

Davison County
MASTER TRANSPORTATION PLAN

METHODS & ASSUMPTIONS

**Davison County Master
Transportation Plan**

Federal Highway Administration

South Dakota Department of Transportation

Davison County


November 18, 2014



Stakeholder Acceptance Page

The undersigned parties concur with the Methods and Assumptions for the ***Davison County Master Transportation Plan*** as presented in this document.

SDDOT:


Signature

Data Analysis Engineer
Title

Nov. 6, 2014
Date

FHWA:

The South Dakota Division of
FHWA has relinquished
oversight of this study to
SDDOT.

- (1) Participation on the Study Advisory Team and/or signing of this document does not constitute approval of the ***Davison County Master Transportation Plan*** Final Report or conclusions.
- (2) All members of the Study Advisory Team will accept this document as a guide and reference as the study progresses through the various stages of development. If there are any agreed upon changes to the assumptions in this document a revision will be created, endorsed and signed by all the signatories.

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I. Introduction and Project Description

A. Background Information

As an early railroad center within a rich agricultural landscape, Davison County has established the importance of 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 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.

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. The County has identified several of these locations on an initial issues map. 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 Mt. Vernon, Ethan, Parkston, and new residential development just over the County border in the adjacent Hanson County.

Two rail lines currently traverse across the County, briefly joining within the Mitchell corporate limits, running north-south and east-west across the County. Two unit train facilities have been identified in Davison County, one at Mt. Vernon and a 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.

Grade crossing conflict points occur at every at-grade roadway-rail line intersection creating a vehicle-train conflict point, with safety and motorist delay impacts. Many of the at-grade crossing locations throughout the County contain only passive traffic control. Others, typically on higher volume roadways, contain active traffic control, such as flashing light signals.

Most of the existing pedestrian and bicycle facilities within Davison County are located in and around the City of Mitchell and Lake Mitchell areas. Currently, the City is in the midst of implementing six (6) phases of their planned bike trail, primarily surrounding Lake Mitchell and on the east side of Mitchell. As expected, the heaviest concentrations of pedestrian and bicycle travel are within and around the more urbanized areas, but there are both pedestrians and bicyclists that also use paved County roads as routes. This creates safety concerns as pedestrians and bicyclists typically are required to use the travel lane as their travel way due to most paved County road miles lack shoulders.

There is a need to evaluate pedestrian and bicycle facilities at a countywide level, in order to identify potential needs, opportunities, gaps, and barriers. Alternative modes of transportation, such as walking and bicycling, are a key component to the livability of a community. As the City completes their trail network and people continue to move outward into the urban fringe and rural areas, there will likely be a greater demand for connectivity to the City trails and other facilities and destinations as they are developed.

Other modes of inter and intra-county travel include Palace Transit and Palace Transit Express with on-call, demand-response system for curb-to-curb transit service, Jefferson Bus Lines with intercity travel between Mitchell and destinations throughout the United States, and the Mitchell Municipal Airport with a single fixed-base operator.

Davison County is experiencing roadway funding constraints, similar to other counties, as federal and state funding sources continue to diminish. 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 compare gaps in the transportation program, reexamine funding structures, and prioritize projects through a Major Roads Plan.

B. Location

The study is being completed in Davison County, South Dakota. The study will encompass all of Davison County including the incorporated and unincorporated cities and townships of Davison County. The study will include all roadways within Davison County, with emphasis on the County Highway System. The location of the study is illustrated in Figure 1.

C. Need for Study

Davison County has experienced sustained population growth since the late 1800's, being one of only a few South Dakota counties to retain and attract new opportunities and residents. Growth is welcomed, but it also brings new challenges to the region and exacerbates "old problems" as the demands on the transportation network are continually evolving. Several of these challenges stem from:

- New industrial, commercial, and agricultural development throughout the County.
- Expansion of the Mitchell urban area as development extends outward into the historically rural agricultural areas.
- Shifts in traffic patterns due to new development, transition of rural to urban/suburban land use, re-emergence in the demand for bicycle and pedestrian facilities.
- Freight demand that continues to push the limits of the existing roadway structure.
- On-going financial stress due to revenue streams not keeping pace with infrastructure and replacement needs.

The SDDOT and Davison County have identified a need to establish baseline conditions, prioritize roadway needs, and determine future system improvements for the County. Overall, the study is expected to:

- Complete a list of transportation issues and needs facing Davison County.
- 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 conditions while promoting a livable community that will enhance the economic and social well-being of Davison County residents.
- 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.

HR Green recognizes the importance of the Davison County Master Transportation Plan document in defining current system deficiencies, identifying future system needs, and ultimately prioritizing the transportation needs for the County. 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 community (and SDDOT) to have up-to-date, reliable (documented) transportation system needs sorted by priority and ability to deliver (costs and other considerations), especially in the competition for available federal and state improvement funding.

D. Study Schedule

The study is scheduled to be completed between October 2014 and July 2015. Key dates and tasks are shown in Figure 2.

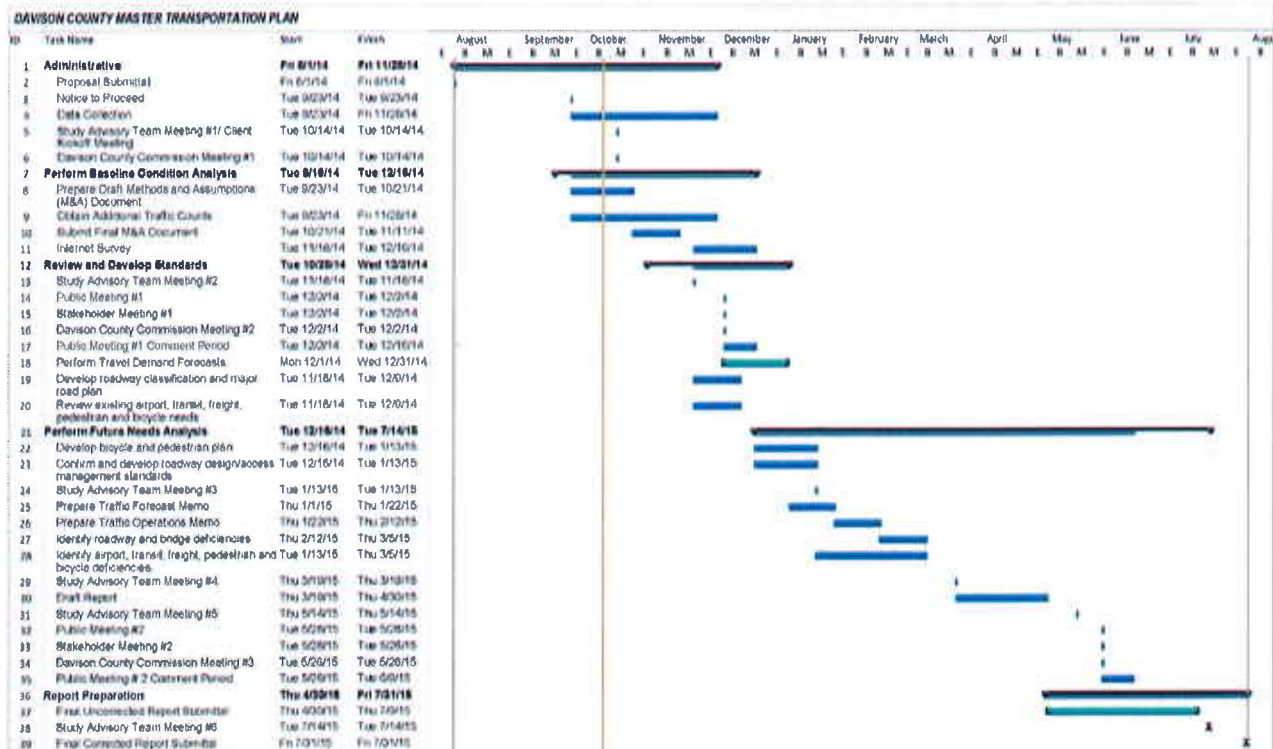


Figure 2 - Study Schedule

E. Facilities Affected by the Study

There will be no direct impacts to any specific facilities. The study will document existing conditions including, locations with high percentages of accidents, roadway segments where traffic volumes may exceed capacity, poor pavement or gravel conditions, deficient bridge conditions, season weight restrictions, and corridors that currently or are expected to create mobility issues throughout Davison County. Text and maps will be used to document these conditions. Field review observations will supplement input from county officials, stakeholders, and the public. The study will provide recommendations to state and local officials on possible improvements that will address existing or future deficiencies.

F. Previous Studies

Davison County Comprehensive Plan
Davison County Draft Updates to Zoning Ordinance
City of Mitchell Comprehensive Plan
City of Mitchell Land Use Plan
City of Mitchell Recreational Trail Plan

G. Study Advisory Team

Jeff Bathke: Davison County Planning & Zoning
Russell Weinberg: Davison County Highway Department
John Claggett: Davison County Commission
Denny Kiner: Davison County Commission
Terry Johnson: City of Mitchell-Public Works
Jeff Brosz: SDDOT – Transportation Inventory Management
Steve Gramm: SDDOT – Project Development
Doug Kinniburgh: SDDOT – Local Government Assistance
Jay Peppel: SDDOT – Mitchell Area

II. Analysis Years/Periods

The Davison County Master Transportation Plan will utilize an existing year and planning year horizon. It is assumed that the existing year will be 2015 and planning year will be 2035, representing a 20-year planning horizon. If needed, based on traffic operations analyses, an interim year may be used to further assess operations and proposed improvements.

At locations where peak hour intersection turning movement counts are available or collected, the peak hour will be identified for analysis. It is assumed, for data collection purposes, that the morning peak hour occurs between 7:00 a.m. and 9:00 a.m. and afternoon/evening peak hour occurs between 3:00 p.m. and 6:00 p.m. The actual peak hour used in analysis will be determined by the intersection counts.

For a majority of the traffic-related analysis, a volume-to-capacity ratio analysis will be conducted on rural roadway segments using daily traffic volumes and capacity estimate based on SDDOT default values and HCM 2010 methodology.

III. Data Collection

Many sources of data are required to establish the current baseline conditions assessment and identify existing issues affecting the transportation system. The data collection effort is anticipated to include the following:

A. Existing City and County Development Practices:

HR Green will obtain and review current ordinances and guidelines pertaining to City and County development practices. These items will include: land use and zoning information, as-build plans, photography, utilities, existing and planned development locations, capital improvement plans, and/or mapping data. This data will be used to determine the long range development planned within Davison County as it relates to planned roadway improvements.

Table 1 - City and County Development Practices Data Collected

TITLE	AGENCY/AUTHOR
Ethanol Plans and Unit Train Loading Facilities Map	SDDOT
School Districts in Davison County	SD Dept. of Education
Census Data	US Census Bureau
5 Year Road Plan 2009-2013 Executive Summary	City of Mitchell
Airport Major Projects 2009-2012 Executive Summary	City of Mitchell
Mitchell, SD Bike Trail Map	City of Mitchell
City Plat Map (Detailed)	City of Mitchell
City Zoning Map	City of Mitchell
City Street Map	City of Mitchell
City of Mitchell Emergency Snow Routes	City of Mitchell
City Code	City of Mitchell
Davison County Commission District Map	Davison County
County Drainage Systems	Davison County
Davison County Driveway Approach Application	Davison County
Davison County Tax Incremental District Guidelines	Davison County
Davison County Zoning Ordinance	Davison County
Zoning Map	PDDIII
Comprehensive Land Use Plan	City of Mitchell Davison County

B. Transportation Network Characteristics:

HR Green will obtain and inventory data related to the existing transportation system within Davison County. Transportation network data will include: functional classification, bicycle and pedestrian facilities, transit systems, airport capabilities, railroad networks, freight capabilities, National Bridge Inspection Standard (NBIS) data for all structures off the state highway system, crash history, current roadway design standards of all applicable agencies within Davison County, and existing geometric, capacity, right-of-way, and other deficiencies along key routes. This data will be used, along with information gathered from the Study Advisory Team, stakeholders, and the traveling public, to develop a list of transportation issues currently facing Davison County.

Table 2 - Transportation Network Characteristic Data Collected

TITLE	AGENCY/AUTHOR
State Highway Functional Classification	SDDOT
Davison County Crash Database	SDDOT
2013 Mileage Reports – Rural Road and City Street	SDDOT
2013 Mileage Reports – Primary County Hwy System	SDDOT
Davison County Crash Summary (2011, 2012, 2013)	SD Dept. of Public Safety
City of Mitchell Crash Summary (2009)	SD Dept. of Public Safety
Long Range Transportation Plan	SDDOT
2015-2018 STIP	SDDOT
SDDOT Local Roads Plan	SDDOT
SDDOT Road Design Manual	SDDOT
South Dakota Airport Directory	SDDOT
BNSF SDDOT Information Sheet	SDDOT
Dakota Southern SDDOT Information Sheet	SDDOT
Official South Dakota Rail Map	SDDOT
Palace Transit Passenger Handbook	Palace Transit
Spring Load Limits Resolution	Davison County
Ethan Road Map	PDDIII
Mt Vernon Road Map	PDDIII
Mitchell Road Map	PDDIII
Davison County Road Map	PDDIII

C. Traffic Volumes:

HR Green identified a number of locations to obtain average daily (24-hour) traffic volumes for planning-level analysis. These locations were categorized into three groups: 1) locations that address known concerns, 2) locations on a paved roadway with low volumes, and 3) information or supplemental count locations to fill in gaps throughout the county. A series of peak hour intersection turning movement count locations were also identified to assess existing commuter traffic.

The SDDOT cross-referenced these locations with available 24-hour tube counts and intersection turning movement counts collected between 2011 and 2013. It was determined that the SDDOT collected tube counts between 2011 and 2013 will be used and factored to year 2015 for existing conditions. Peak hour turning movement counts will be provided by the SDDOT at the SD37 and Spruce Street intersection. The HR Green proposed count locations and the corresponding SDDOT-provided count location are shown in Figure 3.

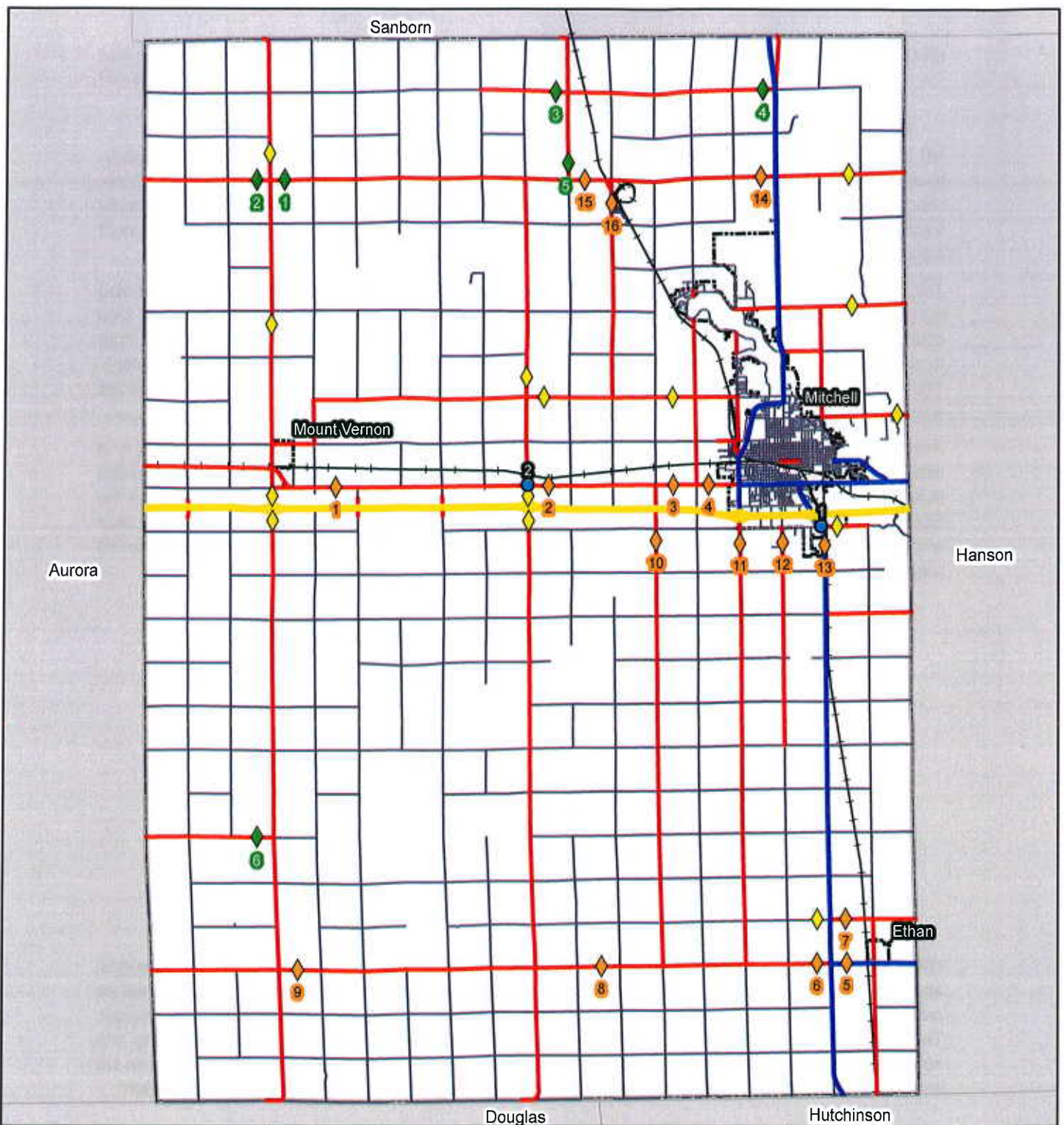
Any additional traffic counts will be collected on a Tuesday, Wednesday, or Thursday while school is in session. Due to the likelihood of any additional traffic counts to be collected during the fall harvest, and potentially spring planting, applicable seasonal factors to be applied to the data will be obtained from the SDDOT. HR Green will coordinate any additional 24-hour tube counts with the SDDOT to gauge their availability to collect the data. It is anticipated that any additional peak hour intersection turning movement counts will be collected by HR Green.

Table 3 - Traffic Data Collected

TITLE	AGENCY/AUTHOR
2013 VMT Report <i>All Vehicles by County</i>	SDDOT
2013 VMT Report <i>Trucks by County</i>	SDDOT
State of South Dakota Traffic Flow Map (2013)	SDDOT
Davison County ADT (2011)	SDDOT
City of Mitchell ADT (2013)	SDDOT
Traffic Counts (Tube Counts)	SDDOT

D. Internet Survey:

HR Green will conduct an internet survey to gather information regarding origin-destination, travel modes, and transportation needs. In addition to the online survey, paper copies of the survey questions will be made available at local churches and meeting halls, at the public meetings, and by mail upon request. The survey will be available for a minimum of four weeks and overlap the first public meeting and subsequent public comment period. Following the completion of the open survey period, HR Green will compile and summarize results to present to the SAT and document in the Master Transportation Plan.



**Figure 3:
Traffic Data
Collection Locations**

Davison County
MASTER TRANSPORTATION PLAN

Legend

● Peak Hour Count Locations

Count Locations (24-Hour)

Type

◆ Location w/ Known Concern

◆ Location w/ Low-Volume

◆ Informational / Supplemental

Yellow line Interstate

Blue line State Highways

Red line County Roads (paved)

Thin grey line County & Township Roads (gravel)

City outline Cities

County outline Davison County

0 0.75 1.5 3
Miles

1 in = 3 miles



HRGreen

IV. Traffic Operations Analysis

The traffic operations analysis will be based on methodology outlined in the Highway Capacity Manual 2010 (HCM 2010). HR Green will predominantly use Highway Capacity Software 2010 (HCS 2010) to complete travel operations analysis. This analysis will maintain compliance with the standard default parameters listed in Chapter 15 of the SDDOT Road Design Manual.

Default values to be used for Highway Capacity Software analysis include:

- Flow Rate = 1,600 vphpl
- Peak Hour Factor = 0.92

Other assumptions, factors, and default values will be based on methodologies provided in the HCM 2010 and will be clearly documented within the Master Transportation Plan and/or applicable document.

V. Travel Forecast

A regional travel demand model is not available for Davison County. For this reason, traffic forecasts will be based on trend lines calculated from historical traffic volume data available from the SDDOT. The traffic forecasts will be supplemented by analyzing anticipated growth areas provided by the County's Planning and Zoning office and the City of Mitchell to adjust the 20-year forecast volumes. For this study, the planning year horizon will be 2035.

VI. Safety Issues

The SDDOT provided crash data for the complete years of 2008-2013. Crash data for the most recently available three (3) complete years, only on roadways outside of county municipalities under Davison County jurisdiction, will be evaluated to identify crash trends or common causes. If necessary, HR Green will complete high level planning review of crash rates within the county and comparisons to statewide averages if available.

VII. Selection of Measures of Effectiveness (MOE)

The primary measures of effectiveness recorded for key study intersections will include average delay per vehicle and Level of Service (LOS). Measures of effectiveness for rural roadway segments include volume/capacity ratio and planning level LOS thresholds. The primary mobility goal for the study will be LOS D. State highway intersections will follow SDDOT Road Design Manual LOS criteria per the highway's functional class (Table 15-1).

Roadway and intersection crash rates will be compared to statewide averages for like-facilities (based on roadway type, area type, and whether it is an intersection or roadway segment).

VIII. Deviations/Justifications

There are no known deviations from study standards at this time. If deviations are deemed necessary during the study process, these issues will be documented and presented to the Study Advisory Team.

IX. Conclusion

The aforementioned approach to the Davison County Master Transportation Plan will accomplish the following goals:

- Complete a list of transportation issues and needs facing Davison County.
- 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 conditions while promoting a livable community that will enhance the economic and social well-being of Davison County residents.
- 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.

The Master Transportation 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. It will provide the tools needed to further promote Davison County as a livable and sustainable community well into the future.