th Street and 403rd Avenue			
Agency/Co.	Davison County/SDDOT			Jurisdiction	Davison County			
Date Performed	1/14/2015			Analysis Year	2035 Planning Year			
Analysis Time Period	PM Peak Hour							
Project Description <i>Davison County Master Transportation Plan</i>								
East/West Street: <i>254th Street</i>				North/South Street: <i>403rd Avenue</i>				
Intersection Orientation: <i>East-West</i>				Study Period (hrs): <i>0.25</i>				
Vehicle Volumes and Adjustments								
Major Street	Eastbound			Westbound				
Movement	1	2	3	4	5	6		
	L	T	R	L	T	R		
Volume (veh/h)	6	63	10	16	61	9		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	6	63	10	16	61	9		
Percent Heavy Vehicles	12	--	--	12	--	--		
Median Type	Undivided							
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration	LTR			LTR				
Upstream Signal		0			0			
Minor Street	Northbound			Southbound				
Movement	7	8	9	10	11	12		
	L	T	R	L	T	R		
Volume (veh/h)	7	9	16	33	21	17		
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00		
Hourly Flow Rate, HFR (veh/h)	7	9	16	33	21	17		
Percent Heavy Vehicles	12	12	12	12	12	12		
Percent Grade (%)	5			0				
Flared Approach		N			N			
Storage		0			0			
RT Channelized			0			0		
Lanes	0	1	0	0	1	0		
Configuration		LTR			LTR			
Delay, Queue Length, and Level of Service								
Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LTR	LTR		LTR			LTR	
v (veh/h)	6	16		32			71	
C (m) (veh/h)	1469	1466		780			754	
v/c	0.00	0.01		0.04			0.09	
95% queue length	0.01	0.03		0.13			0.31	
Control Delay (s/veh)	7.5	7.5		9.8			10.3	
LOS	A	A		A			B	
Approach Delay (s/veh)	--	--	9.8			10.3		
Approach LOS	--	--	A			B		

Appendix B – Railroad Incident Summaries

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

OMB Approval No. 2130-0500

Name Of						Alphabetic Code		RR Accident/Incident No.	
1. Reporting Railroad BNSF Rwy Co. [BNSF]						1a. BNSF		1b. TC0311202	
2. Other Railroad Involved in Train Accident/Incident						2a.		2b.	
3. Railroad Responsible for Track Maintenance BNSF Rwy Co. [BNSF]						3a. BNSF		3b. TC0311202	
4. U.S. DOT-AAR Grade Crossing ID No. 382391A				5. Date of Accident/Incident 03/13/11		6. Time of Accident/Incident 06:30 PM			
7. Nearest Railroad Station MITCHELL				8. Division TWIN CITIES		9. County DAVISON		10. State Abbr. 46 Code SD	
11. City (if in a city)				12. Highway Name or No. 257TH ST				<input checked="" type="checkbox"/> Public <input type="checkbox"/> Private	
Highway User Involved					Rail Equipment Involved				
13. Type C. Truck-trailer F. Bus J. Other Motor Vehicle Code A. Auto D. Pick-up truck G. School Bus K. Pedestrian B. Truck E. Van H. Motorcycle M. Other (specify) D					17. Equipment 4. Car(s) (moving) 8. Other (specify) Code 1. Train (units pulling) 5. Car(s) (standing) A. Train pulling- RCL 2. Train (units pushing) 6. Light loco(s) (moving) B. Train pushing- RCL 3. Train (standing) 7. Light loco(s) (standing) C. Train standing- RCL 1				
14. Vehicle Speed (est. mph at impact) 3		15. Direction (geographical) 1. North 2. South 3. East 4. West 2		18. Position of Car Unit in Train 1					
16. Position 1. Stalled on crossing 3. Moving over crossing 2. Stopped on Crossing 4. Trapped 3		Code 3		19. Circumstance 1. Rail equipment struck highway user 2. Rail equipment struck by highway user 1		Code 1			
20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither 4				Code 4		20b. Was there a hazardous materials release by 1. Highway User 2. Rail Equipment 3. Both 4. Neither 4			
20c. State the name and quantity of the hazardous material released, if any									
21. Temperature (specify if minus) 29 °F		22. Visibility (single entry) Code 4 1. Dawn 2. Day 3. Dusk 4. Dark		23. Weather (single entry) Code 1 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow					
24. Type of Equipment A. Spec. MoW Equip Consist 1. Freight train 4. Work train 7. Yard/Switching (single entry) 2. Passenger train 5. Single car 8. Light loco(s) 3. Commuter train 6. Cut of cars 9. Main./inspect. car 1				25. Track Type Used by Rail Equipment Involved Code 1. Main 2. Yard 3. Siding 4. Industry 1		26. Track Number or Name SINGLE MAIN			
27. FRA Track Class 3		28. Number of Locomotive Units 2		29. Number of Cars 112		30. Consist Speed (Recorded if available) Code R. Recorded 30 mph E E. Estimated		31. Time Table Direction Code 1. North 2. South 3. East 4. West 3	
32. Type of Crossing 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (specify) Warning 3. Standard FLS 6. Audible 9. Watchman 12. None				33. Signaled Crossing Warning		34. Whistle Ban Code 1. Yes 2. No 3. Unknown 2			
Code(s) 07									
35. Location of Warning Code 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach 1				36. Crossing Warning Interconnected with Highway Signals Code 1. Yes 2. No 3. Unknown 2		37. Crossing Illuminated by Street Lights or Special Lights Code 1. Yes 2. No 3. Unknown 2			
38. Driver's Age		39. Driver's Gender Code 1. Male 1 2. Female		40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train Code 1. Yes 2. No 3. Unknown 2		41. Driver Code 1. Drove around or thru the gate 4. Stopped on crossing 2. Stopped and then proceeded 5. Other (specify) 3. Did not stop 3			
42. Driver Passed Standing Highway Vehicle Code 1. Yes 2. No 3. Unknown 2		Code 2		43. View of Track Obscured by (primary obstruction) Code 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify) 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8					
Casualties to:		Killed Injured		44. Driver was Code 1. Killed 2. Injured 3. Uninjured 3		45. Was Driver in the Vehicle? Code 1. Yes 2. No 1			
46. Highway-Rail Crossing Users 0		0		47. Highway Vehicle Property Damage (est. dollar damage) \$2,000		48. Total Number of Highway-Rail Crossing Users (include driver) 1			
49. Railroad Employees 0		0		50. Total Number of People on Train (include passengers and crew) 2		51. Is a Rail Equipment Accident / Incident Report Being Filed Code 1. Yes 2. No 2			
52. Passengers on Train 0		0							
53a. Special Study Block				53b. Special Study Block					
54. Narrative Description DRIVER AGE UNKNOWN									
55. Typed Name and Title				56. Signature				57. Date	

HIGHWAY-RAIL GRADE CROSSING ACCIDENT/INCIDENT REPORT

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION (FRA)

OMB Approval No. 2130-0500

Name Of						Alphabetic Code		RR Accident/Incident No.		
1. Reporting Railroad BNSF Rwy Co. [BNSF]						1a. BNSF		1b. TC0309200		
2. Other Railroad Involved in Train Accident/Incident						2a.		2b.		
3. Railroad Responsible for Track Maintenance BNSF Rwy Co. [BNSF]						3a. BNSF		3b. TC0309200		
4. U.S. DOT-AAR Grade Crossing ID No. 386033E				5. Date of Accident/Incident 03/06/09		6. Time of Accident/Incident 07:45 AM				
7. Nearest Railroad Station MITCHELL			8. Division TWIN CITIES		9. County DAVISON		10. State Abbr. 46		Code SD	
11. City (if in a city) MITCHELL			12. Highway Name or No. JONES AVE						<input checked="" type="checkbox"/> Public <input type="checkbox"/> Private	
Highway User Involved					Rail Equipment Involved					
13. Type C. Truck-trailer F. Bus J. Other Motor Vehicle Code A. Auto D. Pick-up truck G. School Bus K. Pedestrian B. Truck E. Van H. Motorcycle M. Other (specify) J					17. Equipment 4. Car(s) (moving) 8. Other (specify) Code 1. Train (units pulling) 5. Car(s) (standing) A. Train pulling- RCL 2. Train (units pushing) 6. Light loco(s) (moving) B. Train pushing- RCL 3. Train (standing) 7. Light loco(s) (standing) C. Train standing- RCL 2					
14. Vehicle Speed (est. mph at impact) 5		15. Direction (geographical) 1. North 2. South 3. East 4. West 3		18. Position of Car Unit in Train 10						
16. Position 1. Stalled on crossing 3. Moving over crossing 2. Stopped on Crossing 4. Trapped 3		19. Circumstance 1. Rail equipment struck highway user Code 2. Rail equipment struck by highway user 2								
20a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? 1. Highway User 2. Rail Equipment 3. Both 4. Neither 4				20b. Was there a hazardous materials release by 1. Highway User 2. Rail Equipment 3. Both 4. Neither 4						
20c. State the name and quantity of the hazardous material released, if any										
21. Temperature (specify if minus) 27 °F		22. Visibility (single entry) Code 1. Dawn 2. Day 3. Dusk 4. Dark 1		23. Weather (single entry) Code 1. Clear 2. Cloudy 3. Rain 4. Fog 5. Sleet 6. Snow 1						
24. Type of Equipment A. Spec. MoW Equip Consist 1. Freight train 4. Work train 7. Yard/Switching (single entry) 2. Passenger train 5. Single car 8. Light loco(s) Code 3. Commuter train 6. Cut of cars 9. Main./inspect. car 1				25. Track Type Used by Rail Equipment Involved Code 1. Main 2. Yard 3. Siding 4. Industry 2		26. Track Number or Name YARD				
27. FRA Track Class 2		28. Number of Locomotive Units 2		29. Number of Cars 8		30. Consist Speed (Recorded if available) Code R. Recorded 8 mph E E. Estimated		31. Time Table Direction Code 1. North 2. South 3. East 4. West 1		
32. Type of Crossing 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (specify) Warning 3. Standard FLS 6. Audible 9. Watchman 12. None				33. Signaled Crossing Warning		34. Whistle Ban Code 1. Yes 2. No 3. Unknown 2				
Code(s) 07										
35. Location of Warning Code 1. Both Sides 2. Side of Vehicle Approach 3. Opposite Side of Vehicle Approach 1				36. Crossing Warning Interconnected with Highway Signals Code 1. Yes 2. No 3. Unknown		37. Crossing Illuminated by Street Lights or Special Lights Code 1. Yes 2. No 3. Unknown 2				
38. Driver's Age 38		39. Driver's Gender Code 1. Male 2 2. Female		40. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train Code 1. Yes 2. No 3. Unknown 2		41. Driver Code 1. Drove around or thru the gate 4. Stopped on crossing 2. Stopped and then proceeded 5. Other (specify) 3. Did not stop 3				
42. Driver Passed Standing Highway Vehicle Code 1. Yes 2. No 3. Unknown 2		43. View of Track Obscured by (primary obstruction) Code 1. Permanent Structure 3. Passing Train 5. Vegetation 7. Other (specify) 2. Standing railroad equipment 4. Topography 6. Highway Vehicles 8. Not Obstructed 8								
Casualties to:		Killed		Injured		44. Driver was Code 1. Killed 2. Injured 3. Uninjured 2		45. Was Driver in the Vehicle? Code 1. Yes 2. No 1		
46. Highway-Rail Crossing Users 0		1		47. Highway Vehicle Property Damage (est. dollar damage) \$10,000		48. Total Number of Highway-Rail Crossing Users (include driver) 1				
49. Railroad Employees 0		0		50. Total Number of People on Train (include passengers and crew) 3		51. Is a Rail Equipment Accident / Incident Report Being Filed Code 1. Yes 2. No 2				
52. Passengers on Train 0		0								
53a. Special Study Block					53b. Special Study Block					
54. Narrative Description										
55. Typed Name and Title				56. Signature				57. Date		

Appendix C – Expanded Roadway Segment Crash Summary Table

Crashes on County Roadway Segments (2009-2013)

Select North-South County Corridors		Posted Corridor Speed Limit (mph)	Corridor Segment ADT* (veh/day)	Length (miles)	Total # Crashes	Crash Rate (Crashes/ HMVMT)
Roadway Corridor	Limits					
397 th Avenue	255 th St to 265 th St	55	384 – 436 – 371 <i>south to north</i>	10	29	391
403 rd Avenue	255 th St to 265 th St	55	228 – 337 <i>Increasing south to north</i>	10	18	349
403 rd Avenue	252 th St to 255 th St	55 <i>(55-45 south of 253rd)</i>	337 – 465 <i>Increasing north to south</i>	3	8	329
406 th Avenue	255 th St to 265 th St	55	69 – 114 – 505 <i>Increasing south to north</i>	10	11	231
408 th Avenue	255 th St to 265 th St	55	79 – 663 – 2,616 <i>Increasing south to north</i>	10	28	175
409 th Avenue	255 th St to 260 th St	55 <i>(35-45-55 transition from 255th to Nathan)</i>	119 – 728 <i>Increasing south to north</i>	5	12	272

Select East-West County Corridors		Posted Corridor Speed Limit (mph)	Corridor Segment ADT* (veh/day)	Length (miles)	Total # Crashes	Crash Rate (Crashes/ HMVMT)
Roadway Corridor	Limits					
252 nd Street	398 th Ave to 408 th Ave	55	337 – 475 – 1,148 <i>Increasing west to east</i>	10	26	234
253 rd Street	406 th Ave to 408 th Ave	40-25	719	2	7	267
254 th Street	403 rd Ave to Mitchell Limits	55 <i>(55-50 west of 405th) (50-40 east of 407th)</i>	2,043 – 2,281 – 2,681 – 3,200 <i>Increasing west to east</i>	5	44	197
<i>Sub-corridor:</i>	<i>406th Ave to Mitchell Limits</i>			2	26	242
Spruce Street	East of SD 37 to Dakotafest Drive	40	2,388	1.15	10	200

* 2011 or 2013 SDDOT ADT Counts used in calculation of corridor crash rates