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KLJ

CUSTER COUNTY

CUSTER COUNTY MASTER TRANSPORTATION PLAN

AUGUST 2017

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Existing Conditions

Study Purpose

The Custer County Master Transportation Plan (MTP) is a multimodal transportation plan that provides a comprehensive strategy to address roadway, bridge, bicycle, pedestrian, freight, air, and rail issues in Custer County. It includes a 20-year planning horizon that addresses future transportation needs within Custer County, South Dakota.

Custer County is a beautiful place for recreation and it draws thousands of visitors every year. It is a mountainous area in the Black Hills that has been drawing many new residents. Custer County's population is relatively small at around 8,500, but it has been growing consistently. In fact, the county population has grown more than 16 percent in the last 15 years.

Custer and the other towns are certainly growing, but there has also been growth in the unincorporated areas of the county. New homes and subdivisions have been constructed in several areas of the county. Most of these homes are primary residences that generate several trips per day.

The County is well served by US highways 16 and 385 and State Routes 36, 40, 79, 87, 89. There are 263 miles of paved US highways and State Routes that accommodate most traffic in the county. With more than 400 miles of county and forest service roads and 13 county bridges, road and bridge infrastructure is one of Custer County's largest assets.

The Custer County MTP focuses on maintenance and preservation of the road and bridge assets in Custer County. The Custer County MTP also addresses existing needs and provides a proactive program to address projected needs based upon system forecasts.

Study Area

Custer County is located in southwestern South Dakota. US Highway 16 crosses the county from east-to-west and US Highway 385 traverses the county from north-to-south. The City of Custer is Custer County's largest city with a 2010 Census population of 1987. It is also the county seat. Other towns within Custer County include Hermosa, Pringle, Fairburn, and Buffalo Gap. Unincorporated communities include Dewey and Four Mile.

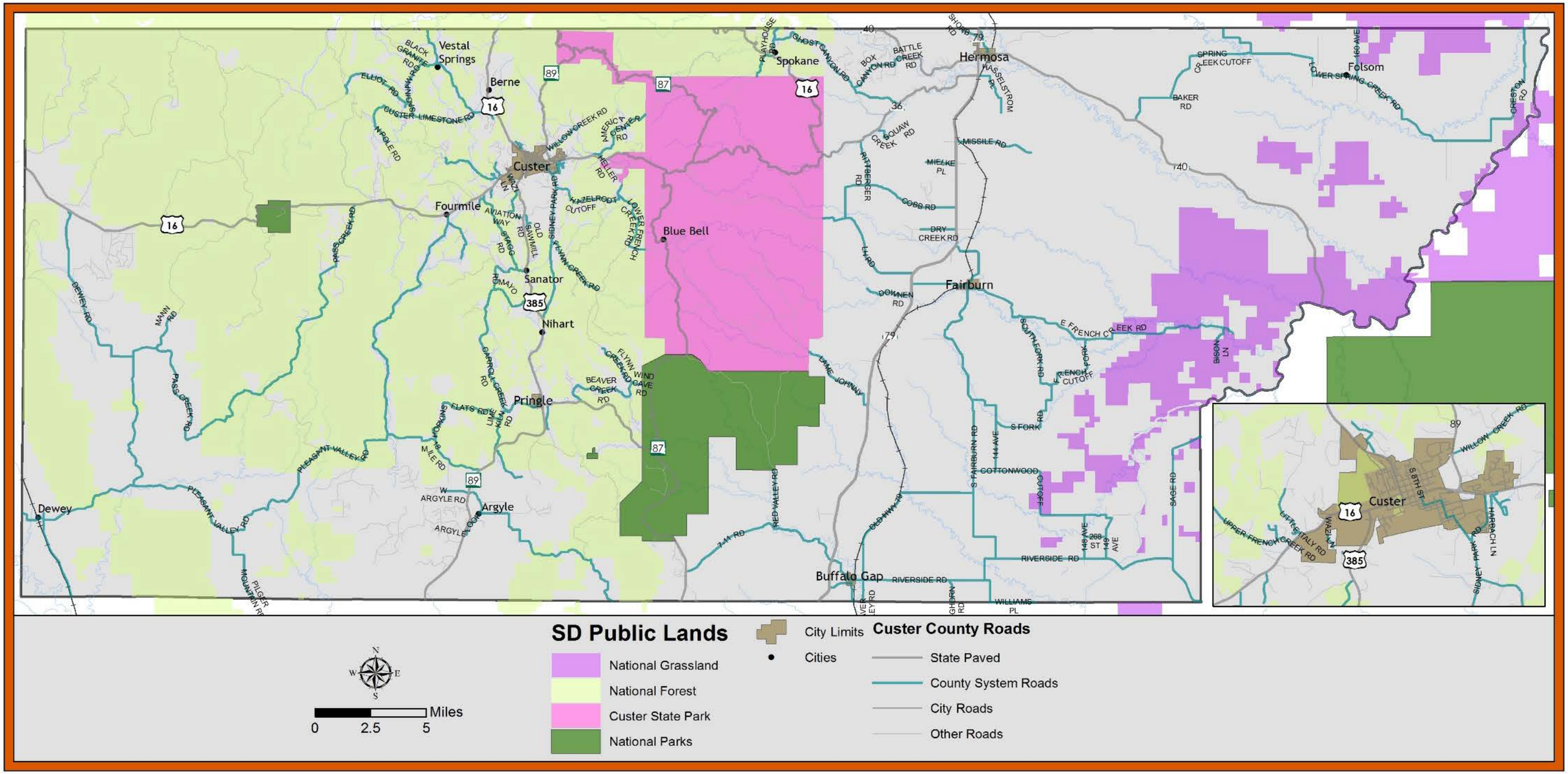
The study area for the Custer County MTP includes the entirety of Custer County (See **Figure 1**). The Custer County MTP will focus exclusively on the roughly 400 miles of roadways and the 13 bridges currently listed on the county system and under Custer County jurisdiction. Analysis will not occur inside of the corporate limits of Custer or Hermosa unless a bridge or roadway is exclusively owned by the County.

Analysis also excludes private, township and SDDOT roadways and bridges. Where necessary, the Custer County MTP may include a small overlap with SDDOT corridors when evaluating potential safety or operational needs related to existing or future county roadways.

As a multimodal plan, the MTP did take into consideration issues and needs related to Prairie Hills Transit, Custer County Airport, and related railroad infrastructure in Custer County.

National protected areas located entirely within the county or in part include Wind Cave National Park, Jewel Cave National Monument, Black Hills National Forest, and Buffalo Gap National Grassland. Custer State Park is also located within the county.

Figure 1: Custer County Study Area



Demographic Profile

Custer County has a population of 8,216 including 3,636 households, according to the US Census Bureau 2010 Census. 24 percent of the county's population is centered in Custer, the Custer County seat. Custer County has experienced a 4.4 percent growth rate since 2010. The median age is approximately 50 years old, which is 13.1 years older than the median age for all South Dakota residents. See **Table 1**.

Table 1: Custer County Demographic Overview

	Custer County	City of Custer	South Dakota
Population	8,216	1,987	814,180
Median Age	50.0	47.5	36.9
Mean Travel Time to Work (min.)	18.5	14.6	16.9
Median Household Income	$46,743	$39,084	$49,495
Land Area (sq. mi.)	1,559.00	2.54	75,811
Population Density (persons/sq. mi.)	5.3	817.0	11.3

Economic Development & Growth

Most economic development and population growth in Custer County is occurring near the City of Custer or the Town of Hermosa. Most of the growth near Hermosa is occurring south along Highway 79 or west near Box Canyon Road.

Transportation System Inventory

This transportation system conditions assessment contains an overview of the primary features of the Custer County Transportation system, including the following:

- Road Inventory
- Roadway Functional Classification
- Existing and Projected Traffic Volumes
- Bridge Inventory
- Freight Movement
- Bicycle-Pedestrian Conditions
- Transit Conditions

The transportation system conditions assessment provides a concise summary of the current conditions of the primary transportation infrastructure in Custer County. The system conditions assessment provides the building block for the development of the 20-year County Master Transportation Plan by establishing a framework for system needs by functional area.

ROAD INVENTORY

The Custer County Highway Department is responsible for approximately 413 miles of roadways within Custer County. Gravel roads comprise about 382 miles or 92.5% of the roads on the county road system. An additional 17 miles of roadway on the County road system are unimproved. The composition of county roadways is shown in **Table 2**.

Table 2: Custer County Road Surface Inventory

Pavement Type	Mileage	Percentage
Gravel/Crushed Rock	382	92.50%
Bituminous	14	3.40%
Unimproved/Trail	17	4.10%
Total	**413**	**100.00%**

ROADWAY FUNCTIONAL CLASSIFICATION

Functional classification defines the role that a roadway will play in servicing the flow of traffic through the road network using factors such as access, mobility, and overall roadway system connectivity. Each class requires a different traffic management system due to the nature of traffic operations on the roadway. The basis for determining Custer County's functional classification system is driven by existing roadway conditions, geometrics, and use.

A primary purpose for a functional classification system relates directly back to funding, specifically the programming of Federal-aid funds through SDDOT. All public roads functionally classified at least as a rural major collector or higher are eligible for Federal assistance provided by the Fixing America's Surface Transportation (FAST) Act. These roads are referred to as "Federal-aid Highways" or "on system".

By roadway functional classification, major collectors make up the highest proportion of the county system, followed by local roadways, then minor collectors (See **Table 3**). The functional classification of county maintained roadways as well as the Federal and non-Federal-aid eligible roadways can be seen in **Figure 2**.

As discussed in the financial element of the MTP, programming by SDDOT regarding how Surface Transportation Program (STP) funds are distributed to counties gives Custer County more flexibility in spending formerly STP funds on roadways classified as less than Major Collectors. However other funding from FAST (E.g. Highway Safety Improvement Program [HSIP]) are still tied to corridors classified at or above Major Collector or "on-system" roadways.

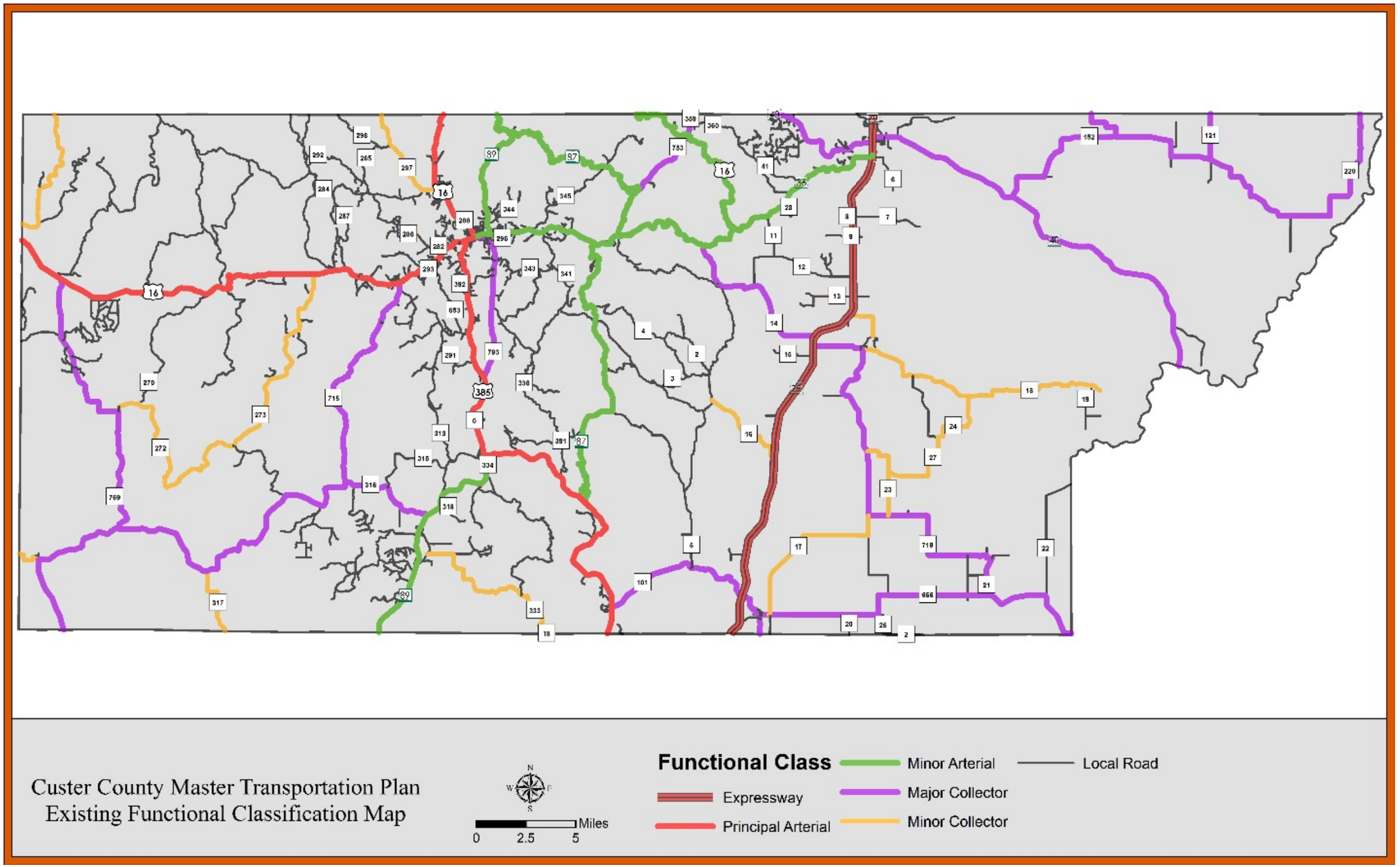
Table 3: Custer County Roadway System by Functional Classification

Functional Classification	Mileage	Percentage
Rural Major Collector	164	40%
Rural Minor Collector	87	21%
Rural Local Roads	161	39%
Total	**413**	**100%**

Beyond the determination of Federal-aid classifications, a well maintained functional classification system allows the county to prioritize maintenance, construction, and other financial responsibilities within the county roadway system. Custer County roadways are organized into the following classes:

- **Principal Arterial** - Serves statewide or interstate travel. In Custer County, these are exclusively SDDOT roadways.
- **Minor Arterial** - Links larger towns and form an integrated network providing intercounty service. In Custer County, these are exclusively SDDOT roadways.
- **Major Collector** - Provides service to any county seat not on an arterial route, to the larger towns not directly served by the higher systems and to other major traffic generators.
- **Minor Collector** - Links local traffic generators with nearby larger towns or with routes of higher classification.
- **Local Roads** - Provides access to adjacent land and service to travel over relatively short distances.

Figure 2: Existing Functional Classification



EXISTING TRAFFIC VOLUMES

Recent traffic counts at 54 locations across the county were available from SDDOT and Custer County. These counts were all conducted between 2013 and 2015. These were the newest counts available on state and county roads. As part of this study, KLJ conducted additional counts. These 15 additional traffic counts were conducted at strategic locations in September 2016. Existing average daily traffic count information is provided in **Figure 3**.

Due to the rural nature of Custer County, county roadways generally experience low traffic volumes. Traffic traveling through Custer County predominately uses US and state routes. Local traffic primarily uses County routes to access homes or farm properties.

A review of existing traffic volumes in Custer County shows that Sidney Park Road, Box Canyon Road, the Hazelrodt Cutoff, and the north end of Pleasant Valley Road are the only roadways on the County system that exceed 500 vehicles per day. Traffic volumes on those roads are 1,250, 575, 550 and 550 vehicles per day respectively. No existing roadway capacity issues were identified.

PROJECTED TRAFFIC VOLUMES

Year 2035 projected average daily traffic count information is provided in **Figure 4**. Recent counts were used as a baseline for traffic projections. They set the benchmark for future growth at the 69 locations around the county. Traffic varies significantly on state versus county roads. State roads carry more traffic and experience more growth because of their regional significance. Therefore, different future growth rates were used in a spreadsheet model for state and county roads to account for the trends on each road type.

Traffic and growth also vary based on the location within the county. Specifically, traffic is higher on all roads closer to the cities of Custer or Hermosa than in other parts of the county. These roads already have higher traffic volumes than their counter-parts. So, a higher growth rate was used on both state and county roads that are adjacent to Hermosa or Custer.

Perhaps the most influential factor in determining traffic forecasts is the recent trends. All the state traffic counts and many of the county counts have past values. These historic counts tell us how much the volume of the road changed from 2010 to 2015 for example. Not all the historic counts match exactly a 5-year trend as some counts were more than or less than five years apart, but they do allow us to calculate a recent trend. The big exception being the counts conducted for this study, which mostly don't have any historic data.

Most of the locations showed very little growth or no growth. A good example is on Dewey Road (County 769) which had a 2013 traffic count of 98 and a 2008 traffic count of 111. Both numbers round to 100 and it was assumed that there was minimal traffic growth on that road recently. There was much higher recent growth around Hermosa and Custer.

The final forecasted growth rate average was 1.92% per year or 46.3% over 20 years. The individual amounts varied based on the factors listed above and then the future traffic volumes were rounded to the nearest 25 to match the existing. No projected roadway capacity issues are anticipated along the County Road system.

BRIDGE INVENTORY

Custer County is responsible for 13 bridge structures throughout the primary and secondary county road system. Bridges maintained by Custer County are shown in **Figure 5**.

FREIGHT MOVEMENT

Custer County is mostly comprised of national and state forest and park lands. The timber industry, saw mills, mining, large manufacturers, agricultural producers, and gravel pit operators generate most trucking operations. A detailed analysis of Custer County freight flow and trends is included in Appendix III.

By both weight and value, trucking is the dominate mode of domestic freight transportation, accounting for 81 percent of shipments by weight and 77 percent of shipments by value. Pipeline was the second highest mode for both at 12 percent by weight and 9 percent by value followed by rail at 6 percent and 5 percent respectively. By 2045, the percent carried by truck is projected to decrease 3 percent by weight and 7 percent by value with corresponding rises in pipeline, rail, and multiple modes and mail.

Airport Conditions

Aviation Way, the entrance road to Custer County Airport, lies 2.4 miles southwest of Custer along US Highway 385. The Custer County Airport provides the county and southern Black Hills access to the National Airway System for private, corporate, and air ambulance operators. Given its location within the Black Hills National Forest, it is also used as a base of operations for the U.S. Forest Service and related activities. The Airport has estimated that helicopter operations range between 2,500 and 4,000 annually depending upon related fire activity in the Black Hills National Forest. A discussion of Airport issues is provided later in the report.

Rail Conditions

Two freight railroads bisect Custer County. Burlington Northern & Santa Fe (BNSF) is a Class I railroad. BNSF's Powder River Division runs through the southwest corner of the County with a crew change point in the City of Edgemont in Fall River County, just south of Custer County. The Rapid City, Pierre & Eastern (RCPE) is a Class III railroad owned and operated by Genesee & Wyoming Inc. (G&W). It bisects the County, passing through Buffalo Gap, Fairburn, and Hermosa. A discussion of rail-related issues is provided later in the report.

BICYCLE-PEDESTRIAN CONDITIONS

There is an extensive trail system within Custer County that is not on or along the County Road system. The existing trail system is shown in **Figure 5**.

TRANSIT CONDITIONS

Prairie Hills Transit operates a demand-response public transportation system within Custer County. They stay mostly to the state routes and operate mostly within a 3-mile radius of city limits in Custer and Hermosa. They also travel from Custer to Pringle to pick up kids for school. They have a strong preference for paved roads as they limit wear and tear on their buses. Road maintenance and winter plowing are important along State routes, in town corridors, and within the 3-mile radius of cities.

Figure 3: Custer County Existing ADT

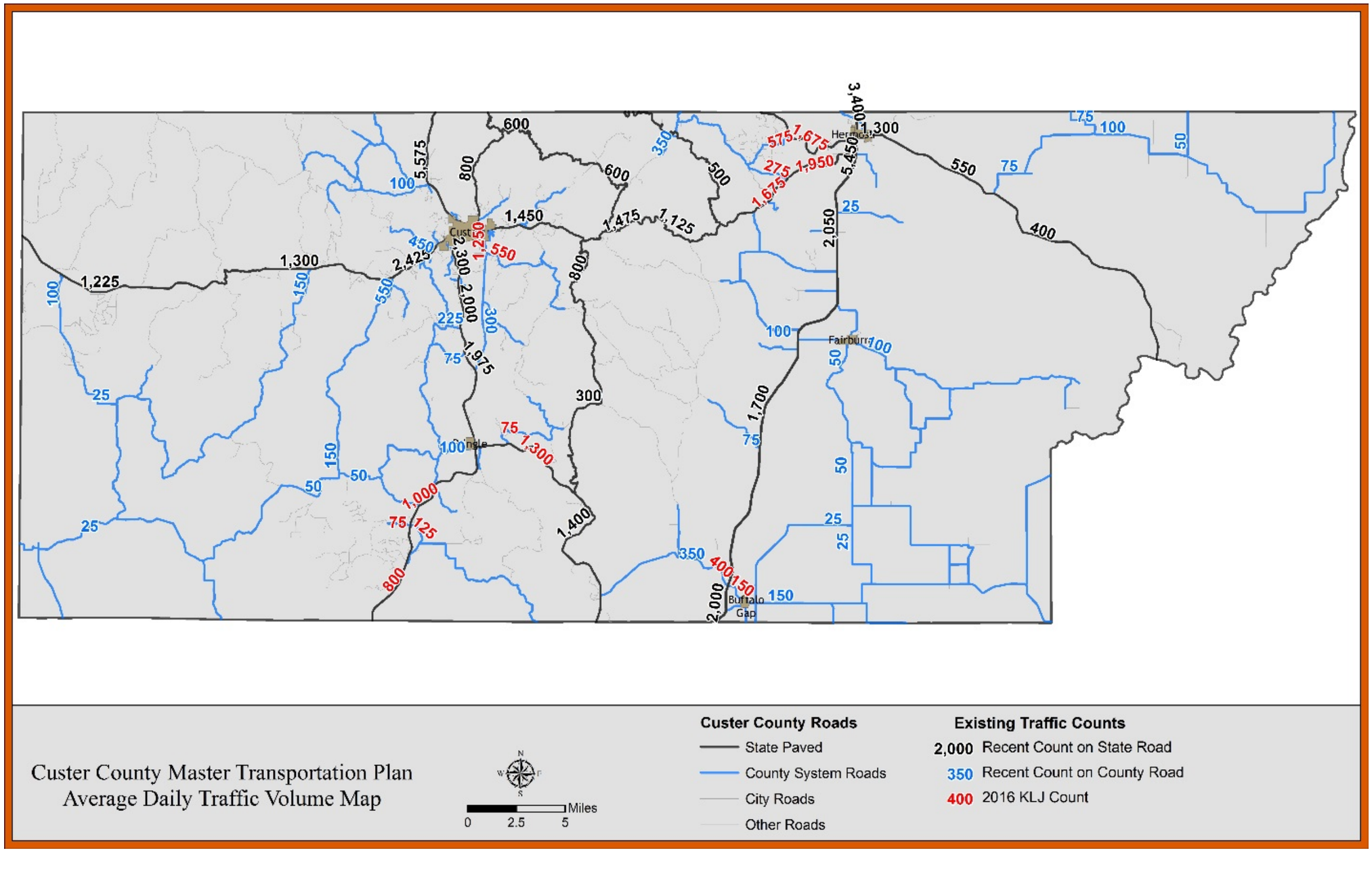


Figure 4: Custer County Projected 2035 ADT

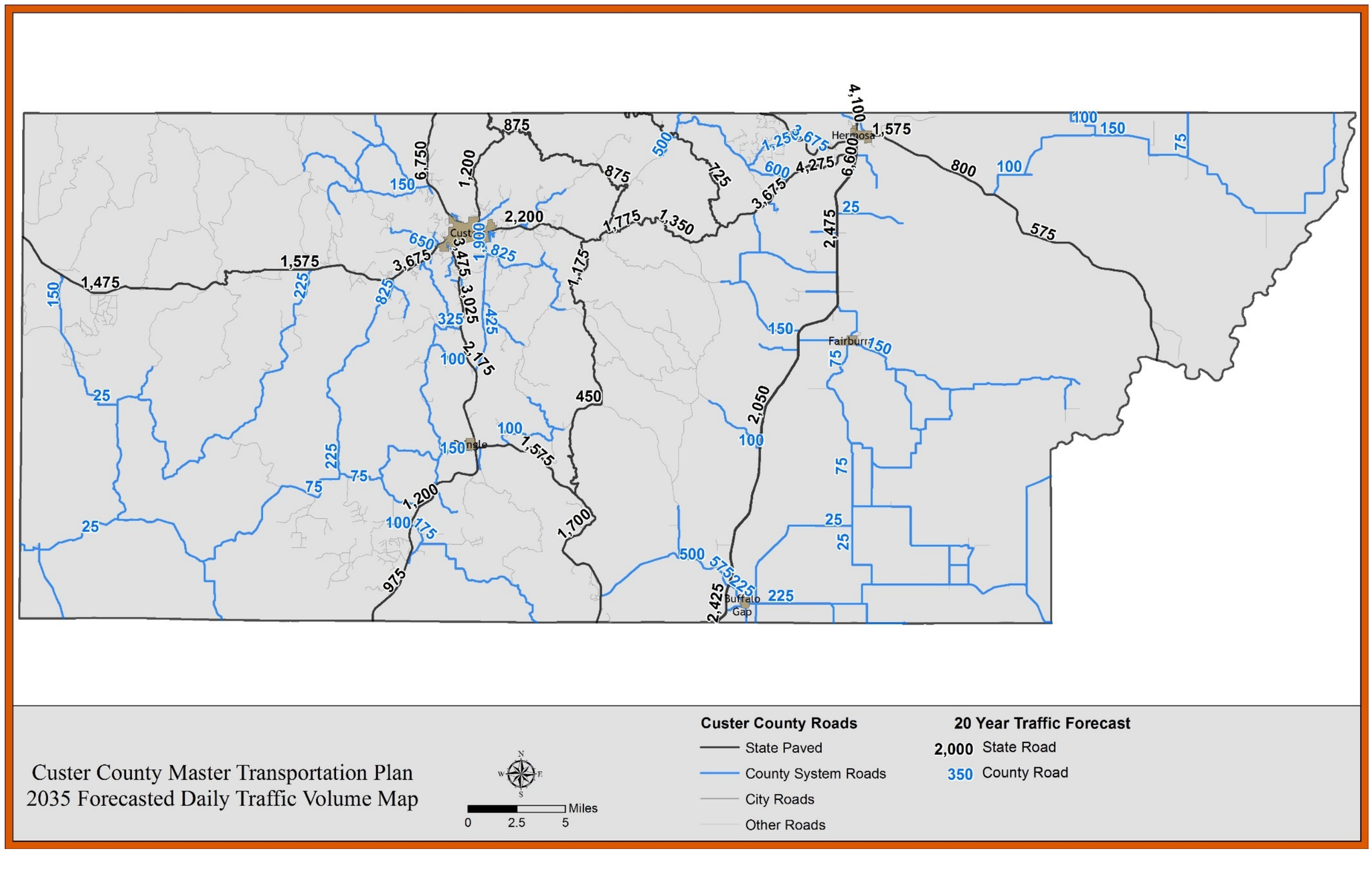
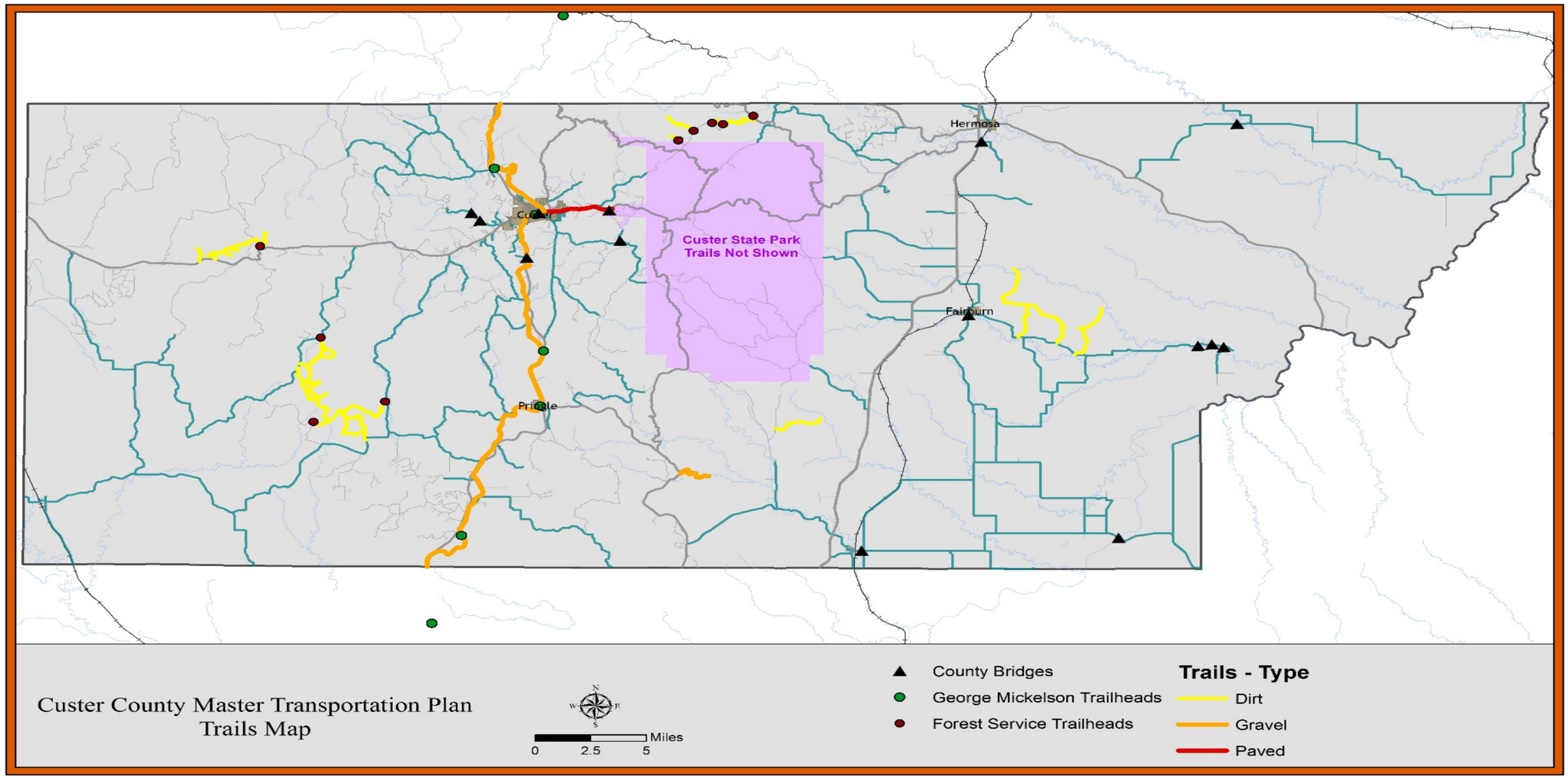


Figure 5: Custer County Trail and Bridge Location



Public Involvement

Public involvement included gathering input from Custer County officials, county residents, SDDOT and other key stakeholders throughout Custer County. The public involvement process included use of an online survey, Study Advisory Team meetings, stakeholder input meetings, and public input meetings.

Online Survey Results

An online survey was used from October 2016 to March 2017 to receive public input on travel patterns and their views on transportation issues and needs. Survey links were located on the Custer County and SDDOT websites, and were discussed at the first set of public meetings and on posters placed in various locations around Custer. Sixty people responded to the survey. The results of the survey are found in Appendix II. Key responses are summarized as follows:

- Almost 94% live in Custer County. Of those who responded, only 42.6% work in Custer County.
- Roughly 70% said there is minimal or no traffic congestion in Custer County. The other 30% said traffic congestion is only occasional.
- Over 82% walk or bike in Custer County. 31.5% said walking or biking in Custer County is somewhat unsafe or not safe.
- Over 60% said overall traffic safety in Custer County is very safe or somewhat safe.
- Almost 70% said gravel road conditions in Custer County are in excellent, good, or fair condition.
- When asked, what transportation improvements are most important to you, the top three responses were county road maintenance, dust control, and roadway safety. Other improvements were listed as being significantly less in importance.
- Concerns regarding Box Canyon Road and Ghost Canyon Road dominated written responses.

Study Advisory Team Meetings

The consultant team met with a Study Advisory Team (SAT) on five occasions throughout the study process. The role of the SAT was to review interim study documentation and to provide feedback and guidance throughout the study. The SAT for the Custer County MTP consisted of the following representatives from county and state agencies or departments:

- Gary Woodford, Custer County Highway Department
- Rick Wheeler, Custer County Sheriff
- Travis Bies, Custer County Commission
- Rex Harris, Custer County Planning & Zoning
- Jeff Knutson, Black Hills National Forest
- Rich Zacher, SDDOT Custer Area
- Stacy Bartlett, SDDOT Rapid City Region
- Jeff Brosz, SDDOT Transportation Inventory Management
- Steve Gramm, SDDOT Project Development
- Wade Dahl, SDDOT Local Government Assistance

Meeting summaries are included in Appendix I.

Stakeholder Input Meetings

A list of project stakeholders was developed during preparation of the Methods and Assumptions document. Efforts were made to obtain input from each of the stakeholders either by phone or by meeting directly with them. The list of stakeholders is shown as follows. Input received from project stakeholders is included in Appendix I.

List of Project Stakeholders

- Prairie Hills Transit
- Custer County School District
- Custer Area Chamber of Commerce and Visitors Bureau
- Recreational Groups
- Wind Cave and other Federal Parks
- Large Manufactures/Agricultural Producers/Gravel Pit Operators (trucking interests);
    - Croell Redi-Mix
    - Neiman Enterprises (Timber Industry)
- Railroad interest groups (BNSF & RCP&E)
- Custer County Airport
- Custer County Ambulance Service
- Custer Volunteer Fire Department
- Elk Mountain School District
- Black Hills Electric Cooperative
- Black Hills Energy
- Custer County Fire Department
- Southern Black Hills Water System
- Custer State Park
- Dispatchers
- Black Hills Forest Resource Association
- Custer County Cities
    - Custer
    - Hermosa

In addition to these stakeholder meetings, three updates were provided to the Custer County Commission.

Public Meetings

Four total public meetings were held in the towns of Custer and Hermosa. The first two public meetings were held in Custer and Hermosa on October 18 and 19, 2016 respectively. There were 11 people in attendance at the first meeting and 49 people in attendance at the second meeting. The purpose of this set of public meetings was to receive input on Custer County transportation issues.

The clear majority of people at the Hermosa meeting came to discuss dust and speeding issues along Box Canyon Road and Ghost Canyon Road. There is also a desire to see fewer trucks along these corridors. Meeting agendas and meeting summaries from the first set of meetings are included in Appendix I.

The last set of public meetings were held on June 13 and 14, 2017 in the towns of Hermosa and Custer, respectively. There were 21 people in attendance at the first meeting and 31 people in attendance at the second meeting. The purpose for these meetings was to present the draft Custer MTP for review and comments. Similar comments regarding dust and speeding were received to those provided at the first set of public meetings.

Attendees generally concurred that formation of a dust control district was a good idea, though they asked that Custer County take a lead role in coordination. Meeting summaries from the second set of public meetings are included in Appendix I.

Issues Identification and Analysis

This section of the report addresses the issues identification and analysis process. Included within this analysis are the following subsections:

- Safety Analysis
- Road Surface Conditions Analysis
- Bridge Conditions
- Freight Issues and Needs
- Pedestrian and Bicycle Facility
- Transit Facility/System
- Subdivision Access Needs and Funding

The Custer County MTP developed and refined this set of identified needs and issues. Public involvement techniques including an online survey, public input meetings, stakeholder outreach and regular meetings with the Study Advisory Team (SAT) were used to ensure political, technical and stakeholder input were factored into the development of the Custer County MTP.

Safety Analysis

Safety on the County Road system is an issue Custer County has been addressing on an ongoing basis, as is evidenced by their recent project to correct visibility issues along Beaver Creek Road. The two primary efforts involved in conducting the safety analysis were the crash data analysis and the field inventory.

The public identified gravel road dust conditions as an issue that limits visibility and reduces road safety.

CRASH ANALYSIS

Historical crash data was received from SDDOT for the period between January 2011 and January 2016. The data was reviewed to determine the location, type, and severity of crashes on the County Road system. There were 222 crashes that occurred on Custer County roads over the five-year period. Seventeen of these crashes resulted in an incapacitating injury, though none resulted in a fatality.

Figure 6 shows the crashes on Custer County roads by crash type. **Figure 7** shows the severity of crashes on Custer County roads. This crash data along with public involvement, input from Custer County and the SDDOT was used to better understand where safety issues exist and what possible future issue mitigation opportunities may apply. Supplemental safety analysis information is provided in Appendix IV.

The highest frequency crash locations were found near Custer and Hermosa where traffic volumes are heaviest. The most common crash types were those involving a motor vehicle in transport, those involving hitting a post, mailbox, or animal, and those resulting in an overturn or rollover.

Figure 6: Custer County Crash Types

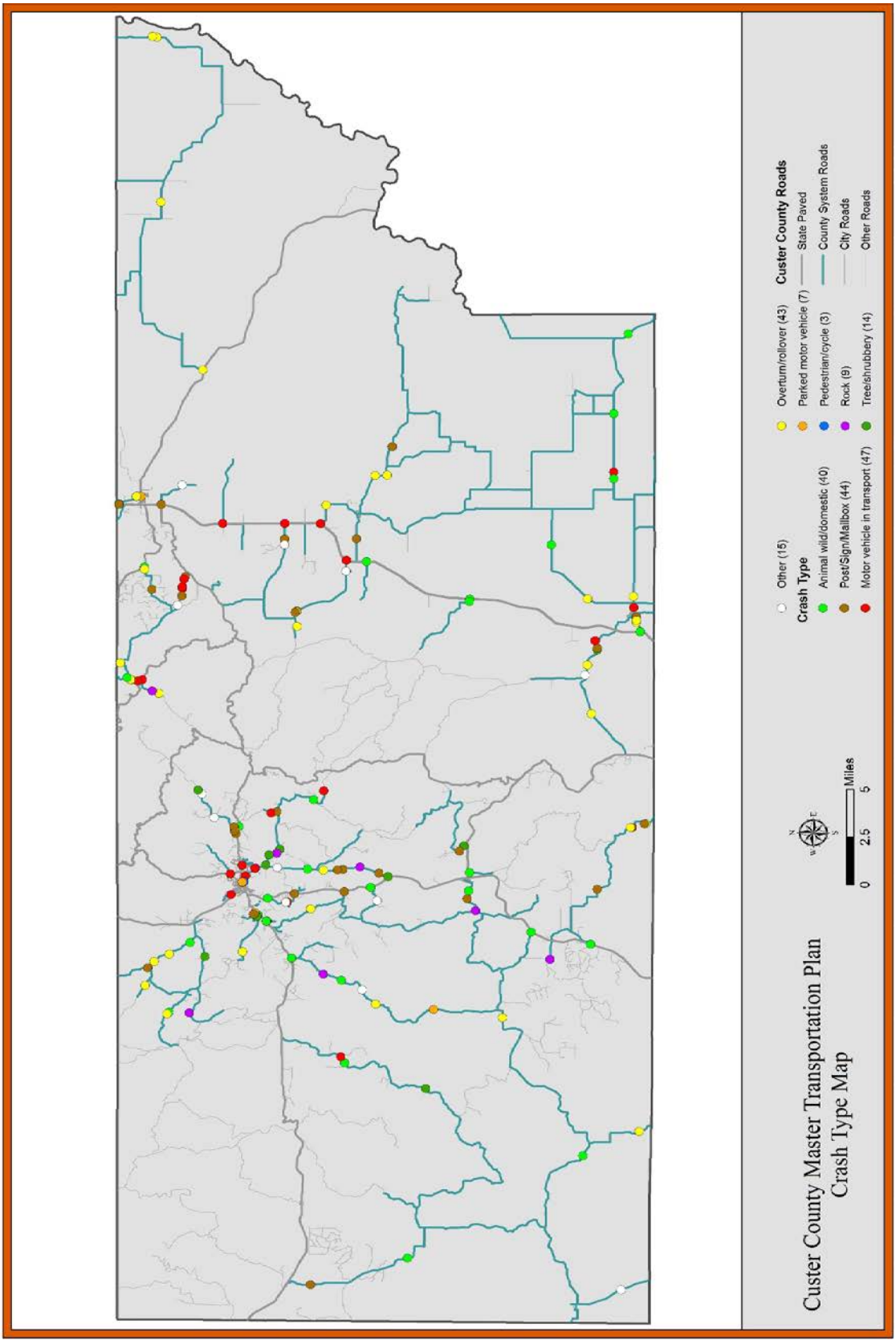
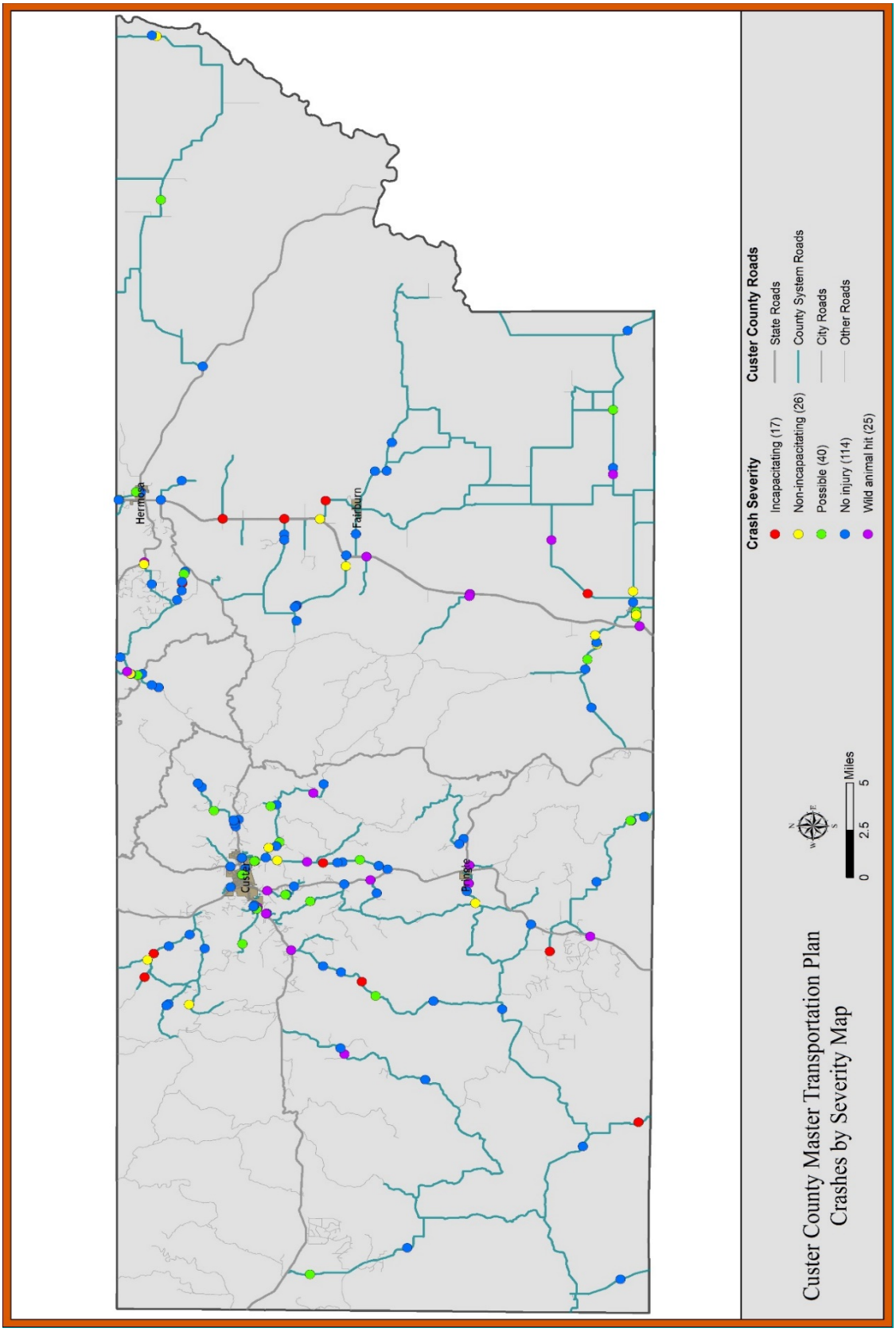


Figure 7: Custer County Crash Severity



FIELD INVENTORY

Many of the safety issues identified by this study were identified during the field inventory conducted in September and October 2016. These issues are shown in **Figure 8**. Others were identified based on communications with stakeholders, members of the SAT, and input from the general public.

The field inventory served as a guide to where needs exist, although it was not intended to be a comprehensive guide to safety needs within the county. Key safety issues identified by the field inventory include blind curves/visibility, curves needing reshaping, excessive grades and steep inslopes.

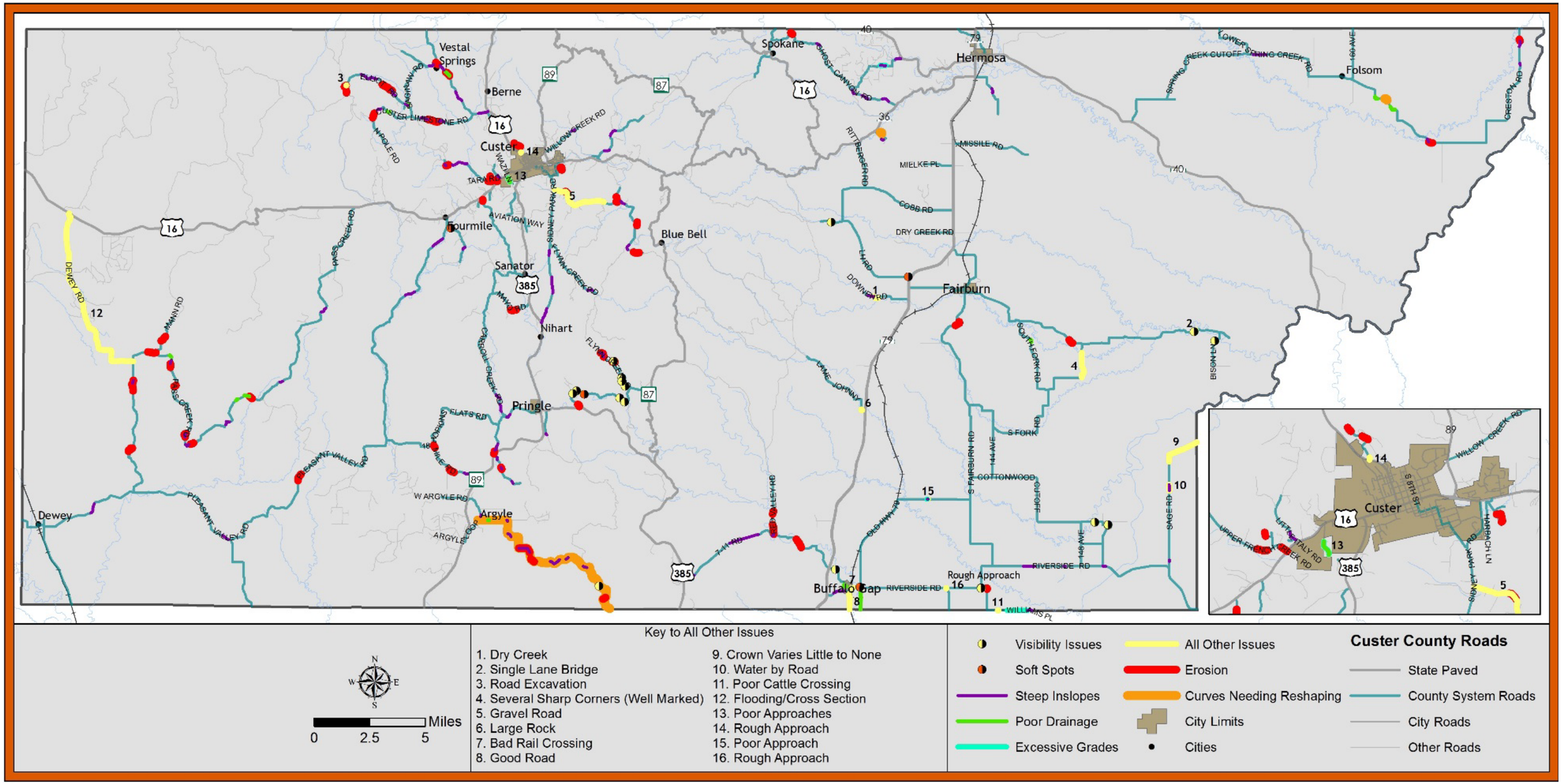
Blind Curves/Visibility Issues

Seven individual corridor locations were identified as having blind curves and/or visibility issues by the inventory that was conducted. These included:

- East end of County Road 18 (East French Creek Road)
- North end of County Road 19 (Bison Lane)
- East end of County Road 21 (Cottonwood Cutoff)
- County Road 101 east of Highway 79
- Beaver Creek Road
- Hazelrodt Cutoff and Lower French Creek Road intersection (skew)
- Flynn Creek Road (Not a County maintenance responsibility)

Where possible, geometric improvements and/or removal of sight obstructions should be considered to address these issue locations. Possible other improvements, such as better delineation may also be considered.

Figure 8: Issues from Field Inventory



Curves Needing Reshaping

This issue covers locations where the super elevation of the curve varied or was inadequate or the transition was poor. This issue predominantly occurs along Argyle Road, although the condition was also observed along a short segment of Squaw Creek Road. This issue should be addressed by bringing in additional gravel and re-blading.

Excessive Grades

Excessive grades were identified along Williams Place on the southern County border and along Box Canyon Road. The primary solution to addressing this is to change the profile of the road. In many cases, this may not be feasible because of limited right of way or impacts to adjacent properties. Corridors with excessive grades require additional maintenance, especially during winter snow and ice conditions.

Steep Inslopes

Steep inslopes is one of the more common issues identified along roadways throughout the County. In many cases, resolution of this issue may not be practical because of the deep fills that would be required to flatten the inslopes. While this may be true, steep inslopes should be flattened when practical. Placement of guard rail may also be considered.

Road Surface Conditions Analysis

The clear majority of roadways maintained by the county are gravel surfaces which require a regular and ongoing program for maintenance and management. Gravel road maintenance is addressed through the county's annual maintenance budget, plus any significant upgrades addressed as separately identified projects. The following road surface conditions were identified during the field inventory (See **Figure 8** on the previous page).

Poor Drainage

Poor drainage pertains to insufficient ditch cross sections, as well as culverts that were damaged or filled with dirt and debris. There were roughly a dozen locations within the County where this was identified as an issue. Each of these locations should be reviewed and addressed on a case by case basis.

Erosion

Erosion was only noted when it was in relation to the road, such as when the road surface was eroding away, when the shoulder was eroding, or under conditions of significant ditch erosion (when ditch erosion could possibly impact roadway). This is a common condition at many locations within the County. Like poor drainage conditions, each of these locations should be reviewed and addressed on a case by case basis.

Soft Spots

Most of the gravel road surfaces within the County appear in good condition. Soft spots were identified at the west end of Riverside Road, along Beaver Creek Road, and along Fourmile Road. Maintenance needs adjacent to cattle guards were another issue that was raised by emergency responders. In discussions with the Custer County Road Superintendent, Custer

County has an active program to address maintenance at cattle guards. Identified soft spot locations require removal of poor material and replacement and compaction with a well-graded gravel base.

Bridge Conditions Analysis

Custer County currently has 13 bridges for which it is responsible for maintenance. As part of the MTP, a detailed system review based on the most current National Bridge Inventory (NBI) data and existing needs identified by Custer County Highway Department were used to develop a bridge improvement program to address the most pressing needs facing Custer County's bridge infrastructure.

To evaluate bridge conditions of Custer County bridges, the National Bridge Inventory (NBI) was obtained from SDDOT. The NBI contains a unified database for bridges including the identification information, bridge types and specifications, operational conditions, and bridge data including geometric data, functional description, inspection data, etc.

Information within the NBI addresses the bridge location, classifies the type of routes carried on and/or under the structure and locates the bridge within the spatial location. The NBI defines standard categories for classification of the bridges, material components of the bridge, deck, and deck surface. Operational conditions provided in the NBI provides information about the age of the structure, rehabilitation year, average daily traffic, average daily truck traffic and information regarding to bypass and detours. In aggregate, the NBI provides a uniform inventory of information regarding current inspection data, ratings assigned by inspectors and appraisal results.

Bridge Sufficiency Ratings

The principal metric used to evaluate bridge conditions is the bridge sufficiency rating. The bridge sufficiency rating is a numeric value used to describe bridge conditions, with a score of 100 indicating an entirely sufficient bridge, and a score of zero indicating a completely deficient bridge. These ratings are assigned to bridges as part of federally mandated biennial bridge inspection process which results in the development of the NBI.

The sufficiency rating is an overall score based on several bridge characteristics, including structural adequacy and safety, age, serviceability and functional obsolescence and suitability for continued public use.

Based on sufficiency ratings from the NBI bridges are generally classified as:

- Not deficient;
- Structurally deficient;
- Functionally obsolete.

FHWA defines a ***structurally deficient*** bridge as:

- *"Structural deficiencies are characterized by deteriorated conditions of significant bridge elements and potentially reduced load-carrying capacity";*

- *"A structurally deficient designation does not imply that a bridge is unsafe, but such bridges typically require significant maintenance and repair to remain in service, and would eventually require major rehabilitation or replacement to address the underlying deficiency".*

FHWA defines a ***functionally obsolete*** bridge as:

» *"Bridge does not meet current design standards (for criteria such as lane width), either because the volume of traffic carried by the bridge exceeds the level anticipated when the bridge was constructed and/or the relevant design standards have been revised. Addressing functional deficiencies may require the widening or replacement of the structure".*

Bridge sufficiency ratings are also used to determine if a bridge is eligible for federal or state bridge rehabilitation or bridge reconstruction funding. Bridges with sufficiency ratings below 80 are eligible for rehabilitation and bridges with sufficiency ratings below 60 are eligible for replacement and for Federal funds. This criterion applies for replacement funding through the SDDOT Bridge Improvement Grant (BIG) Program.

Of the 13 Custer County bridges expected to remain in operation following completion of the Custer County MTP, 2 bridges have an NBI sufficiency rating less than 60. These two bridges are under construction or planned to be reconstructed in the next year or two. The average NBI rating of all Custer County bridges is 76.4. The statewide SDDOT-owned bridge sufficiency rating average is 90.6. The sufficiency rating for bridges in Custer County once the two bridges are improved can be seen in **Table 4**. A further breakdown of bridge locations and conditions can be seen in **Figure 9**.

*Table 4: Custer County Bridge Sufficiency Ratings**

Bridge Sufficiency Rating	Number of Bridges	Percentage
80+	8	62%
60 to 80	5	38%
Less Than 60	0	0%
Total	13	100%

* Assumes two bridges (one under construction, one planned for reconstruction) are completed.

Custer County Bridge Deficiencies

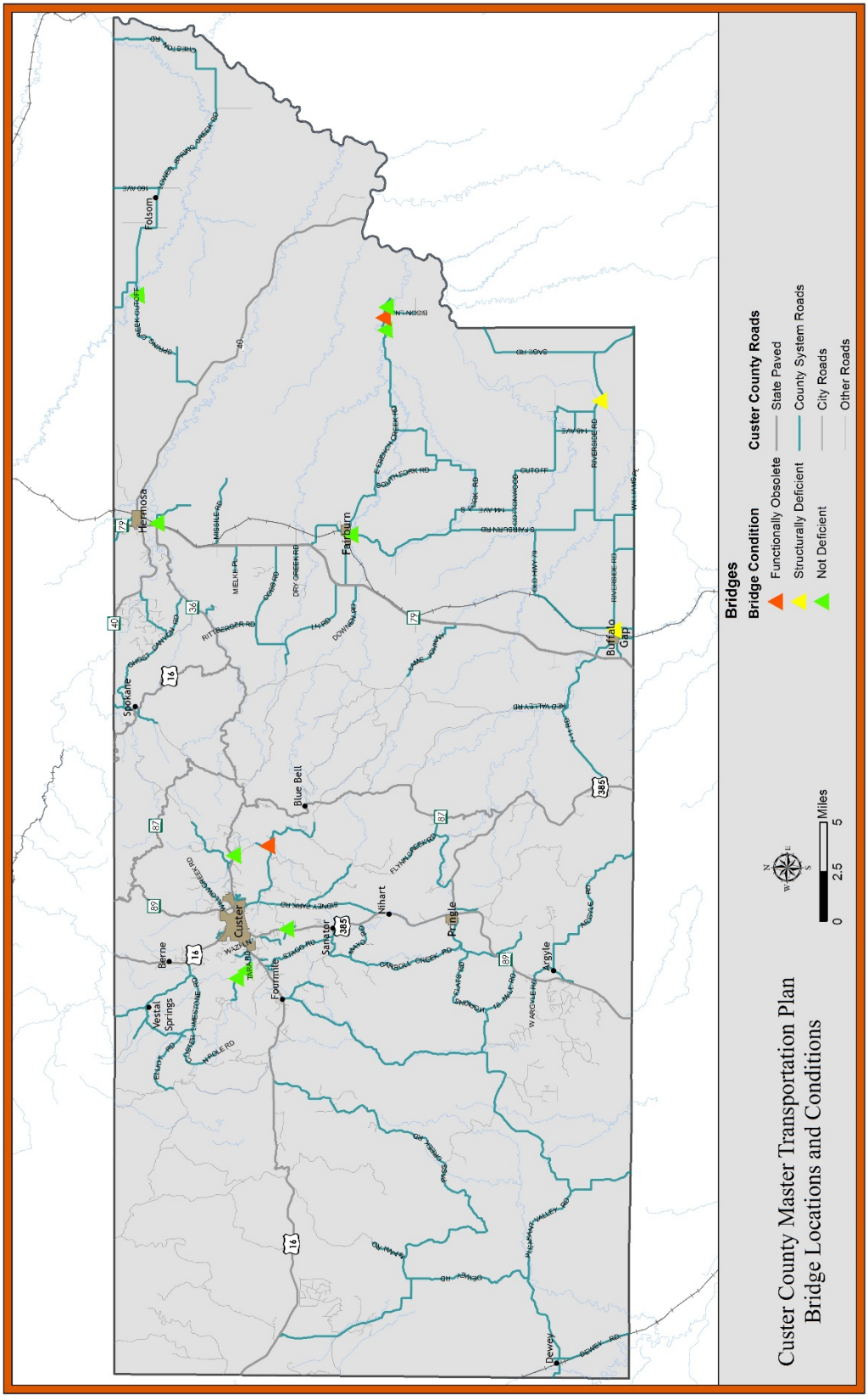
Table 5 shows a breakdown of the condition of bridges owned by Custer County. Of the total county-wide system, 4 bridges (30 percent) are considered structurally deficient or functionally obsolete. This percentage will drop to 15 percent once the two bridges planned/under reconstruction are completed. Nationwide, 21.9 percent of bridges are considered deficient (from 2009 FHWA data). Statewide in South Dakota, 24.7 percent of bridges are considered deficient (from SDDOT national bridge inventory data).

*Table 5: Bridge Deficiencies on Custer County Bridges**

Condition	Number of Bridges	Percentage
No Deficiency	9	70%
Structurally Deficient	2	15%
Functionally Obsolete	2	15%
Total	13	100%

* Active projects will reduce structurally deficient and functionally obsolete bridges to 1 each.

Figure 9: Bridge Locations and Conditions



Custer County's 13 county-system bridges are in mostly good shape structurally according to their national bridge inventory scores. These ratings can be seen in **Table 6**. Only two are considered structurally deficient at this time. However, one of those two is by far the longest bridge in the county and would be replaced at considerable expense.

Table 6 – Custer County Bridge Sufficiency Ratings

Bridge ID	Crossing Feature	Facility	Location	NBI Sufficiency Rating
17226094	MICKELSON TRAIL	OLD SAWMILL ROAD	1.0 SOUTH OF CUSTER	93.30
17263069	STOCKADE LAKE INLET	STATE PARK RD	3.3E .1N CUSTER	60.30
17268086	FRENCH CK	HAZELRODT CUTOFF	4.5SE CUSTER	66.80
17379260	BEAVER CK	E MAIN ST, FAS 6488	0.4E BUFFALO GAP	47.70
17425128	FRENCH CK	S FAIRBURN ROAD	FAIRBURN S CITY LIMIT	97.90
17431030	BATTLE CK	HASSELSTROM PLACE	1S HERMOSA	78.90
17496252	CHEYENNE RV	RIVERSIDE ROAD	11.7E & 0.8N BUFFALO GAP	31.10
17528144	FRENCH CK	E FRENCH CK ROAD	10.0E 2.0S FAIRBURN	69.80
17535143	FRENCH CK	E FRENCH CK ROAD	2S 10.5E FAIRBURN	44.90
17540147	FRENCH CK	BISON LANE	11E 2S FAIRBURN	78.90
17547020	SPRING CK	SPRING CK CUTOFF	12E HERMOSA	80.40
17207076	RUBY CK	UPPER FRENCH CK RD	2.2W & 0.5S CUSTER	92.30
17201071	RUBY CK	UPPER FRENCH CK RD	2.8W CUSTER	92.30

BIG Scoring & Technical Evaluation

A scoring system has been developed to prioritize their repair and replacement need. Those bridges that need work and have a high potential to receive state Bridge Improvement Grant (BIG) funding will score higher than those that do not meet these criteria.

To determine the county's bridge needs, a technical evaluation was produced to rank the bridges in order of priority. All existing county system bridges in Custer County were scored based upon the approved SDDOT BIG Program scoring criteria.

The BIG Score is what will be used by SDDOT in evaluating and selecting projects submitted to SDDOT in future funding years. The BIG Score can be increased for a potential bridge by either increasing the amount of local match (up to an additional 10 points available prorated per the amount of local match above 20% being supplied by the County) or by submitting

projects which are shovel ready (10 points if the project is ready for bid letting at time of application submittal).

BIG Scoring is an important factor in prioritizing bridges. However, an additional layer of technical and qualitative scoring was applied to bridges in Custer County to provide a preliminary list of system investment priorities.

Technical Evaluation

A two-tiered evaluation process was used to prioritize bridges in Custer County. The first scoring process was based on technical criteria including Sufficiency Rating, Posting and Detour. The evaluation process rated bridges on a sliding scale of sufficiency <20, <30, <40 or >40. Secondarily, bridges were evaluated on a sliding scale based on a posting of 0, 1, 2 or >2. Thirdly, bridges were evaluated based on a detour of >4 and then >8.

Technical-Qualitative Evaluation

The second level of analysis was more of a composite technical-qualitative scoring matrix to outline a prioritized list of bridges for replacement within Custer County. The technical-qualitative evaluation started from the technical evaluation discussed above, and applied a more refined metric as follows:

- SDDOT BIG Score – Based on the preliminary rating of each of the bridges in Custer County, the relative score of each bridge was evaluated. As shown in Table 7, most of the highest scoring bridges pursuant to the BIG criteria also ranked high in terms of the overall technical evaluation.
- Condition Average – Superstructure, substructure and deck rating were combined into an average score to provide a weighted score of the most critical structural elements of each bridge.
- Fracture Critical – One structure was identified as fracture critical in the NBI database. It was determined that this fracture critical structure was more likely to experience potential failure.
- Rehabilitation Only – Structures that didn't have a superstructure, substructure, or deck rating less than 4 are not eligible for replacement through the BIG Program. Therefore, structures with score higher than 4 in these three areas were flagged. In some cases, this would serve to reduce their potential ranking.
- County System (Collectors) – A less significant factor than those previously discussed was if the bridge was located on either a county minor or major collector.

- County Priority – Five initial bridge structures had been identified by Custer County prior to the current bridge evaluation. This initial priority listing was a consideration of the evaluation process.

Table 7 provides an overall summary of the technical-qualitative ranking and current status of the bridges in Custer County along with a replacement cost estimate based on structure length and deck width.

Table 7 – Custer County Ranked Bridges and Current Status

Technical-Qualitative Rank	Bridge Number	County Priority	Rural Collector	Fracture Critical	ADT	B.I.G. Score	Condition Avg.	Estimated Repair/ Replace-ment Cost	Program Status
1	17535143	x		x	15	55.6	5.3	$650,000	2017
2	17268086	x			188	23.3	5.3	$300,000	
3	17379260		Rural Major Collector		108	12.9	5.7	$202,000	2020
4	17263069				30	26.0	6.0	$240,000	
5	17547020	x	Rural Major Collector		50	25.2	6.3	$208,000	2020
6	17528144				18	23.3	5.7	$195,000	
7	17425128		Rural Major Collector		40	12.0	6.0	$672,000	
8	17496252		Rural Major Collector		100	24.1	7.0	$3,150,000	
9	17431030	x			15	6.7	6.0	$50,000	2019
10	17226094				50	8.1	7.3	$510,000	
11	17540147	x			12	17.2	6.3	$231,200	2018
12	17207076				40	9.7	7.0	$195,000	
13	17201071				40	9.7	6.7	$195,000	

Based on the current Five-Year Bridge and Road Improvement Plan approved by the County Commission, a total of five bridges are identified for either replacement or significant preservation efforts for the years 2017-2021. This excludes the French Creek Structure (17-268-086) which has been programmed for 2017 with Federal funds. Given anticipated shortages in available BIG funds, it is anticipated that some of these bridges found in the County's Bridge and Road Improvement Plan will need to be improved later than desired.

In addition to the five structures currently pegged by Custer County for replacement or preservation over the next five years, the County has identified the need for $100,000 in annual small drainage structural repair.

Freight Issues and Needs

Trucking Industry Needs

As in many rural areas of the country, Custer County roads typically have lower design standards and often receive a disproportionate amount of impact from truck traffic on the system; either from state and federal highway system traffic diversion, first and last mile connectivity, or other heavy truck travel patterns. This makes it difficult for counties to continually maintain roadways, particularly for counties that are primarily gravel roads.

Trucking industry representatives have requested that roads be designed to carry heavy loads. The County has a year-round 6-ton load limit on all chip seal pavements, which now include Sidney Park Road and Playhouse Road. It is not anticipated that this will change. The County has also seen an increased need for maintenance on 7-11 road due to approximately 300 trucks per day accessing the gravel quarry. If uranium mining activity increases in the southwest quadrant of the County, additional roadway capacity may be needed, particularly along Dewey Road.

Trucking industry representatives also said that snow plowing and winter road maintenance can have an impact on their ability to haul. Safety on hills and dust abatement were also concerns raised by the trucking industry.

In August 2016, the Custer County Commission approved Resolution 2016-10 to encourage the USDOT Under Secretary for Policy to expand South Dakota's National Multimodal Freight Network (NMFN). This far-reaching policy is intended to improve the safety, security, efficiency, and resiliency of multimodal freight transportation.

Airport Needs

The Airport Layout Plan states that the mix of general aviation fixed wing aircraft and helicopter operations at the airport has created challenges in parking and operation of both types of these aircraft. There is a potential for damage to light general aviation aircraft from flying debris and downwash from the helicopter operations that are present at the airport.

Per the Airport Layout Plan, the runway's present width of 60 feet meets FAA standards for the design aircraft however the sponsor has requested to widen the runway to 75 feet, primarily to enhance safety of aircraft operations during crosswind conditions. This plan further recommends that a helipad be constructed to the south of the touchdown for runway 26. Other recommendations of the Airport Layout Plan will be incorporated as recommendations in this MTP by reference.

Rail Needs

There are no intermodal or rail Transload facilities in Custer County. The closest facility is the Midcontinent Transload and Freight Solutions operation just east of Box Elder, Pennington County. The facility has 120,000 square feet of warehouse capacity and can hold 120 railcars. Custer County has approximately 40 miles of trackage, but approximately 42 total highway-railroad crossings throughout the county. 9 of these are public, at-grade, and the remainder are private roads. If limestone mining near Dewey becomes active, a rail loading facility may

be needed. No other rail-related needs have been identified, other than ongoing maintenance of the at-grade crossings in Custer County.

Pedestrian and Bicycle Facility Issues

Custer State Park is in the preliminary planning stage of connecting the Mickelson Spur trail (the trail between Custer City and Stockade Lake) to Legion Lake and Game Lodge. No other County needs associated with connectivity or maintenance have been identified.

Transit Facility Issues

Prairie Hills Transit has a strong preference for paved roads as they limit wear and tear on their buses. Road maintenance and winter plowing are also important issues.

Subdivision Access Needs and Funding

Many of the subdivisions in the County have only one way in and one way out. This can be a problem for fire protection and other emergency responders. Potential new roadway extensions were identified at various locations throughout Custer County. These potential new roadway extensions are shown in **Figures 10, 11, 12, 13, and 14**. Ideally, these new roadway extensions will move forward over time as new plats are submitted for continued area growth.

Custer County Approach Construction Requirements state that, "Private access roads which exceed one thousand three hundred (1,300) feet in length should provide for intermediate turn-arounds in conformity with Custer County Road Specifications (12/28/06)". County ordinances and standards should include language that promotes or requires roadway connectivity.

Funding for road improvements is also a need for subdivisions. Many of them have incorporated and they keep their secondary road tax. The County gets no taxes from them for road improvements. Often, private landowners have no plan or regular schedule to upgrade their roads and they may not be motivated to bring their neighbors together when improvements are needed.

Many of the private and subdivision roads within the county are below standards and receive infrequent maintenance. Custer County does not have sufficient funding to address these needs, but does have a mechanism in place to provide grading and dust control when the subdivision provides 50% of the costs.

More information and a recommended strategy to address subdivision road dust and maintenance issues is provided later in the report.

Figure 10: Potential Road Connections West of Hermosa

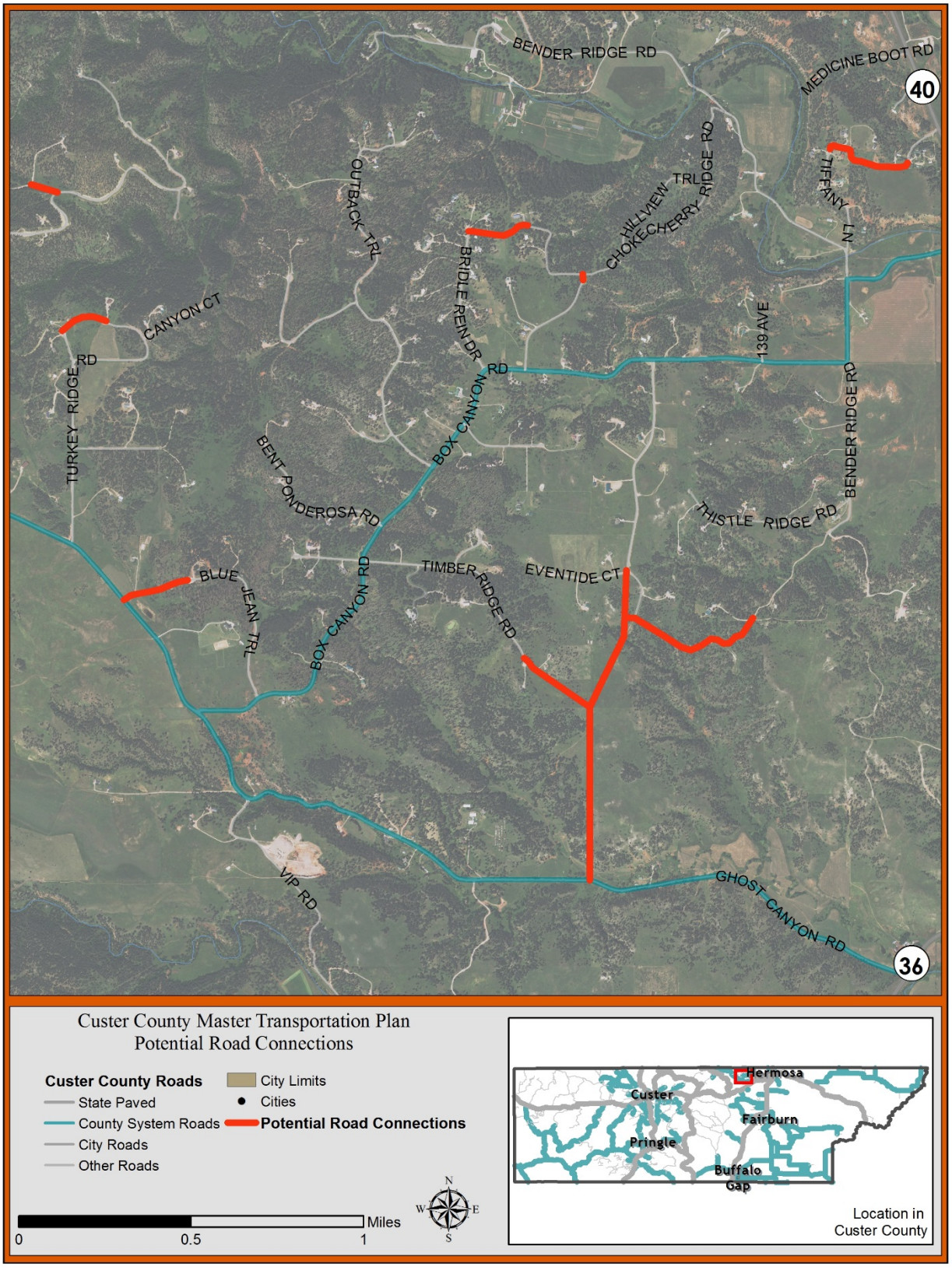


Figure 11: Potential Road Connections - West Missile Road

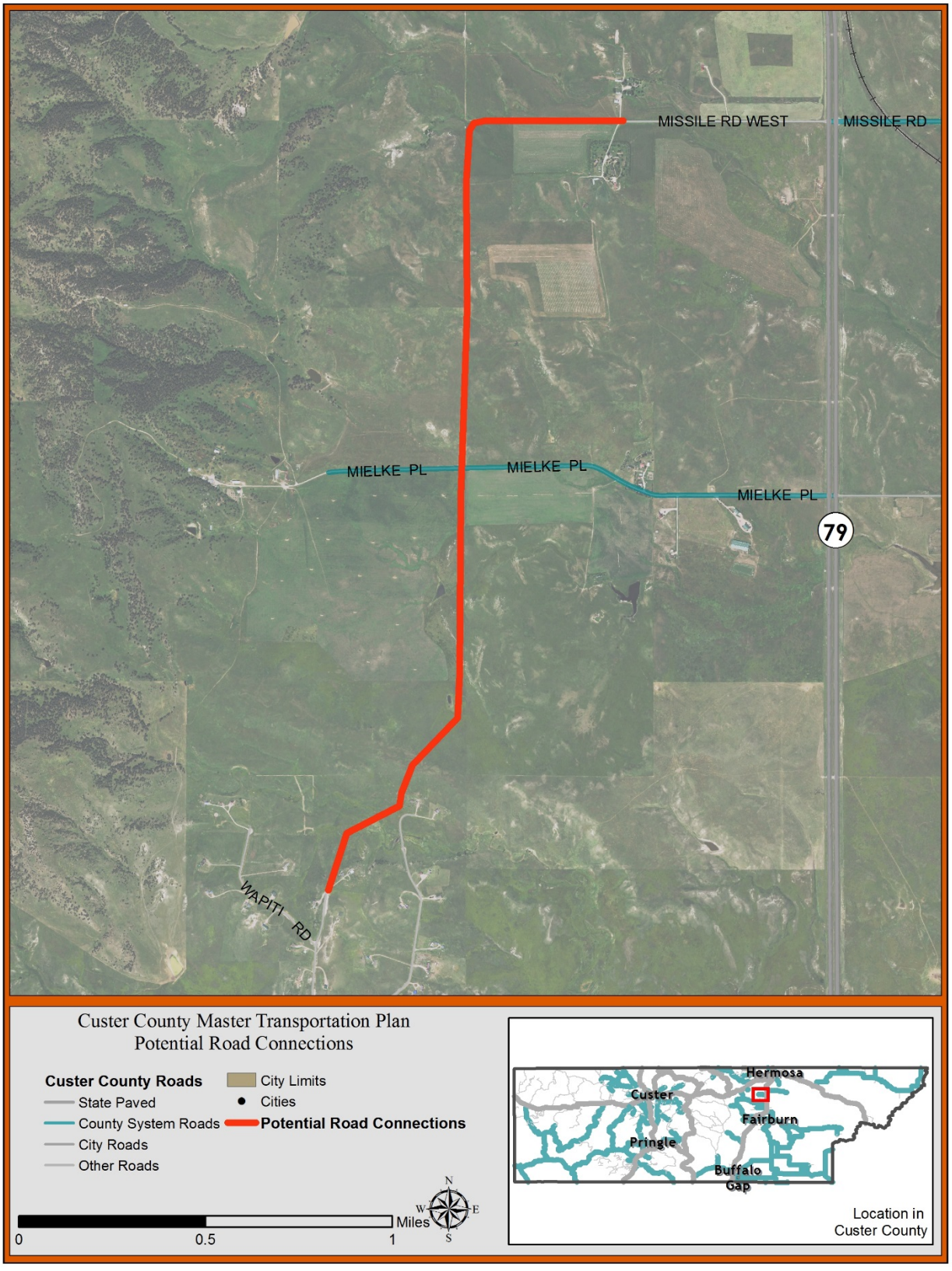


Figure 12: Potential Road Connection - Sidney Park Road

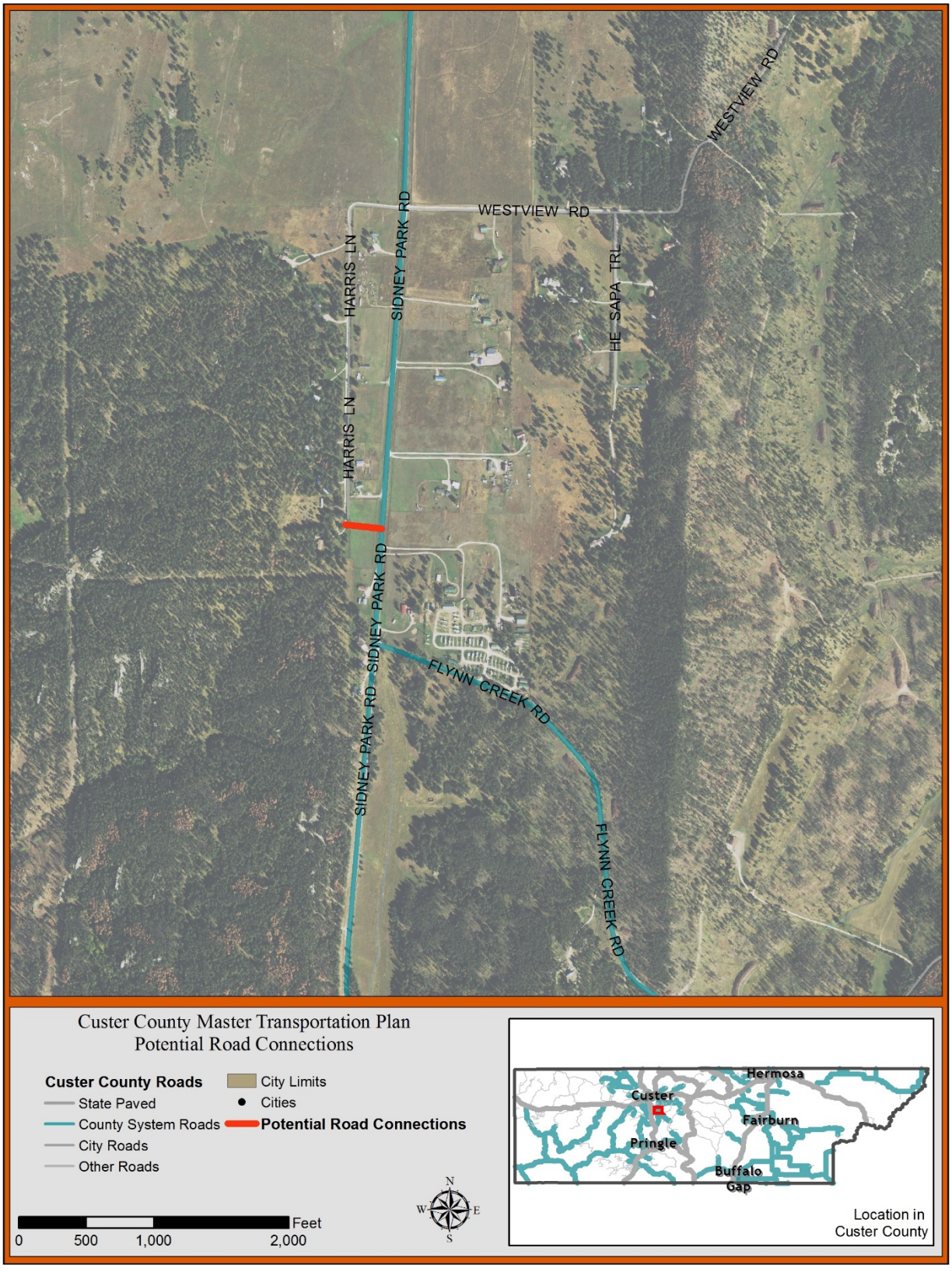


Figure 13: Potential Road Connections Southwest of Custer

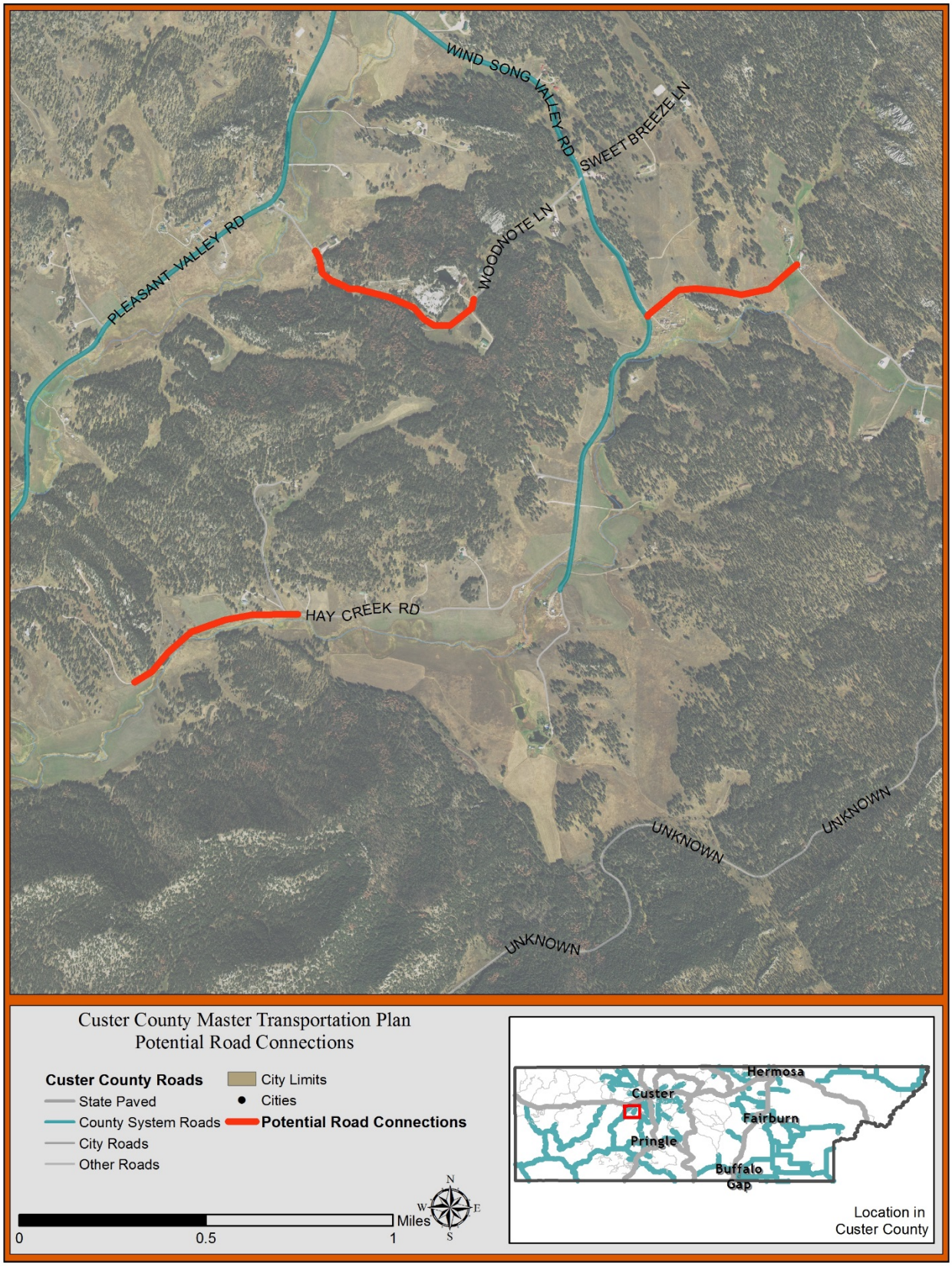
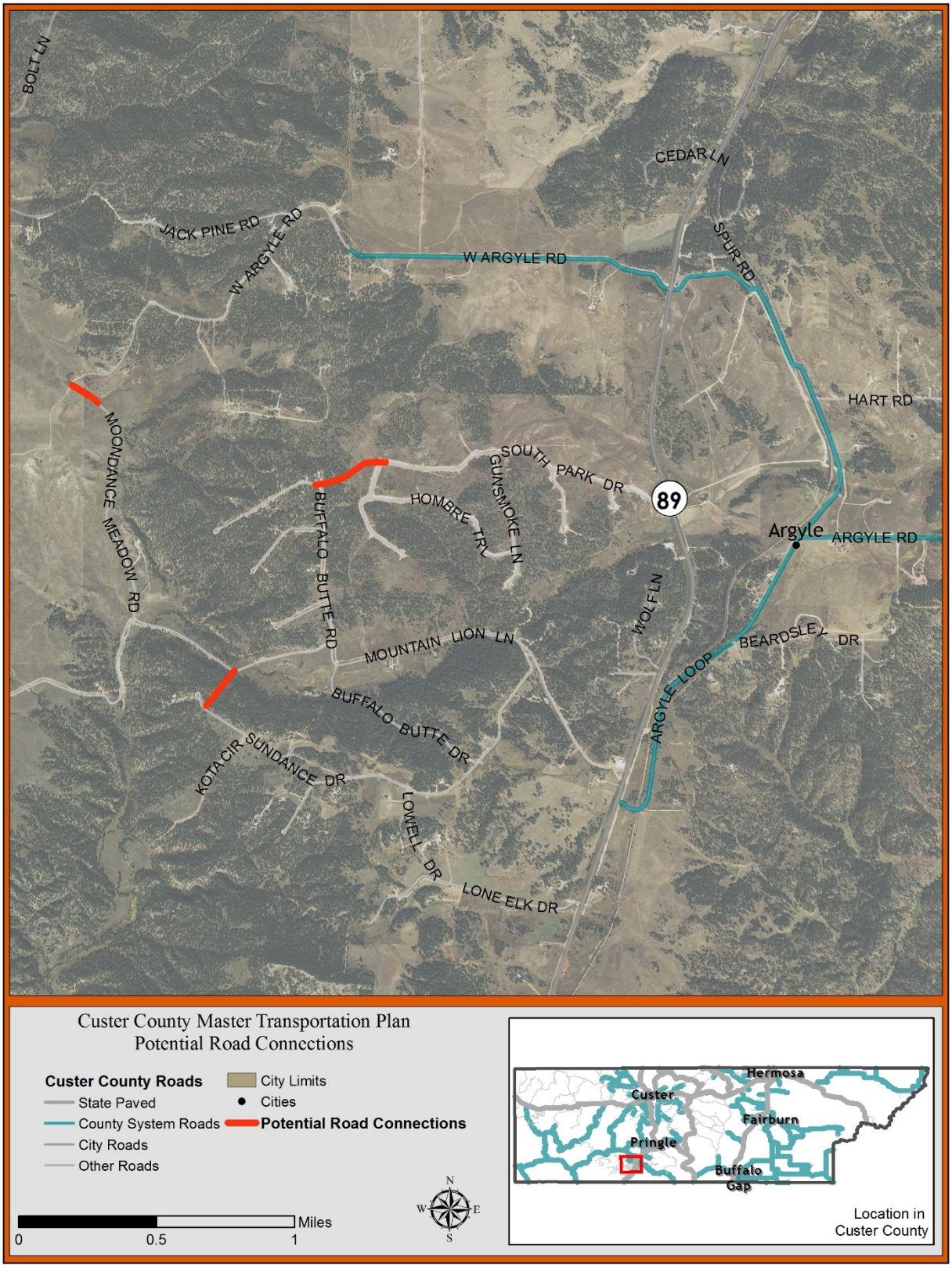


Figure 14: Potential Road Connections West of Argyle



Critical Issue Locations Analysis

At the onset of the study, Custer County identified priority corridors that were known to have needs requiring attention. Some of these corridors were also located in high traffic or high growth areas. These priority corridor locations are shown in **Figure 15**. Priority corridor locations, needs, safety analysis and improvement alternatives are discussed in the following paragraphs.

Box Canyon Road Corridor (County Road 41)

Box Canyon Road is a local road that is approximately 3.2 miles long. It serves numerous subdivision roads and supports a growing residential area within Custer County. See **Figure 16**. Steep inslopes and excessive grades were identified issues along the eastern half of the corridor. Public concerns have been raised regarding speeding and dust.

BOX CANYON ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 3 crashes reported along the corridor and no crash pattern has been established. See **Figure 17**. One of the crashes was a wild animal hit and the other two were single vehicle, rollover crashes. All the crashes occurred on dry road surfaces, after dark and none of them involved serious injury.

Given the relatively low frequency or severity of crashes along Box Canyon Road, it appears that the steep inslopes and excessive grades along the corridor, while undesirable, have not resulted in significant crashes.

The bigger issue, as pointed out by the public, appears to be dust. While some pointed to the effect that speeding and large truck activity has on dust, traffic control to reduce speeds is not expected to be effective, nor is it likely warranted. Similarly, signage that would prohibit use by trucks would not be an adequate measure to control dust.

With estimated Average Daily Traffic of 575 vehicles per day, Box Canyon Road is among the heaviest traveled gravel roads in Custer County. Therefore, it is reasonable to assume that the impact of dust on road surface conditions and on residential impacts are equally high.

BOX CANYON ROAD IMPROVEMENT ALTERNATIVES

Given the higher traffic activity along Box Canyon Road and that it serves several subdivisions, it may be appropriate to reclassify Box Canyon Road as a minor collector road. Resolution of the steep inslopes and excessive grades can be achieved if more right of way is dedicated to allow increased cuts at the hill top where large cuts have already been made, or increased fills at the bottom of inslopes. It is possible that other road connections can be made to promote use of other corridors, thereby reducing traffic levels along Box Canyon Road.

Potential dust mitigation measures include paving, or addition of a dust palliative applied at regular intervals. Road reconstruction and paving can cost upwards of $2 million/mile. Adding a dust palliative, either magnesium chloride or soybean oil appears to be a more financially feasible alternative.

Figure 15: Priority Corridor Locations

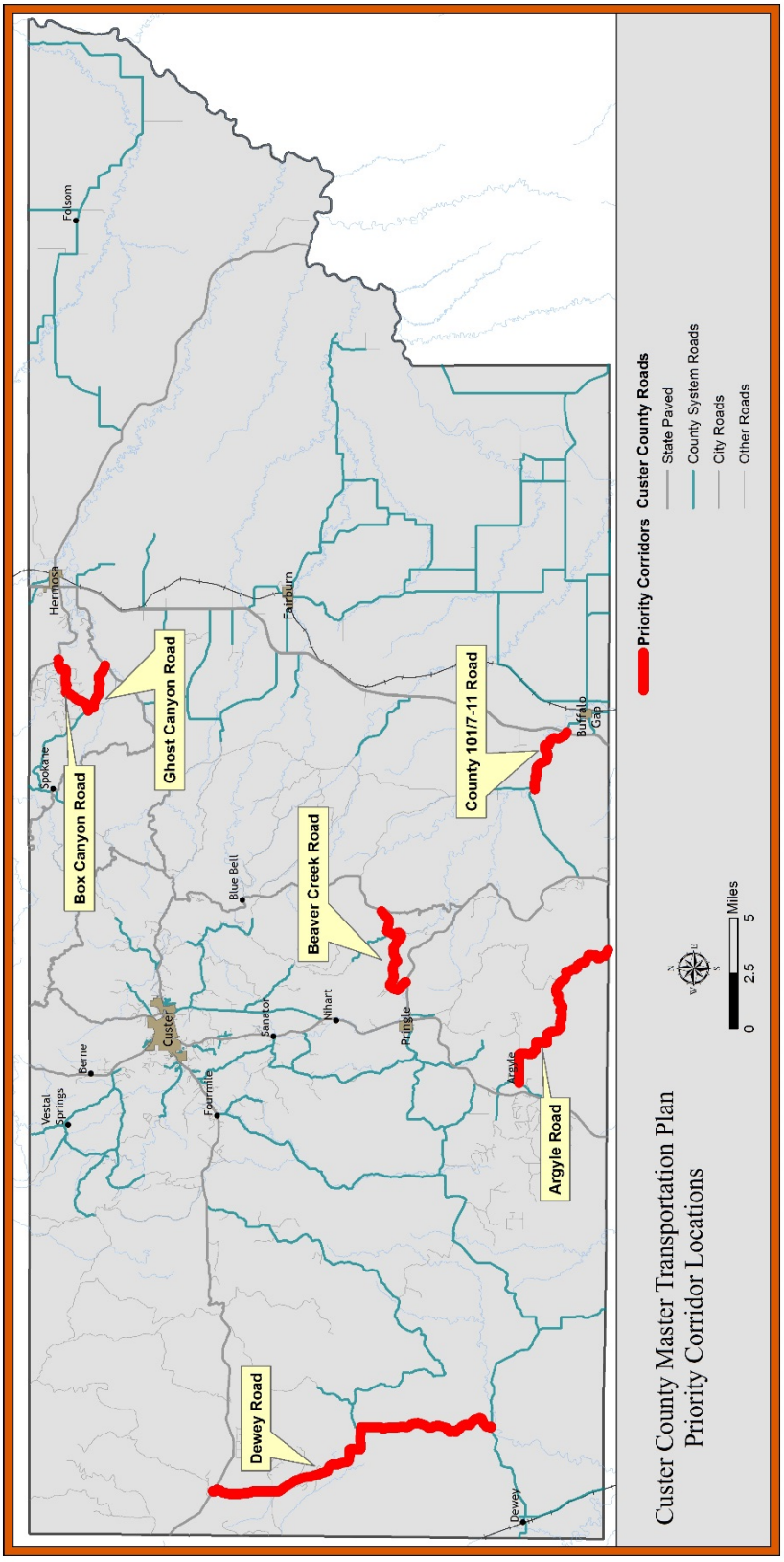


Figure 16: Box Canyon and Ghost Canyon Road Locations

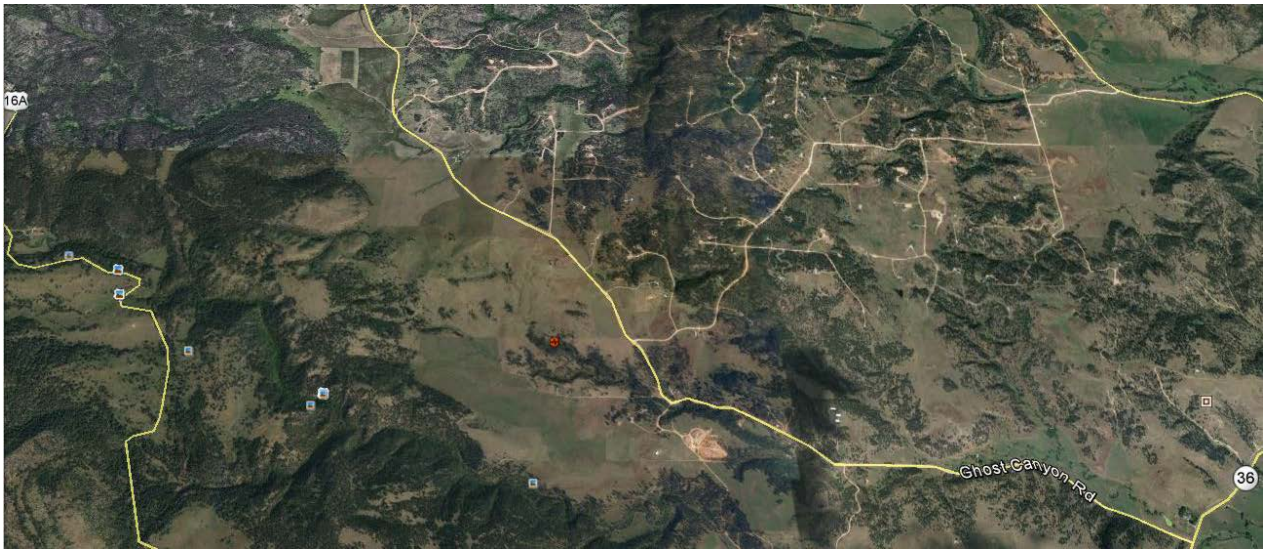
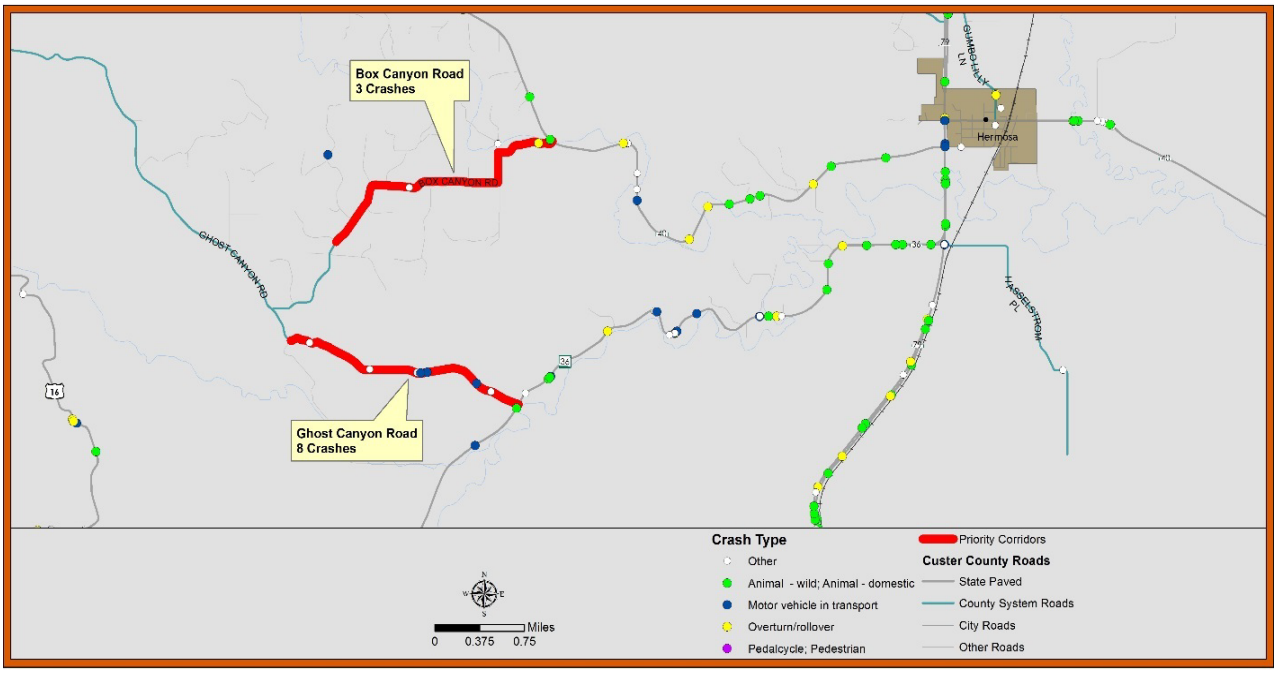


Figure 17: Box Canyon and Ghost Canyon Road Crashes



Ghost Canyon Road Corridor (County Road 360)

Ghost Canyon Road between Highway 36 and Box Canyon Road is a local road that is approximately 2.4 miles long. Unlike Box Canyon Road, Ghost Canyon Road has fewer adjacent residents and subdivision road connections and serves primarily as a corridor for through traffic (See **Figure 16**). Steep inslopes were identified at various locations along the corridor. Public concerns have been raised regarding speeding and dust.

GHOST CANYON ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 8 crashes reported along the corridor and no crash pattern has been established (See **Figure 17**). One of the crashes was a wild animal hit and three crashes included multiple vehicles, while none of the crashes were rollover crashes. Three of the crashes occurred on snow or ice-covered road surfaces, two occurred after dark and one crash (head-on) involved an incapacitating injury.

Given the relatively low frequency and absence of rollover crashes along Ghost Canyon Road, it appears that the steep inslopes along the corridor, while undesirable, have not resulted in significant crashes.

The bigger issue, as pointed out by the public, appears to be dust. While some pointed to the effect that speeding and large truck activity has on dust, traffic control to reduce speeds is not expected to be effective, nor is it likely warranted. Similarly, signage that would prohibit use by trucks would not be an adequate measure to control dust.

With an estimated Average Daily Traffic of 275 vehicles per day, Ghost Canyon Road has higher than the average traffic levels for gravel roads in Custer County. Therefore, it is reasonable to assume that the impact of dust on road surface conditions are also higher than the average for gravel roads within the County.

GHOST CANYON ROAD IMPROVEMENT ALTERNATIVES

Given the higher traffic activity along Ghost Canyon Road and that it serves several subdivisions and provides connectivity between State Highway 36 and North Playhouse Road, it may be appropriate to reclassify Box Canyon Road as a minor collector road. Resolution of the steep inslopes can only be achieved if more right of way is dedicated to flattening inslopes resulting in increased fills at the bottom of inslopes. This condition should be monitored by the County and addressed on a case by case basis.

Potential dust mitigation measures include paving, or addition of a dust palliative applied at regular intervals. Road reconstruction and paving can cost upwards of $2 million/mile. Adding a dust palliative, either magnesium chloride or soybean oil appears to be a more financially feasible alternative.

Beaver Creek Road Corridor (County Roads 391 and 336)

Beaver Creek Road is a local road between US Highway 385 and Highway 87 that is approximately 5.4 miles long (See **Figure 18**). With estimated Average Daily Traffic of 75 vehicles per day, Beaver Creek Road has similar traffic volumes to most other gravel roads in Custer County.

Numerous blind curves limit visibility, a soft spot and some erosion issues were also identified.

BEAVER CREEK ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 2 crashes reported (both in 2013) along the corridor (See **Figure 19**). No crash pattern has been established. Both crashes were run off the road crashes and neither resulted in a rollover. Both crashes occurred on curves, one was after dark and the other was affected by icy road surface conditions. No injuries occurred from either crash.

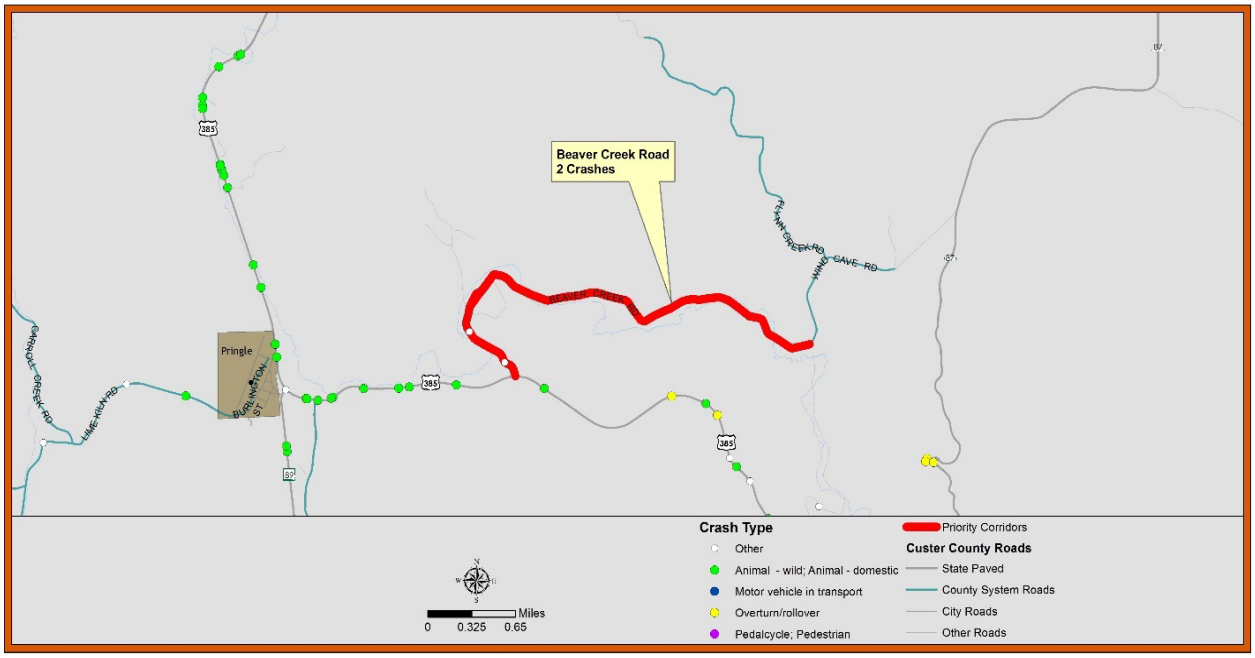
Given the relatively low frequency of crashes along Beaver Creek Road, it is not possible to draw any conclusions from the crash data.

BEAVER CREEK ROAD IMPROVEMENT ALTERNATIVES

The County actively started to address the blind curves last fall. More efforts are needed to remove trees that block sight distance and to flatten horizontal curves.

Figure 18: Beaver Creek Road Aerial

Figure 19: Beaver Creek Road Crashes



7-11 Road Corridor (County Road 101)

7-11 Road is a major collector road that provides an important connection between US Highway 385 and Highway 79 in Custer County (See **Figure 20**). With an estimated Average Daily Traffic of 400 vehicles per day, 7-11 Road has higher than the average traffic levels for gravel roads in Custer County. It is approximately 8.3 miles long, though the issue location segment between Red Valley Road (County Road 5) and Highway 79 is only 3.5 miles long.

A combination of steep inslopes and erosion issues have been identified along this corridor. There was a visibility issue identified on the east side of Highway 79 near Buffalo Gap.

7-11 ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 6 crashes reported along the corridor (See **Figure 21**). No crash pattern has been established. All the crashes were non-junction crashes and all occurred on curves. One of the crashes included multiple vehicles, two of three crashes that occurred on icy road conditions were rollover crashes. One of the crashes occurred after dark. Three crashes resulted in non-incapacitating injury or possible injury.

Given the relatively low frequency and limited rollover crashes along 7-11 Road, the steep inslopes along the corridor, while undesirable, have not resulted in significant crashes.

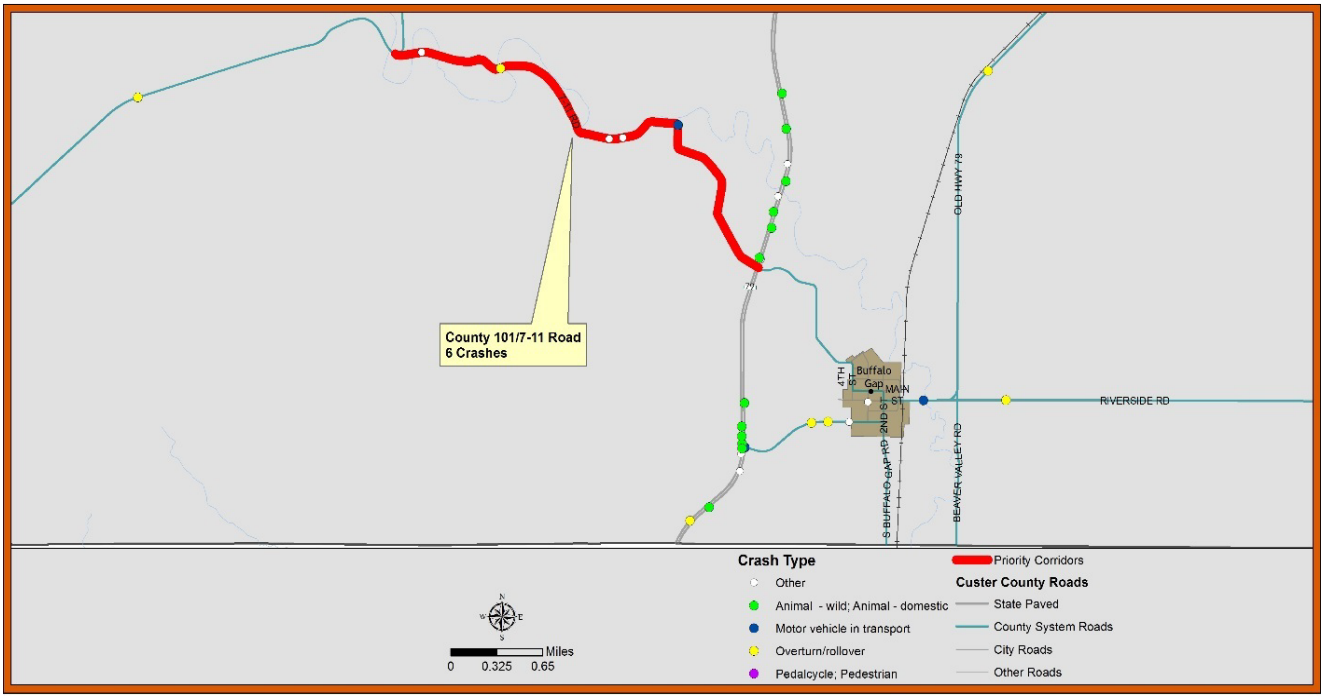
7-11 ROAD IMPROVEMENT ALTERNATIVES

Resolution of the steep inslopes can only be achieved if more right of way is dedicated to flattening inslopes resulting in increased fills at the bottom of inslopes. The need for heighted

maintenance to continue is predicated by the presence of significant truck traffic traveling to and from the gravel pits.

Figure 20: 7-11 Road Aerial

Figure 21: 7-11 Road Crashes



East Argyle Road Corridor (County Road 333)

Argyle Road is a minor collector road that is approximately 7 miles long. With estimated Average Daily Traffic of 125 vehicles per day, Argyle Road has similar traffic volumes to most other gravel roads in Custer County. It serves many single-family homes and provides a connection between State Highway 89 and US Highway 385 (See **Figure 22**). A variety of issues including visibility, curves needing reshaping, steep inslopes, poor drainage, and erosion have been identified along this corridor.

ARGYLE ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 6 crashes reported along the corridor (See **Figure 23**). Five of the six crashes were run-off-the-road crashes and three of those were rollover crashes. All the crashes were non-junction crashes and all occurred on curves. One of the crashes included multiple vehicles, and all crashes except for one were on dry road surfaces.

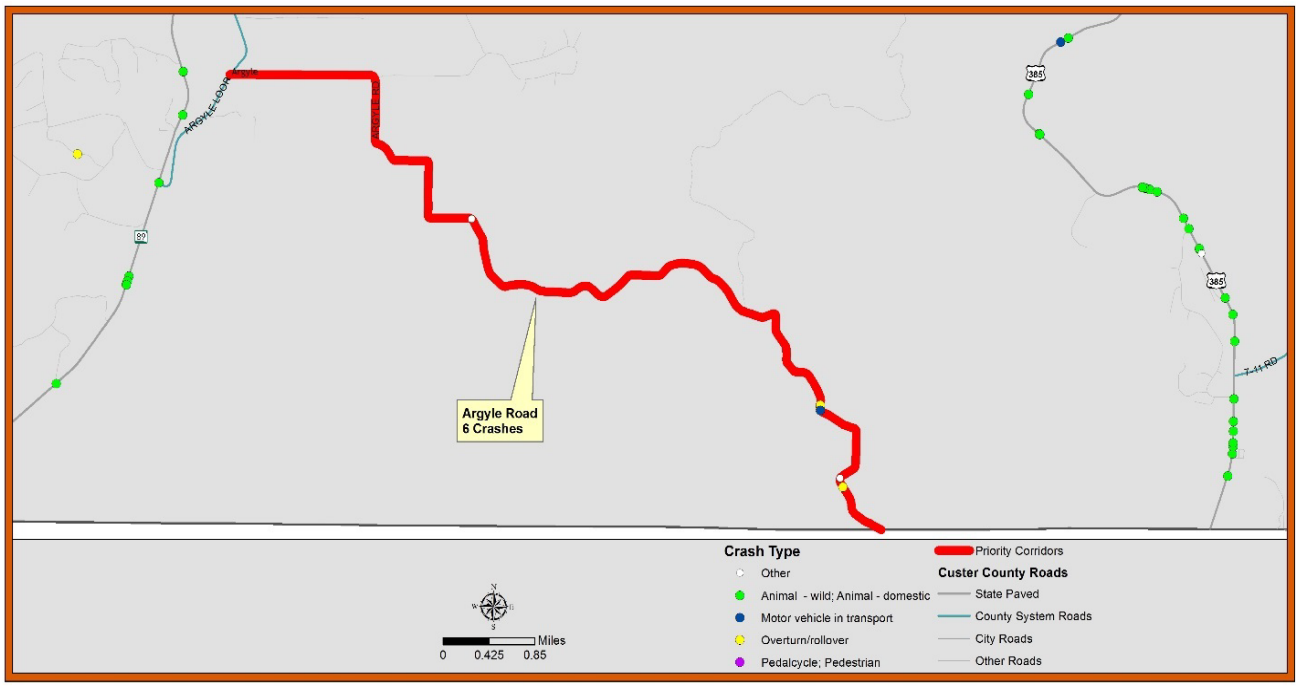
Given the pattern of run-off-the-road and rollover crashes along Argyle Road, the curves needing reshaping and steep inslopes along the corridor, as well as other identified road surface condition issues should be addressed.

ARGYLE ROAD IMPROVEMENT ALTERNATIVES

Resolution of the identified issues can only be achieved if more right of way is dedicated to improving roadway alignment and flattening inslopes. Road surface conditions can also be improved by graveling and reblading projects.

Figure 22: East Argyle Road Aerial

Figure 23: East Argyle Road Crashes



Dewey Road Corridor (County Road 769)

Dewey Road is a major collector road that lies north-south along the western side of Custer County (See **Figures 24 and 25**). The section of this corridor lying between US Highway 16 and Pilger Mountain Road needs substantial upgrading. Significant drainage, flooding, typical section, and pavement surfacing issues have been identified along this corridor. Though Dewey Road experiences low traffic (100 ADT or lower), its location in highly floodable areas could present a significant hazard should vehicles become trapped during flood events.

The occurrence of flooding also makes the roadway difficult to maintain. In some areas, the road section has not been fully defined, as the ditch capacities are insufficient to carry expected storm water flows.

DEWEY ROAD SAFETY ANALYSIS

A review of crash data indicates that for the period between January 2011 and January 2016 there were 2 crashes reported along the corridor (See **Figure 26**). No crash pattern has been established. Both crashes were non-junction crashes. One of the crashes involved a domestic animal and the other crash occurred on icy road conditions and was a rollover crash.

The relatively low frequency of crashes along Dewey Road may be due to the low traffic volumes and low speeds present on the corridor. As is stated above, roadway flooding could present a significant hazard should vehicles become trapped during flood events. Additionally, if traffic levels in the future were to increase, the existing road section does not meet current design standards and would have difficulty carrying heavier volumes of traffic.

DEWEY ROAD IMPROVEMENT ALTERNATIVES

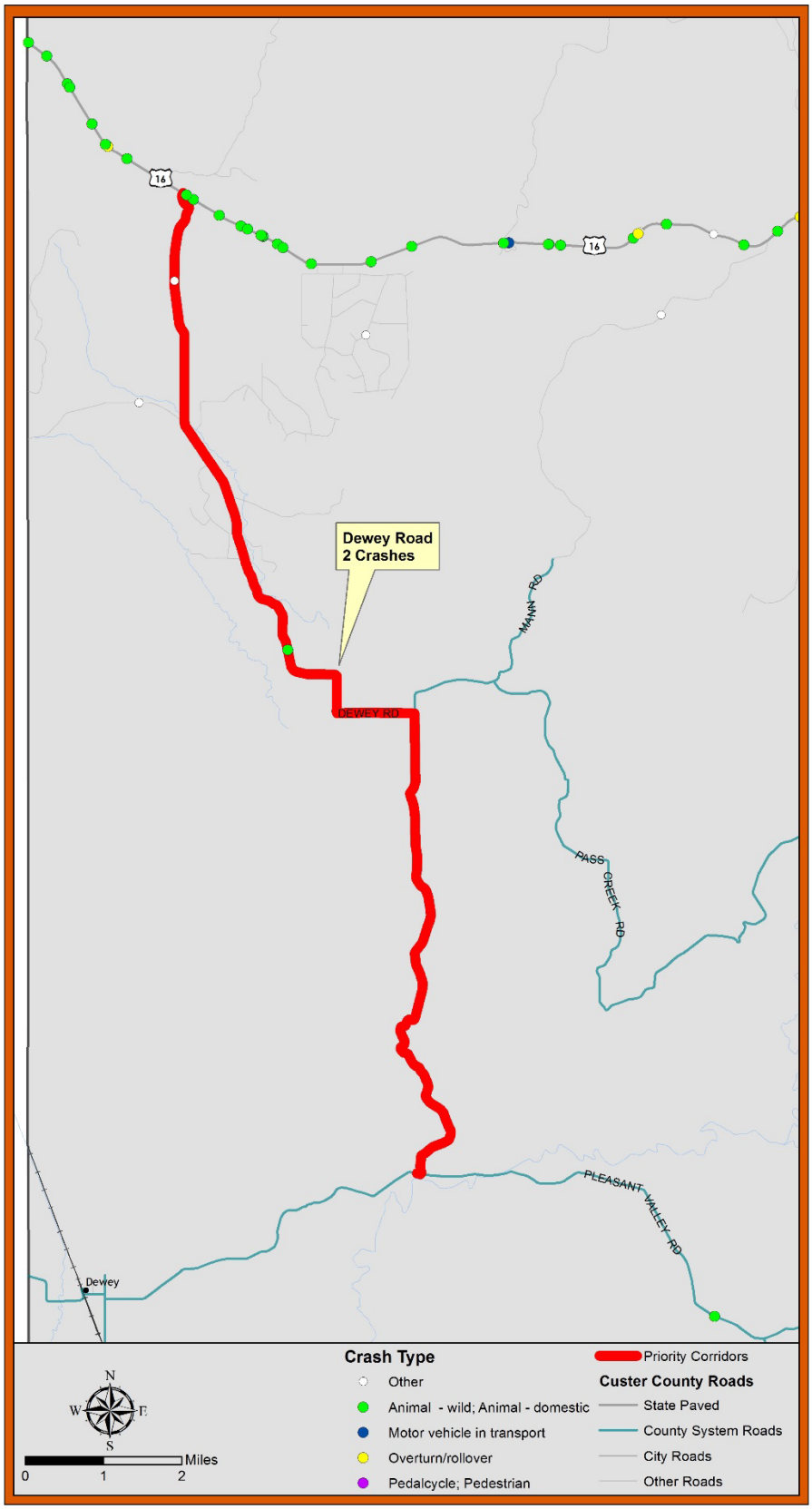
Significant improvements along Dewey Road would be required to bring the road up to current design standards. Additionally, development of a typical section with ditches, placement of gravel surfacing throughout the corridor, and provision of culverts and possibly a short bridge along the corridor may be merited if travel along the corridor increases. A type, size, and location study should be undertaken to examine the potential for a future bridge.

A phased approach to corridor improvements over time would make sense if travel increases and the road moves up on the list of County road improvement priorities. Correction of drainage deficiencies should be addressed in initial phases to reduce the impacts of flooding and to enable roadway maintenance activities to be successful.

Figure 24: Dewey Road Conditions

Figure 25: Dewey Road Aerial

Figure 26: Dewey Road Crashes



Gravel Road Maintenance Needs

Custer County currently maintains approximately 382 miles of gravel roads. The County currently follows a gravel road maintenance strategy that reacts to wherever the greatest needs exist. There are no load limits placed on gravel roads, though County staff said load limits could be placed if roads had soft spots or were showing damage to the surface.

It might be beneficial to consider a combination of responding to key corridor needs while maintaining a strategy that addresses the entire system on a rotational basis. For example, if the County were to place gravel on each of their gravel roads once every 10 years, this would equate to placing gravel on 38 miles of road every year.

DUST CONTROL AND STABILIZATION

According to the Custer County Road Specifications approved on 12/28/06, application of dust control measures, such as magnesium chloride, may be required to control dust along some corridors. Guidance from the Gravel Roads Maintenance and Design Manual dated November 2000, as well as information supplied by Environmental Dust Control (EDC), was used in the development of this section of the report.

There are multiple types of applications used for dust control and stabilization, though use of magnesium chloride or soybean oil are two more commonly used ones in Custer County. Application of magnesium chloride has been the sole method of dust control used by the Custer County Highway Department.

There have been some public complaints that magnesium chloride can have a detrimental impact on vehicles. Yet, from a cost standpoint, magnesium chloride at $5,200/mile per application appears to be favorable compared with soybean oil which has an estimated cost of $11,400/mile per application. There has been some discussion that soybean oil lasts longer and works better, thus making it more cost competitive.

In addition to reduced dusting, applications also control the loss of fines from the gravel surface. When the fines are lost, the stone and sand-sized particles that remain will tend to remain loose on the surface, leading to some deterioration like wash-boarding and reduced skid resistance. Roads that lose their fines become very hard to maintain and require fresh gravel with a higher percentage of fines to be hauled in. This becomes very expensive.

Use of dust control and stabilization techniques can also reduce the amount of gravel lost along the boulevard due to the passing of heavy traffic. Further, the manufacturers of many dust control and stabilization techniques recommend that the surface should not be bladed at all after the application of their products. Therefore, blade maintenance should be reduced.

Dust Control and Maintenance Strategies

The use of soybean oil as a dust palliative has provided good results in the town of Hermosa. However, soybean oil has not been tested on higher traffic/higher speed Custer County roads. Therefore, it may be best to test soybean oil on a roadway section before a decision is made regarding its practicality. Until then, continued use of magnesium chloride is recommended.

Currently, Custer County responds to requests for blading and dust control on an annual basis and requires those making the request to pay half the cost. There are a few roads in the

County that have significant subdivision traffic feeding onto them, resulting in the brunt of the blading maintenance and dust problem being borne by the adjacent landowners.

Examples of this condition exist along Box Canyon Road and portions of Ghost Canyon Road, though, most gravel roads will exhibit dusty conditions at times unless a dust palliative is applied. A strategy to address this on a more consistent basis would be to form a district that includes all the roads feeding the main road and to spread the costs of dust control to all the subdivisions that use the road. At the June 13, 2017 public meeting, the public generally expressed support for this strategy, though they felt it would be difficult to implement unless the County lead the effort. The district could be set up to apply dust palliative annually. This strategy would follow the County's current cost participation policy, improve safety, and spread the cost of annual road maintenance amongst more users of the road facility.

Custer County spent $65,000 on magnesium chloride applications in 2016. This amount has been increasing annually. At an estimated cost of $400/mile, proposed strategies would increase the budget needed for dust control considerably if they are implemented.

Paved Roads Maintenance Needs

While there are about 14 miles of paved roads maintained by Custer County, some of these roads have pavements in moderate to poor condition. Moderate to poor condition pavements were observed along the paved sections of Sidney Park Road, Missile Road, Mineral Drive, and segments of County Roads 345, 359 (Playhouse Road), and 753.

Pavement maintenance needs were based on an evaluation of existing pavement conditions in Custer County as of the fall of 2016. Baseline assumptions for an ongoing maintenance and construction program for Custer County roadways were developed through an analysis of the approved 2017-2021 Five Year Bridge and Road Improvement Plan for Custer County.

Custer County has programmed in the 2017-2021 chip seal and fog projects along 2 of the corridors identified as having substandard pavement conditions. These projects include Sidney Park Road and 359 (Playhouse Road). The other pavement segments exist along Missile Road, Mineral Drive, and segments of County Roads 345 and 753. These roadways may warrant consideration for being turned back to gravel once pavement conditions deteriorate further.

Design Standards and Maintenance Hierarchy

Custer County has standards for low, medium, and high-volume roads, as well as private roads within the County. These standards require minimum driving surfaces of 18, 20 and 24 feet respectively. While the MTP was under development, an update to these standards was under review. New county road standards for residential local roads, subdivision collector roads, and collector roads call for minimum driving surfaces of 20, 24, and 24 feet respectively. Typical sections for County roads are shown in **Figure 27**.

There are about a dozen roads in Custer County that do not meet current cross section standards. Custer County intends to bring these roads up to standards over time as part of their general maintenance program. These substandard roads are shown in **Figure 28**.

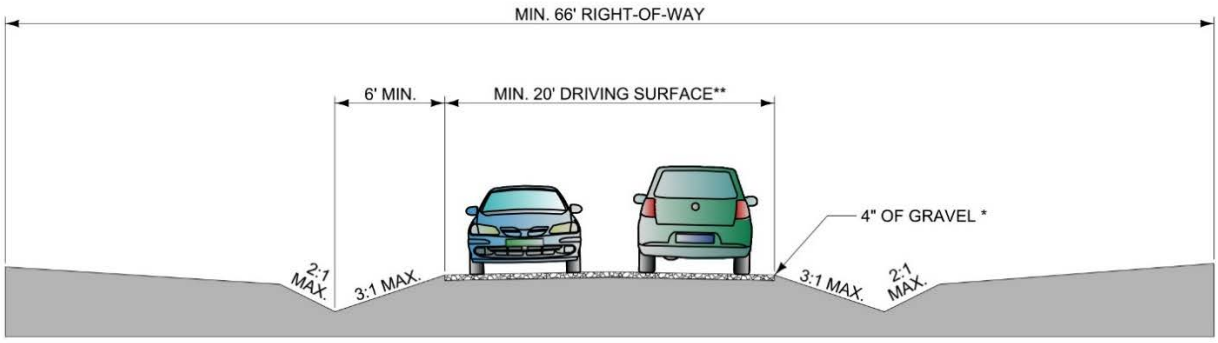
Additional clarity should be considered to address maintenance requirements of unique conditions. For example, traffic volumes on County roads that carry higher traffic volumes may require more extensive maintenance than typical low volume County roads.

Consideration will be given to using the functional classification system or some other hierarchy for application of road standards.

Custer County does not have a design standard that discourages long cul-de-sacs or that requires subdivisions to provide easements for future extensions to secondary accesses. These standards would be very beneficial in limiting the occurrence of single access subdivisions.

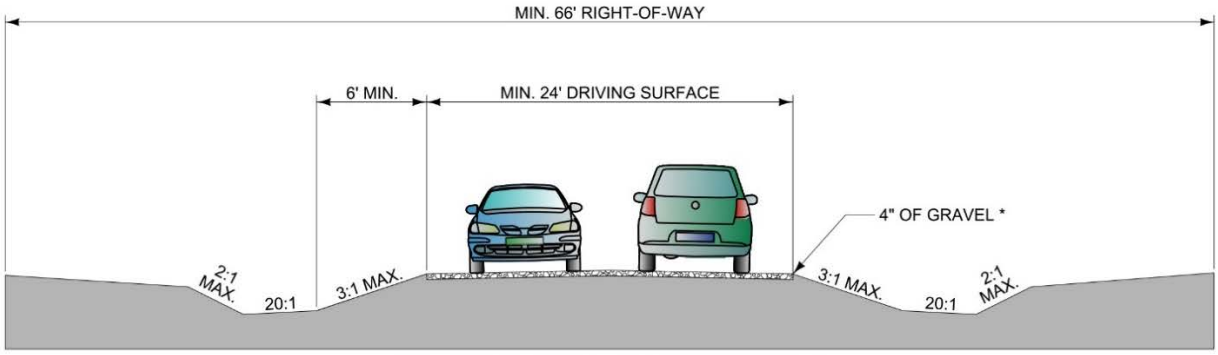
Figure 27: Custer County Typical Sections

RESIDENTIAL LOCAL ROADS



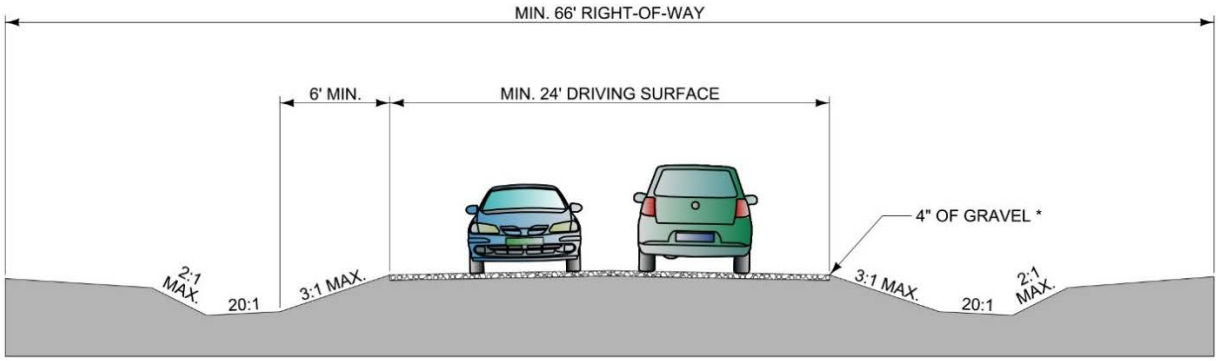
* IF APPLICABLE, ASPHALT SURFACING MAY BE USED
** PRIVATE ACESS ROADS AND DRIVEWAYS - USE MIN. 12' DRIVING SURFACE

SUBDIVISION COLLECTOR ROADS



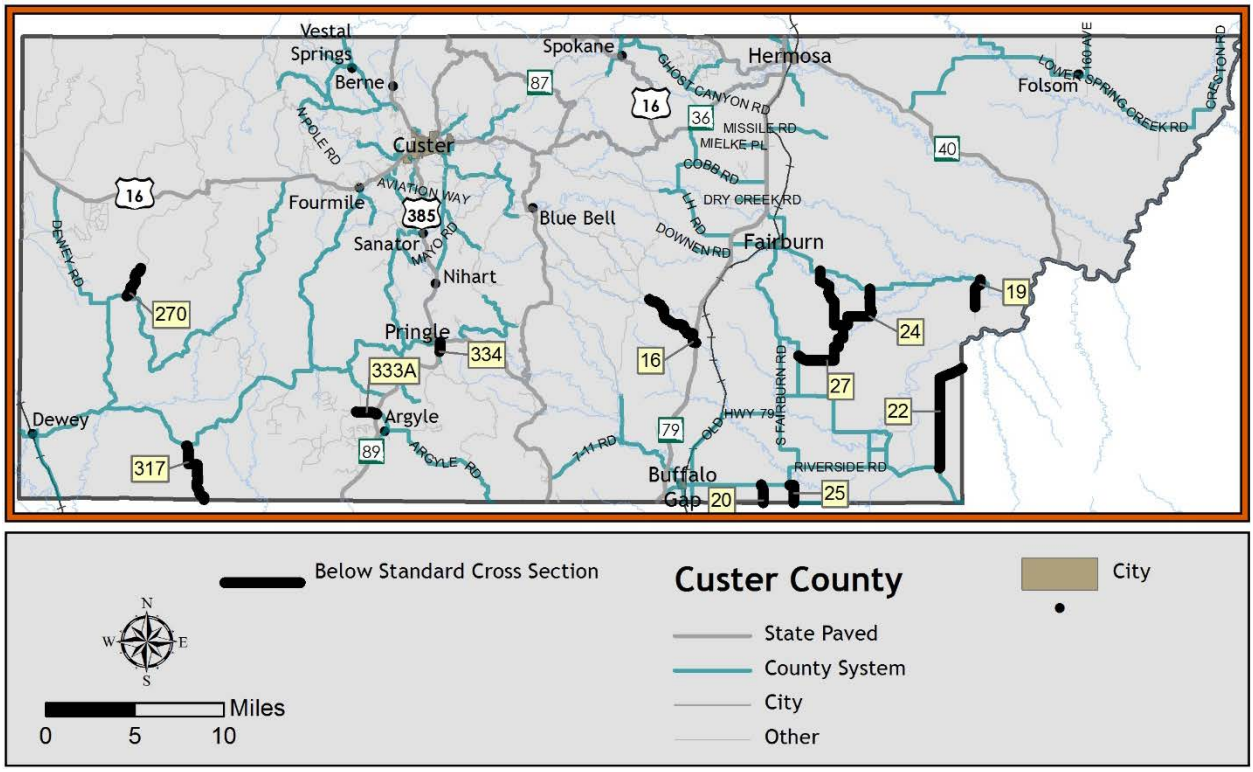
* IF APPLICABLE, ASPHALT SURFACING MAY BE USED

COLLECTOR ROADS



* IF APPLICABLE, ASPHALT SURFACING MAY BE USED

Figure 28: County Roads with Substandard Cross Sections



Conversion of Gravel to Asphalt

As traffic volumes on high volume County roads increase, the County may determine that the road should be paved. The Gravel Roads Maintenance and Design Manual published by South Dakota Local Transportation Assistance Program (SD LTAP) in November 2000 (see Excerpt in Appendix V) provides significant guidance to assist in decisions whether to pave a gravel road. The Manual suggests that serious consideration should be given to some kind of paving when traffic volumes reach 400-500 vehicles per day. In Custer County, the following gravel roads currently fall within or above this traffic range:

- Box Canyon Road (575 vehicles/day)
- Hazelrodt Cutoff (550 vehicles/day)
- North end of Pleasant Valley Road (550 vehicles/day)
- South end of Upper French Creek Road (450 vehicles/day)
- East end of 7-11 Road (400 vehicles per day)

It is anticipated that traffic on these roads will continue to increase over time. Yet traffic is not the only factor in determining whether it is desirable to pave a gravel road. There are substantial costs associated with road preparation, paving and ongoing maintenance. Additionally, Custer County does not have the equipment to maintain asphalt roads themselves.

There are other factors that impact the ability to pave a road. Many of the roads under consideration would need to be widened to meet standards and to facilitate the higher speeds prevalent on paved roads. In the case of Box Canyon road, limitations on right of way would

make this especially difficult. There is also concern that steep inclines such as those present on Box Canyon road could be hazardous to travel under icy conditions.

On a statewide level, many counties have turned paved roads back to gravel due to insufficient funding available to maintain their paved roads. Custer County has similar expectations, as has been discussed for Missile Road. Until significant additional funding comes available, it may be prudent for Custer County to take a similar position and use their limited resources to maintain their existing paved and gravel road system.

Financial Assessment

System Revenue Summary

As part of preparing the Needs Assessment for Custer County MTP, a preliminary assessment of existing and projected revenues to support transportation improvements was developed. The preliminary assessment is based on the *Five-Year Bridge and Road Improvement Plan* (2017-2021) adopted by the County Commission in October of 2016.

Table 8 demonstrates the base year assumptions for revenues collected or anticipated for Custer County.

Table 8 – Revenue Assumptions (Base Year)

Revenue Source	Base Year
Local Funds	
General Funds	$612,683
Motor Vehicle License	$755,107
Wheel Tax	$134,031
State Funds	
BIG	$60,000
Small Bridge Grant	$0
STP Exchange Funds	$185,400
Federal Funds	
None Anticipated	$0
TOTAL	**$1,747,221**

The revenue sources anticipated are lumped in three general categories, Local, State and Federal. A general description of each funding category is defined below.

Local Funds – Local funds include general funds provided by the County Commission to support the County Highway Department. Local funds also include Motor Vehicle Licensing fees collected by Custer County. Additionally, local funds also include the wheel tax levied by the county. Assumptions for local revenue are based on the 2016/2017 general ledger financial data and the Five-Year Bridge and Road Improvement Program developed by Custer County.

State Funds – State funds include Bridge Improvement Grant (BIG) program developed by SDDOT. Custer County annually applies for BIG funding and has

historically received an awarded project once every two or three years. State funds also include the STP exchange between SDDOT and cities and counties in South Dakota.

Federal Funds – Currently no assumption is being made for future federal funds to support projects in Custer County. This assumption will be reviewed with the SAT before finalizing.

Revenues were projected in three bands: Short Range – 2018-2022; Mid-Range – 2023-2027; and Long Range 2028 – 2037. Based on straight line projections of anticipated overall funding for the Custer County MTP, **Table 9** demonstrates the assumption of revenues to support the Custer County Highway Department. These assumptions are based on a 1.5 % inflation factor, and don't yet assume that some of these revenues may not be available for specific roadway and bridge projects. **Table 9** bands projected into short, mid, and long-range time frames.

Table 9 –Revenue Assumptions – MTP Planning Horizon

Revenue	2018-2022	2023-2027	2028-2037
General Fund	$3,204,057	$3,451,679	$7,724,254
Motor Vehicle License	$3,948,871	$4,254,055	$9,519,830
Wheel Tax	$700,922	$755,092	$1,689,764
BIG Program	$300,000	$300,000	$600,000
STP Exchange Funds	$969,559	$1,044,490	$2,337,386
Subtotal	**$9,123,408**	**$9,805,316**	**$21,871,233**

These revenues support specific transportation improvements in the form of roadway and bridge maintenance and construction projects and are also used to support the day to day and administrative functions of the Custer County Highway Department. Therefore, the total of these funds is not exclusively available to support specific new construction transportation projects identified herein or in later stages of the Custer County MTP.

Investment Strategies & Recommendations

Some critical roadway needs have also been identified in addition to project needs already listed in the Five-Year Road and Bridge Improvement Plan prepared by the County. These additional existing needs address road safety and include blind corner and visibility issues. They were included in the short-range element of the MTP.

Gravel Road Investment Strategy

As was discussed earlier in the report, it may be beneficial for Custer County to implement a program to place gravel on all their gravel roads over time. If a rotational program were implemented, this would assure that all gravel roadways throughout the County would have funds allocated toward their maintenance.

Pavement Investment Strategy

Custer County has only 14 miles of paved roads. Of these, they have a program to fog and seal and restripe Sidney Park and Playhouse roads every four years. Custer County also maintains

load limits on these roads year-round to keep them in good condition. If these practices are continued, these roads should stay in good condition well into the future.

Other paved roads are being considered for being turned back to gravel. These plans allow the County to maintain their paved road system using existing and anticipated funding. Addition of more paved roads is not currently anticipated. If more roads within the County are paved in the future, additional funding for paved road construction and maintenance will be required.

Bridge Investment Strategy

The Custer County bridge system is in generally good condition, as was discussed earlier in the report. Custer County intends to continue applications for BIG funds that should allow the County to address current and future bridge deficiencies.

Short and Long Range Project Recommendations

These proposed projects are based on the completed analysis, as well as input from the SAT and the public. Proposed short range projects are listed in **Table 10**. Short range projects are those that have identified funding and are anticipated to be completed by the end of the year 2021. The highest priority projects for Custer County are already programmed in their Five-Year Bridge and Road Improvement Plan. Project number 11 adds a category for dust control, which is already being done by Custer County.

Projects 12-21 include needed projects to address blind curve or visibility issues identified during the road survey, as well as improvements to County shop and salt shed facilities. It is anticipated that blind curve or visibility projects will be completed from the County wide aggregate grading and re-surfacing budget.

Table 10 – Custer County Short Range Projects

Project Number	Short Range Project	Estimated Construction Year	Estimated Construction Cost
1	Sidney Park Road Chip Seal/Fog - June	2017	$144,000
2	Playhouse Road Chip Seal/Fog - June	2017	$115,000
3	Sidney Park Road Pavement Marking - June	2017	$8,000
4	Bridge 17-268-086 Replacement - June	2017	$500,000
5	County Wide Grading and Re-Surfacing	Annual	$500,000
6	County Wide Small Structure Replacement	Annual	$100,000
7	Bridge 17-535-143 Replacement	2018	$650,000
8	Sidney Park Road Chip Seal/Fog	2021	$170,000
9	Playhouse Road Chip Seal/Fog	2021	$136,000
10	Sidney Park Road Pavement Marking	2021	$9,000
11	County Dust Control Program	Annual	$70,000
12	Beaver Creek Road Tree Removal/Cross Section Improvements*	2017 - 2018	<$10,000
13	East end of County Road 18 (East French Creek Rd)*	2017-2018	<$10,000
14	North end of County Road 19 (Bison Lane)*	2018	<$10,000
15	East end of County Road 21 (Cottonwood Cutoff)*	2017-2019	<$10,000
16	County Road 101 east of Highway 79*	2017	<$10,000
17	Curve Reshaping and Added Aggregate Along Argyle Road	2018-2019	<$10,000
18	Curve Reshaping Along Squaw Creek Road	2020-2021	<$10,000
19	Expansion of County Highway Department Shop Facilities	2017-2021	Unknown
20	Addition of a New Salt Shed by Hermosa	2017-2021	Unknown
21	Hazelrodt Cutoff/Lower French Creek Rd int (skew)*	2021	<$10,000

* Project to address identified blind curve or visibility issue

Proposed long range projects are listed in **Table 11**. Long range projects are those anticipated to be completed after the year 2021. While many of these projects are desired sooner, funding limitations indicate that it may not be possible to complete them during the short-range element of the plan. Some of these projects may become short range projects if additional funding becomes available or if County priorities change.

Table 11 – Custer County Long Range Projects

Project Number	Long Range Project	Estimated Construction Cost
22	Repair Bridge 17-150-147 over French Creek (11 miles E & 25 miles S of Fairburn)	$231,199
23	Repair Bridge 17-431-030 over Spring Creek (1 mile S of Hermosa)	$50,000
24	Repair Bridge 17-547-020 over Spring Creek (12 miles E of Hermosa)	$207,265
25	Repair Bridge 17-379-260 (0.4 miles E of Buffalo Gap)	$201,830
26	Annual County Wide Grading and Re-Surfacing	$600,000
27	Annual County Wide Small Structure Replacement	$120,000
28	Annual County Dust Control Program	$100,000
29	Sidney Park Road Chip Seal/Fog (every 4 years starting in 2025)	$200,000
30	Playhouse Road Chip Seal/Fog (every 4 years starting in 2025)	$165,000
31	Sidney Park Road Pavement Marking (every 4 years starting in 2025)	$11,000
32	Box Creek Road - Reduce Excessive Grades	Unknown
33	Annual County Wide Address Steep Inslopes/Install Guard Rail	Unknown
34	Dewey Road Cross Section Improvements (Phased over time)	Unknown
35	New Bridge along Dewey Road	Unknown
36	7-11 Road - Ongoing Maintenance in Response to Heavy Truck Traffic	Unknown
37	Ghost Canyon Road - Address Steep Inslopes	Unknown
38	New Roads to Improve Connectivity	Unknown

Appendix I
PUBLIC INVOLVEMENT

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
CUSTER COUNTY

Notice of
Public Open House & Informational Meetings

Custer County Master Transportation Plan

Meeting 1: October 18th, 2016
5:30 to 7:00 PM
Custer County Courthouse — Commission Room
420 Mount Rushmore Road, Custer, SD

Meeting 2: October 19th, 2016
5:30 to 7:00 PM
Hermosa Elementary School — Gymnasium
11 4th Street, Hermosa, SD

The South Dakota Department of Transportation (SDDOT) in conjunction with Custer County will hold public open house and informational meetings to discuss and receive public comment on the Custer County Master Transportation Plan (MTP). The Custer County MTP development process was initiated in August 2016. The MTP will address a full range of transportation options and issues, most specifically related to gravel pavement management and road safety. The purpose of this public meeting is to gather comments on issues that should be addressed by the Custer County MTP.

Custer County is preparing the MTP with funding from SDDOT. The Custer County MTP is a long range (20 year) plan for addressing current and projected needs for county highway and bridge infrastructure within Custer County.

The public open house and informational meetings will run from 5:30 to 7:00 pm. Staff from Custer County, SDDOT and their consultant will be available to discuss the initial efforts toward developing the Custer County MTP.

All persons interested in commenting on Custer County transportation issues are invited to attend this meeting to share your views and concerns. Public and written comments will be taken as part of the public input meeting specific to the Custer County MTP. Written comments should be sent to the attention of KLJ, Attn: Custer County MTP, 2969 Airport Road, Suite 1B, Helena, MT, 59601. Written public comment will be accepted on the Custer County MTP through November 2nd, 2016.

For more information regarding the Custer County MTP contact KLJ Project Manager, Steve Grabill at (406) 441-5783 or Steve.Grabill@kljeng.com. Information about the Custer County MTP is available online at http://www.sddot.com/transportation/highways/planning/specialstudies/CusterCo/Default.aspx.

Notice is hereby given to individuals with disabilities that this open house meeting is being held in a physically accessible place. Please notify the SDDOT ADA Coordinator at least two business days prior to the open house meeting if you have special needs for which this agency will need to make arrangements.

The telephone number for making special arrangements is 605-773-3540 or 1-800-877-1113 (Telecommunication Device for the Deaf).

Notice published twice at the total approximate cost of $315.00

Affidavit of Publication

State of South Dakota)
)ss.
County of Custer)

Charles W. Najacht of said county, being duly sworn, on oath says that he is publisher of the Custer County Chronicle, a weekly newspaper printed and published in Custer City, said County of Custer and has full and personal knowledge of all the facts herein stated; that said newspaper is a legal newspaper and has a bona-fide circulation of at least two hundred copies weekly, and has been published within said County for fifty-two successive weeks next prior to the publication of the notice herein, mentioned, and was and is printed wholly or in part in an office maintained at said place of publication: that the

KLJ Engineering
SD Dept of Transportation
Open House & Informational Meeting

a printed copy of which, taken from the paper in which the same was published, is attached to this sheet, and is made a part of this Affidavit, was published in said newspaper at least once each week for two successive week(s), on which said newspaper was regularly published, to wit:

Sept 28, 2016; _____, _____;
Oct 12, 2016; _____, _____;
_____, _____; _____, _____;
_____, _____; _____, _____;
_____, _____; _____, _____;

the full amount of the fees for the publication of the annexed notice is $ 315.00.

Charles W. Najacht

Subscribed and sworn to me before this 12th
of October, 2016;

Norma Najacht
NOTARY PUBLIC
MY COMMISSION EXPIRES: May 5, 2018

NORMA NAJACHT
NOTARY PUBLIC
SOUTH DAKOTA
SEAL SEAL

SOUTH DAKOTA DEPARTMI
CUSTER

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Public Open House & I

Custer County Maste

Meeting 1: Octo
5:30 to
Custer County Courthou
420 Mount Rushmo

Meeting 2: Octo
5:30 to
Hermosa Elementary S
11 4th Street,

The South Dakota Department of Trans
Custer County will hold public open
discuss and receive public comment on t
Plan (MTP). The Custer County MTP
August 2016. The MTP will address a
issues, most specifically related to gr
safety. The purpose of this public meeti
should be addressed by the Custer Co

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County MTP is a long range (20 year) p
needs for county highway and bridge i

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All persons interested in commenting
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KLJ, Attn: Custer County MTP, 2969 Air
Written public comment will be accept
November 2nd, 2016.

For more information regarding the C
Manager, Steve Grabill at (406) 441-5

Notice is hereby given to individuals with
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Coordinator at least two business days
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The telephone number for making s
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Notice published twice at the total app

Record of Meeting
Custer County Master Transportation Plan (MTP)
Public Input Meeting (PIM) #1A
October 18, 2016
5:30pm - 7:00pm
Custer County Commission Meeting Room

1. Meeting Attendees

There were 11 people in attendance at the meeting. A copy of the meeting sign-in sheet is attached.

2. Welcome & Introductions

Those in attendance were greeted and introductions were made.

3. Review Project Displays

Mr. Grabill reviewed and summarized the seven boards that were displayed. The boards covered the study area, functional classifications, crash severity data, key issue locations, and various issues along the entire road system. These issues were identified during a field inventory and included issues such as blind curves, steep inslopes, erosion, soft spots, as well as others. The paved roadways were also inventoried according to their surface conditions.

4. Provide PowerPoint Presentation

Mr. Grabill provided a PowerPoint presentation. The presentation covered the project purposes, project schedule, description of the study area, and results of the field inventory. Photographs of many issues seen throughout the county were included as examples. The presentation finished with the following general conclusions:

- Most county roads are low volume with some exceptions
- Single access subdivisions / road standards under review
- Relatively high number of severe crashes
- Steep slopes, blind curves among identified safety issues

Mr. Grabill also directed attendees to the project website and online survey.

5. **Comments and Questions**

Mr. Grabill asked for comments and questions concerning issues the public wanted addressed. Feedback he received is summarized in the following bullets:

- A representative of the logging industry raised concerns about adding pavement in the County. Mr. Grabill said that KLJ intended to look at possible thresholds for when a road may be paved, but he said he didn't think there would be recommendations to pave new roads.
- It may be useful to consider how Michelson Trail can tie to other County destinations
- Maps should be added to the website. Mr. Grabill said the presentation would be added to the website.
- Custer County needs to maintain Forest Road and Trail Act (FRTA) easements.

6. **Adjournment**

Mr. Grabill adjourned the meeting at 7:00 p.m.

SIGN IN

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Tuesday, October 18, 2016 – Custer County Courthouse Commission Room – 5:30-7:00 PM

Name	Title/Representing	Address/Phone No.	Email
Steve Grabill	KLJ		Steve.Grabill@KLJENG.COM
Steve Gramm	SDDOT	700 E. Broadway Ave Pierre, SD	Steve.gramm@state.sd.us
Ron Williams	KLJ	Rapid City, SD	Ron.Williams@KLJENG.com
Oonagh Wood		Pringle	oonagh@gwtc.net
Jason Ferguson	chronicle	Custer	custernews@gwtc.net
Marty Brooks	Neiman	Hill City	~~mar~~ mbrooks@rapidnet.com
Laura Burns	USFS	Custer	lburns@~~gw~~fs.fed.us
Gary Woodford	Custer Co.	Custer	
RICH ZACHER	SDDOT	CUSTER	rich.zacher@state.sd.us
REX HARRIS	CUSTER CO	Custer	
Jeff Knutson	USFS	Custer	jknutson@fs.fed.us

Record of Meeting
Custer County Master Transportation Plan (MTP)
Public Input Meeting (PIM) #1B
October 19, 2016
5:30pm - 7:00pm
Hermosa Elementary School Gymnasium

1. Meeting Attendees

There were 49 people in attendance at the meeting. A copy of the meeting sign-in sheet is attached.

2. Welcome & Introductions

Those in attendance were greeted and introductions were made.

3. Review Project Displays

Mr. Grabill reviewed and summarized the seven boards that were displayed. The boards covered the study area, functional classifications, crash severity data, key issue locations, and various issues along the entire road system. These issues were identified during a field inventory and included issues such as blind curves, steep inslopes, erosion, soft spots, as well as others. The paved roadways were also inventoried according to their surface conditions.

4. Provide PowerPoint Presentation

Mr. Grabill provided a PowerPoint presentation. The presentation covered the project purposes, project schedule, description of the study area, and results of the field inventory. Photographs of many issues seen throughout the county were included as examples. The presentation finished with the following general conclusions:

- Most county roads are low volume with some exceptions
- Single access subdivisions / road standards under review
- Relatively high number of severe crashes
- Steep slopes, blind curves among identified safety issues

Mr. Grabill also directed attendees to the project website and online survey.

5. **Comments and Questions**

Mr. Grabill asked for comments and questions concerning issues the public wanted addressed. Feedback he received is summarized in the following bullets:

- What is capacity and how is it addressed? Mr. Grabill responded that from a volume standpoint, it is likely that none of the roads are over capacity. He said in some cases capacity concerns may warrant a turn lane or a wider road or shoulder based on standards.
- Where does the money come from and when will physical work be started? Mr. Grabill said this hadn't been evaluated yet, but he said it was likely that money would come from current funding sources. He said it was too early to determine when any new projects would be done.
- Has the County ever done a plan like this before? Mr. Gramm responded that these plans have only been done within the state over last few years and that this was the first done within the County. Mr. Grabill added that a Comprehensive Plan was done by the County in 2008 but it contained very little about transportation compared to what this plan would address.
- This plan is long overdue. The County can't keep up with development.
- Gravel trucks in Ghost Canyon/Box Canyon are an issue.
- Dust is a problem. Speed of vehicles makes this problem worse.
- The trucking industry would like a slower speed limit on Box Canyon and Ghost Canyon.
- Dust is a big issue in Box Canyon.
- Are critical needs identified now and can they start now to fix them? Mr. Grabill said the study was in the very beginning of the analysis process and no proposed projects have been identified.
- Does the study consider speed limits and enforcement? There are no speed limit signs on Ghost Canyon. Mr. Grabill said that to date, the study hasn't considered speed limits or enforcement. He said he would discuss the matter with the Study Advisory Team.

- Will non-county roads and access to subdivisions be addressed? Mr. Grabill responded that in general, non-county roads would not be addressed. He said the study would look at single-access subdivisions to see if future connections can be made for more than one access.
- A resident of Ghost Canyon recommended using Magnesium Chloride to address the dust issue.
- Is there a deadline for improvements created by the study? Mr. Grabill said the study process would work with the SDDOT and County to establish priorities, but it would be up to the County to establish deadlines, if any.
- Will there be representatives from the subdivisions on the Study Advisory Team? Mr. Grabill said that the purpose of the public meetings was to approach stakeholders not on the SAT for their input. He said he would ask whether SAT membership needed to be expanded.
- The County should make standards for developers tougher so they don't negatively affect county roads.
- A resident was concerned about longevity of mitigating dust using Magnesium Chloride water. We need regular applications or a long-term solution.
- Consider growth in Pennington County in projections in Custer Subdivisions.
- Soybean oil for dust control has been used in Hermosa.
- Will KLJ meet with County Commissioners at their regular meetings? Mr. Grabill said, yes.

6. Adjournment

Mr. Grabill adjourned the meeting at 7:00 p.m.

SIGN IN

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Name	Title/Representing	Address/Phone No.	Email
REX HARRIS	CUSTER CO	673-8174	
Steve Gramm	SDDOT	700 E. Broadway Ave. Pierre 773-6641	Steve.gramm@state.sd.us
LINDA HAGER	Self	13894 Thistle Ridge Rd Hermosa SD 57744 255-4114	
Brian McIlrer	Custer Co	13816 Ridgetop Rd	
KEITH INGRAM	SELF	13819 RIDGETOP RD HERMOSA SD 57744	
Gene Mikesha		13739 Battle Creek Rd Hermosa	
Jennifer Stillings	Custer Co	24613 Bridle Rein Dr. Hermosa	SWISSMISS43307@yahoo.com
MATT McPHEE		13722 SUNNY RIDGE RD	Mattmcphee1@hotmail.com
JIM LINTZ	Hermosa	13977 S.D 36	
DAN MARTIN	HERMOSA	13826 BOX CANYON RD 255-5515	
Sandy Collins	Custer Co	13794 Ghost Canyon Rd 255-4158	
Jim BAKER	BADLANDS SAND & GRAVEL	15003 S.D Hwy 40 Hermosa	JimBaker65@icloud.com

SIGN IN

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Name	Title/Representing	Address/Phone No.	Email
Clyde Stroatmeyer & Nancy		24587 Outback Trail	
Dennis Thompson		24587 Tiffany Ln	
Mandi Burnett		13795 Ghost Canyon Rd.	Mandi0852@yahoo.com.
Jackie Mercado		13885 Thistle Ridge Rd, Hermosa	JMERCADO566@MT-Rushmore.Net
Kendra Wright		24660 Outback Trail Hermosa	Kendraoutbacktrail@gmail.com
Randy Burnett		13795 Ghost Canyon RD	
Don Holsworth	Town of Hermosa (Board)		
[illegible]		13813 Box Canyon Rd Hermosa, SD 57744	
[illegible] +1		24577 OUTBACK TR, HERMOSA	Elizabeth@mainstreetsquare.com

SIGN IN

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Name	Title/Representing	Address/Phone No.	Email
SCOTT SMITH		13813 BOX CANYON RD	
LINDA KRAMER		HERMOSA	
[illegible]		"	
Mary Bishop		"	
Gary Baker		HERMOSA	
Sal Mercado		Hermosa	
Scott Wyles		24660 Outback Tr / Hermosa	
Gary Foss		13814 Box Canyon Road	
MARK JURRENS		13794 GHOST CANYON RD	
Steve Grabill		KLJ	
Ron Williams		KLJ	

SIGN IN

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Name	Title/Representing	Address/Phone No.	Email
VINCENT B HAGER	SEFF	13894 THISTLE RIDGE ROAD HERMOSA, SD	THISTLERIDGE@MT-RUSHMORE.NET
TERRANCE/ANITA RACINE		24686 Outback Trail, Hermosa	MR.TAXRELIEF24.ORG
Tim Kursave		13799 Ghost Canyon RD	TKursave@Gmail.com
Jan Diedrich		13901 Battle Creek Rd	
Marge Nikuk		13939 Battle Creek Rd	mgnikuska@hotmail.com
RICH ZACHER	SDDOT	115 CENTENIAL DRIVE, CUSTER	rich.zacher@state.sd.us
Debra Larson (Keystone)		13755 Haugan Trail, Hermosa	kdlarsapple@gmail.com
DAVID KARLINSKI		24637 139TH AVE. HERMOSA	
Patti Pendegraft	Hermosa	13759 Box Canyon Rd 255-4113	Spendo@mt-rushmore.net
Norm/Sandy Eckhoff		24632 Bridle Rein Dr Hermosa	
Carol Sadowsky		24626 Bridle Rein Dr Hermosa	casadowsky@hotmail.com
Tom Simmons		" "	" "

COMMENTS

RECEIVED

OCT 28 2016

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Please use the space below to provide comments regarding the Custer County Master Transportation Plan.

PLEASE PRINT

Name (Optional): Jan Dietrich

Address (Optional): Battle Creek Rd –

While I realize there are a lot of problems with roads in Custer Co but from what you explained Wed nite, I love a problem understanding why it takes an expensive study to notice some of the problems. And why aren't they fixing them as the go on; a little at a time. I've lived in the county most of my life but have never seen dust like this gravel used on our road produces. It needs to be fixed somehow – the dust is unhealthy for people + animals – I'm hoping when you are done with your plan that if nothing else, mag water will be applied – Thank you for your work –

Please leave comments with meeting conductors or mail comments by Wednesday, November 2, to:

Steve Grabill, Project Manager
KLJ
2969 Airport Road Suite 1B
Helena, MT 59624-1567
Email: steve.grabill@kljeng.com
Phone: 406-441-5783

Note "Custer County Plan" in the email subject heading

PROJECT WEBSITE:

sddot.com/transportation/highways/planning/specialstudies/CusterCo/default.aspx

When visiting the website, please take our online survey!

COMMENTS

RECEIVED
NOV 04 2016

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Wednesday, October 19, 2016 – Hermosa Elementary School Gymnasium – 5:30-7:00 PM

Please use the space below to provide comments regarding the Custer County Master Transportation Plan.

PLEASE PRINT

Name (Optional): C Meiners

Address (Optional): 13866 Ghost Canyon & 5998 Bison Lane

Bison Lane & ~~South~~ East Fairburn Rd; Good Plan To replace Bridges on East End, We saw one of The Engineers from KLJ one day on Bison Lane. Only comment – He was driving way to Fast To observe much – nice fellow – wasn't sure what Was going on at that time. Gravel on lower end should be like upper end To South Fork. Need more money for Mag water on roads. Too Much Speed on Both Roads Its not equal treatment That Property owners on Paved roads don't Participate Through heavier Taxation of Properties They own To contribute To Gravel Property owners roadways. Maybe equal taxation but Gravel Property owners get more of Their tax dollars (equal Assesments continuing) Spent on their roads

(continued reverse)

Please leave comments with meeting conductors or mail comments by Wednesday, November 2, to:

Steve Grabill, Project Manager
KLJ
2969 Airport Road Suite 1B
Helena, MT 59624-1567
Email: steve.grabill@kljeng.com
Phone: 406-441-5783

Note "Custer County Plan" in the email subject heading

PROJECT WEBSITE:
sddot.com/transportation/highways/planning/specialstudies/CusterCo/default.aspx
When visiting the website, please take our online survey!

#11
55

Common Knowledge

① Better roads, more speed; wash boards and not holes, less speed & dust

② Too much rock & not enough binder

③ Grading after moisture event and severe dust events.

Problems

① Core or less for roads doesn't do much under todays program

@ Is there equal distribution over the County.

- High density home areas getting priorities

- Low and remote areas low priorities

@ remote homes should see some mag^{+} application minimally.

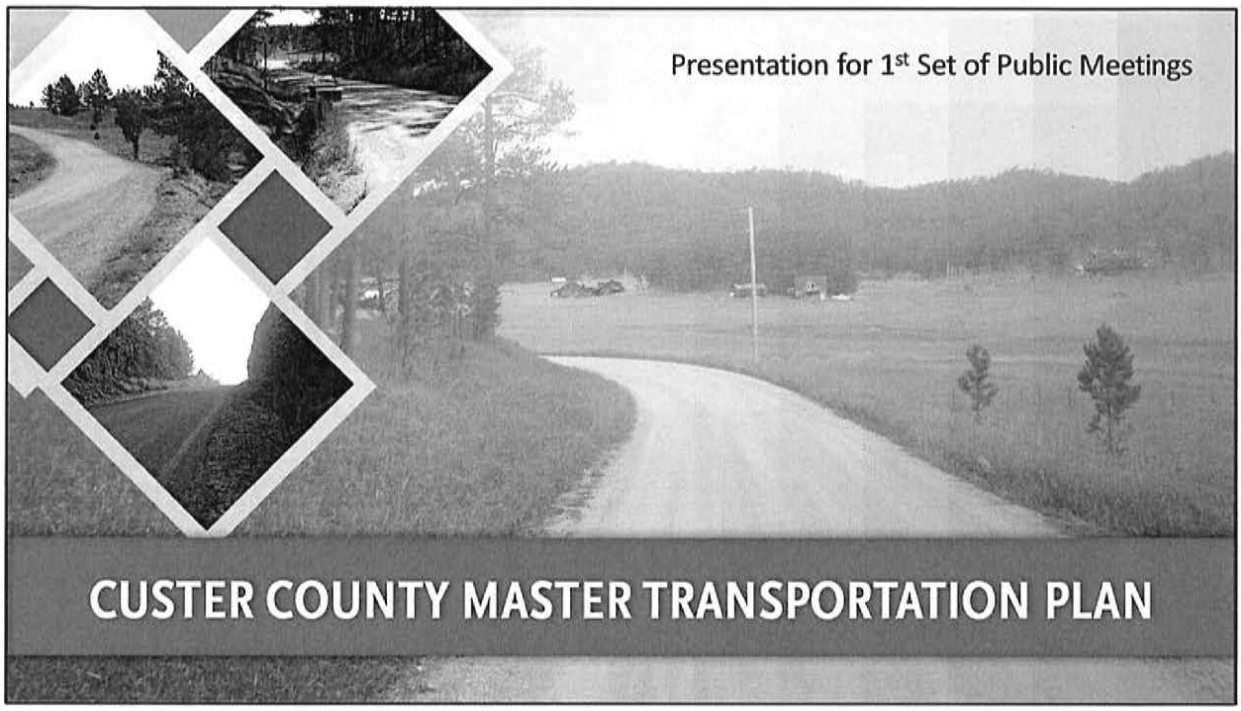
Would Contribute To problem

① more contribution from developers of properties, commercial operations

② start hard surface like Chip seal or paving

③ Less spending on equipment & infrastare, more on contractors

⇒ Thoughts from a non-political Lane owner



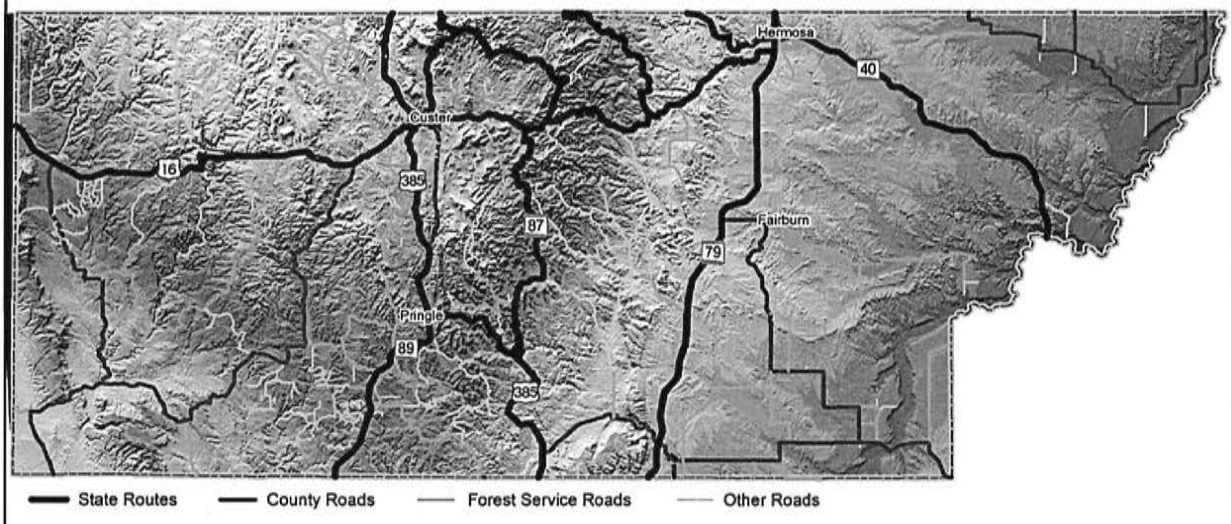
Project Purposes

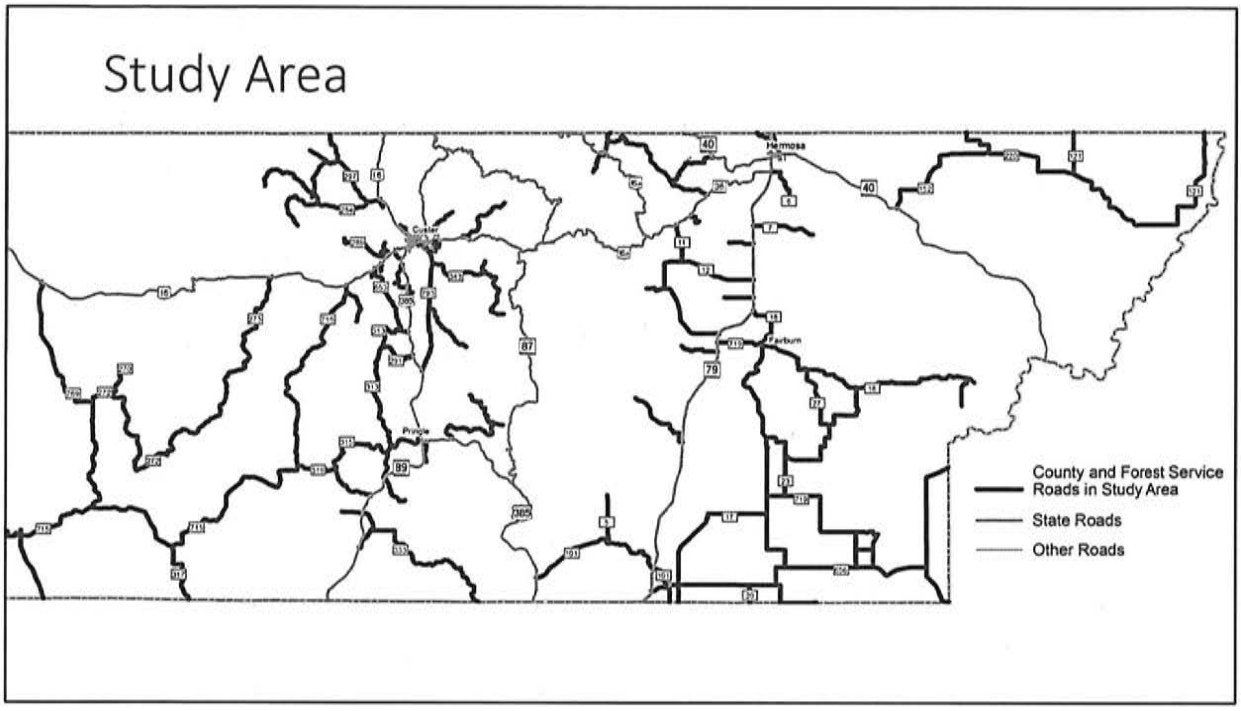
- Inventory Existing Transportation Conditions
- Identify and Address Transportation Needs
  - Consider Multimodal Needs within the County
  - Focus on Road and Bridge Maintenance and Preservation
- Identify and Evaluate Safety Issues within the County
- Develop a Proactive Program to Address Projected Needs
- Update Roadway Standards within the County
- Examine Available Funding and Assist with Project Prioritization

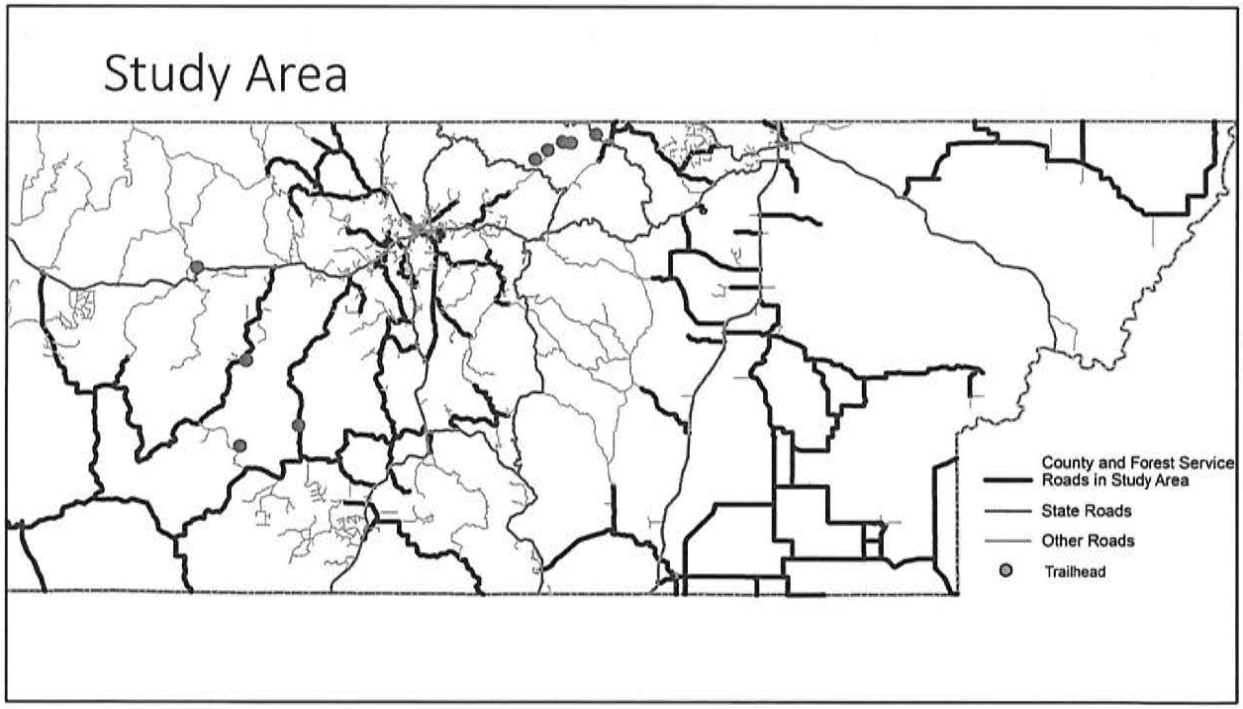
Project Schedule

• Notice to Proceed	8/1/16
• Existing Conditions Inventory	8/1/16 – 10/18/16
• Stakeholder Meetings	Ongoing
• Public Input Meetings (1st Set)	10/18/16 – 10/19/16
• Revenue Analysis & Draft Standards	10/19/16 – 2/15/16
• Issues Analysis & Plan Development	12/1/16 – 3/30/17
• Public Input Meetings (2nd Set)	April 2017
• Draft Report	May 2017
• Final Report	June 2017

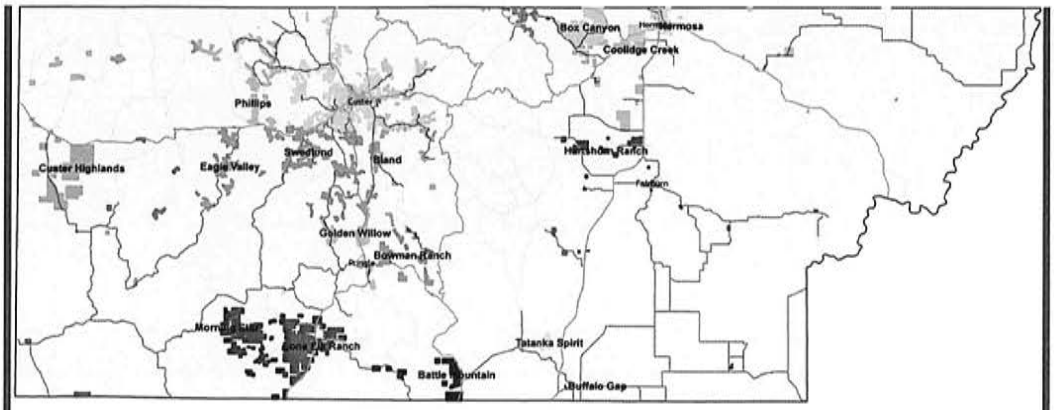
Study Area




Study Area
Hermosa
Custer
Fairburn
Pringle
County and Forest Service Roads in Study Area
State Roads
Other Roads


Study Area
County and Forest Service Roads in Study Area
State Roads
Other Roads
Trailhead

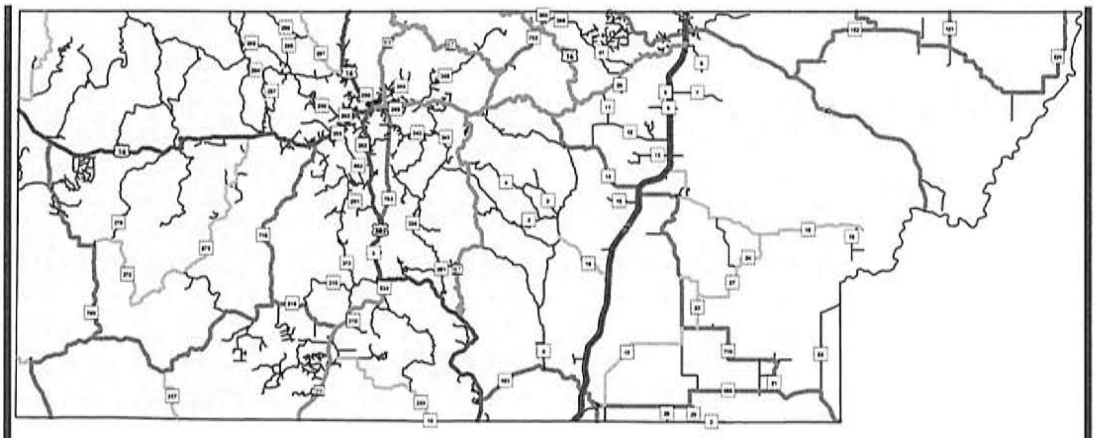
Study Area



Custer County Master Transportation Plan
General Neighborhoods Map

0 2.5 5 Miles

Functional Classification



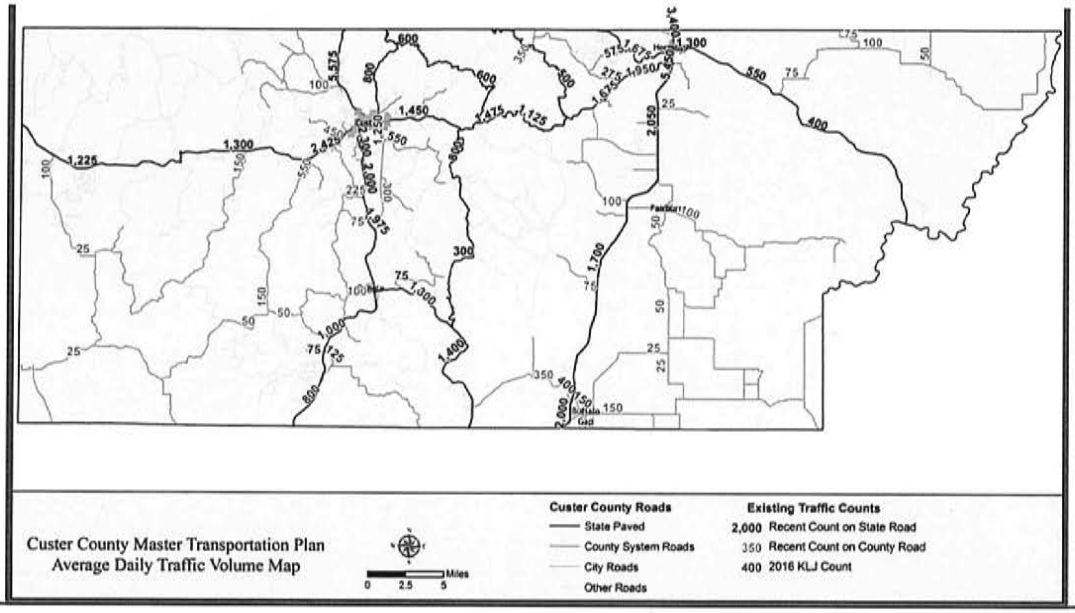
Custer County Master Transportation Plan
Existing Functional Classification Map

0 2.5 5 Miles

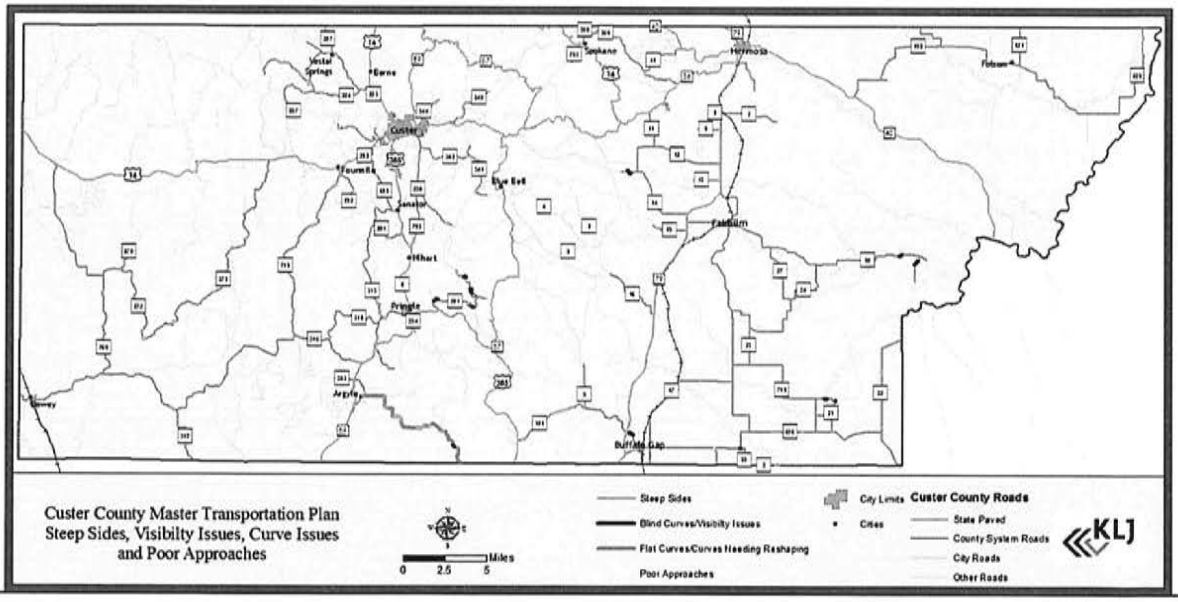
Functional Class

- Expressway
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local Road

Traffic Volumes



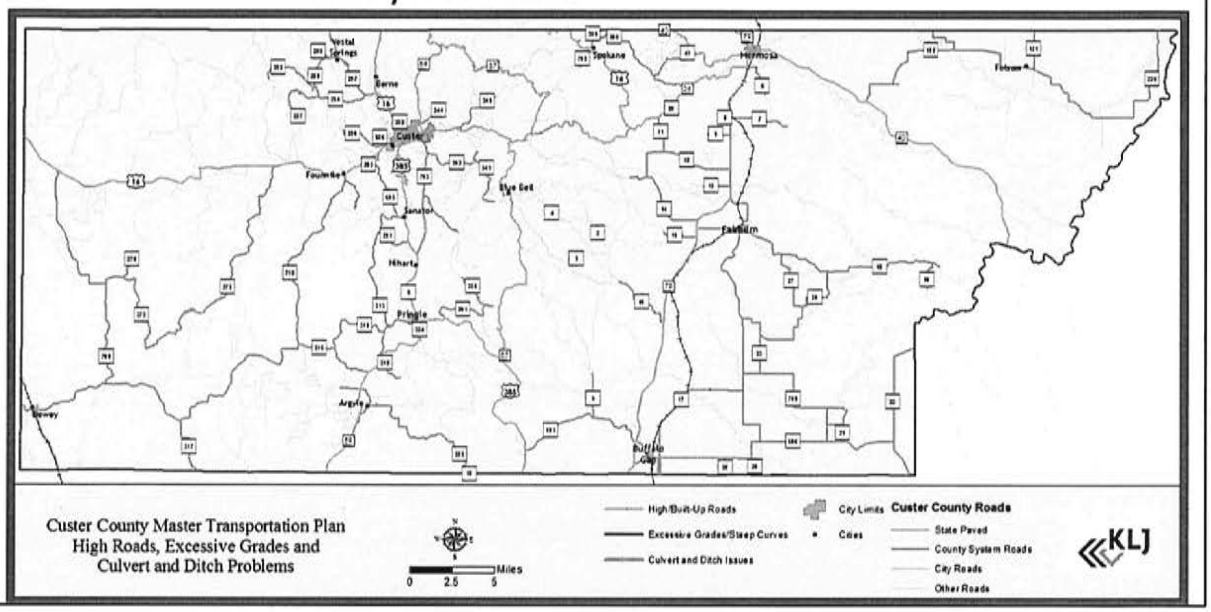
Field Inventory Results



Blind Curve Examples

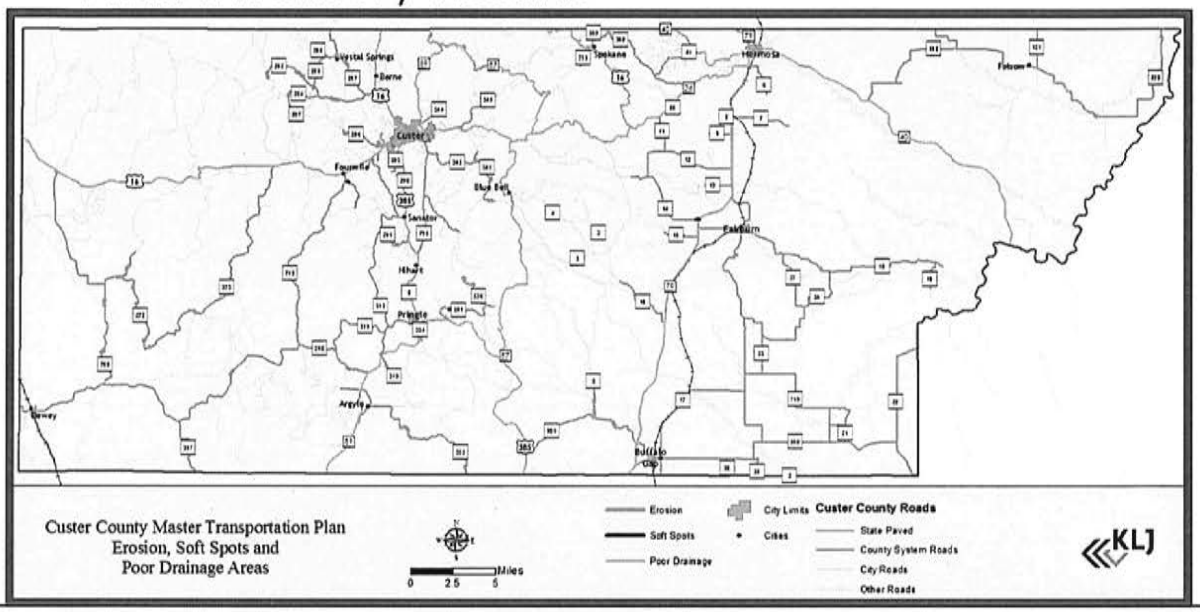
Steep Sides Examples

Field Inventory Results



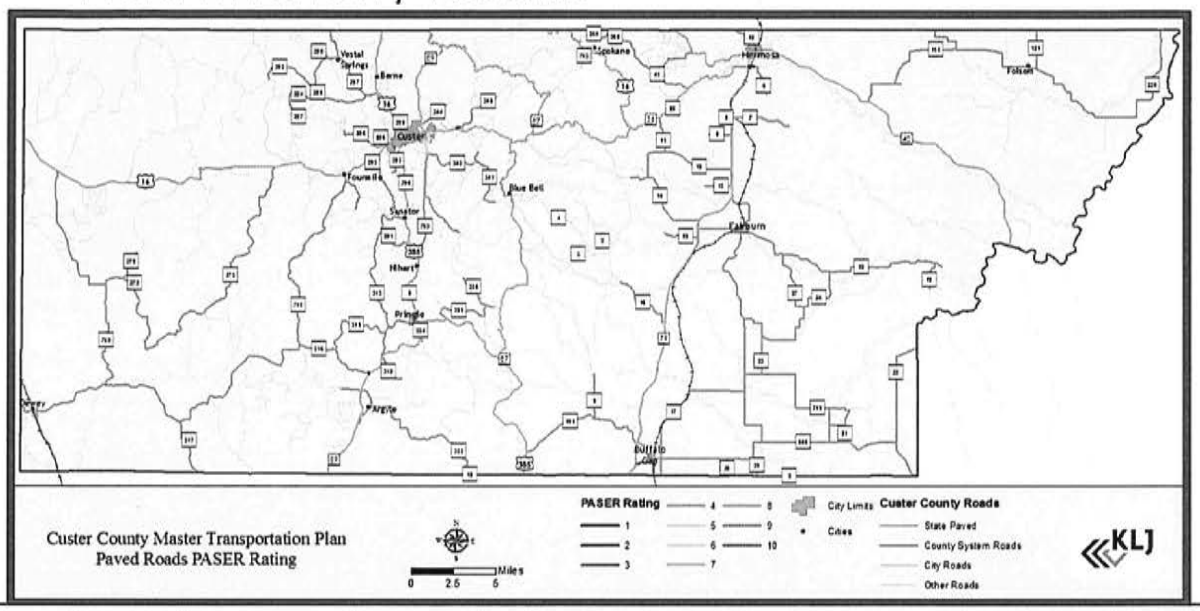
Excessive Grades Example

Field Inventory Results



Erosion Examples

Field Inventory Results

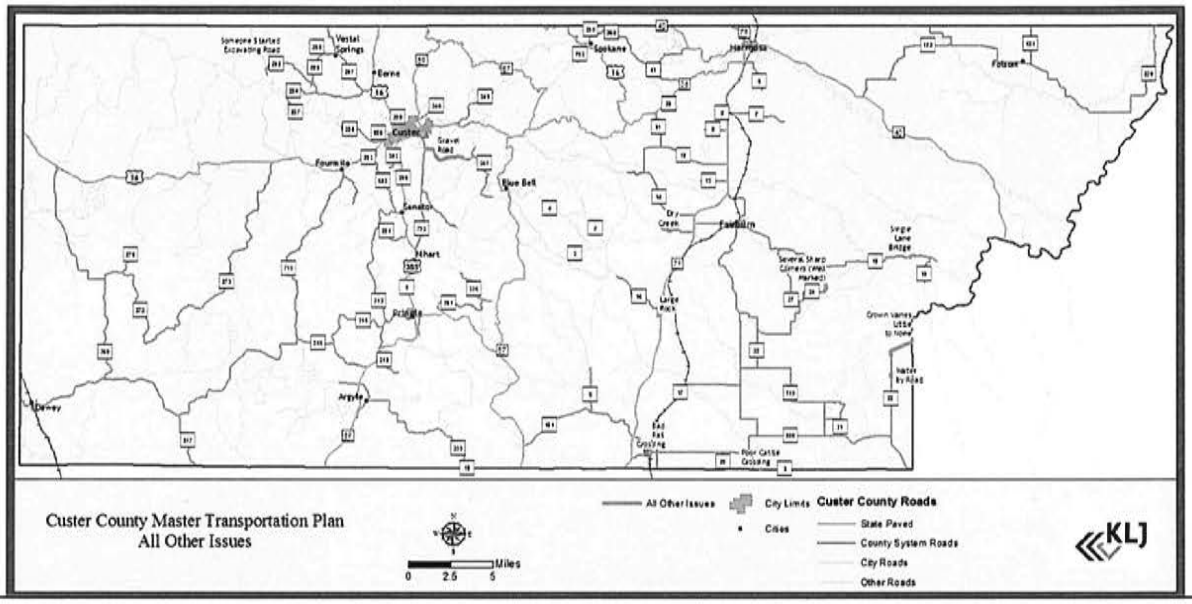


Pavement Surface Evaluation & Rating (PASER)

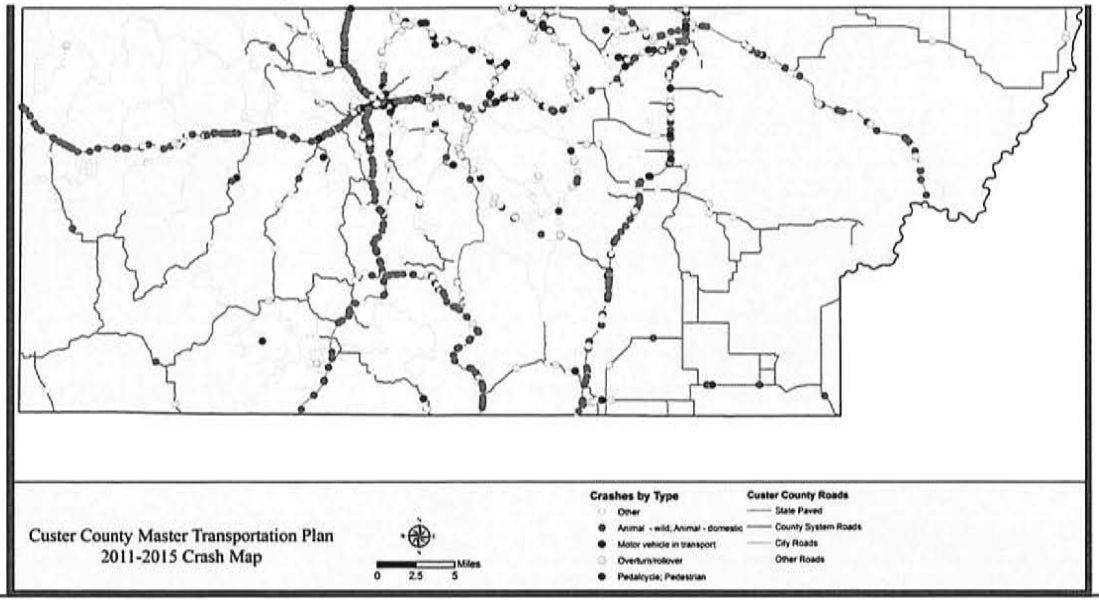
#2 Rating

#6 Rating

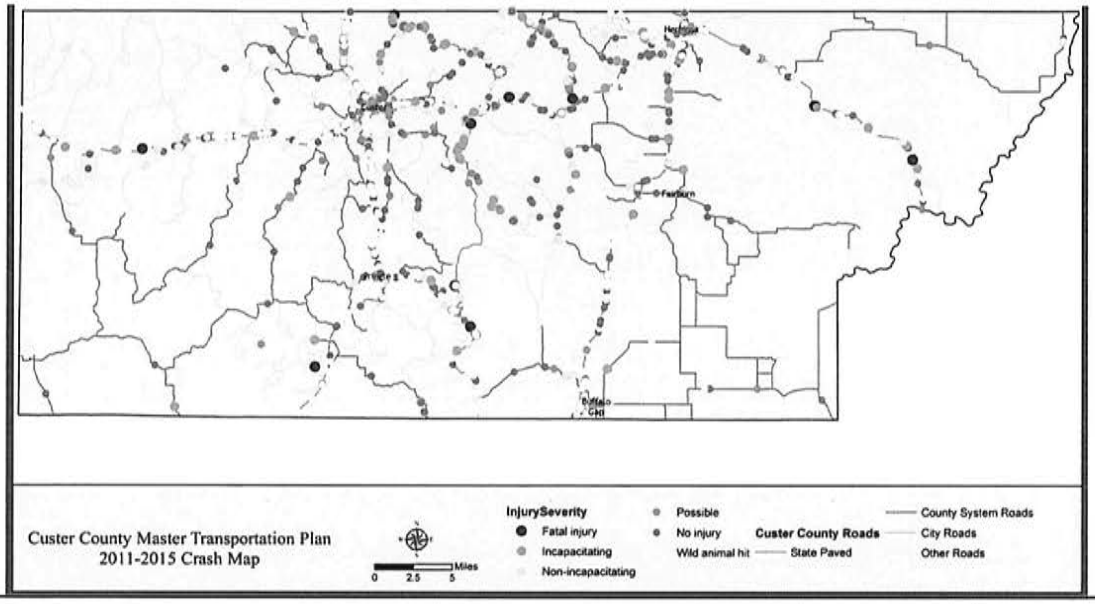
Field Inventory Results



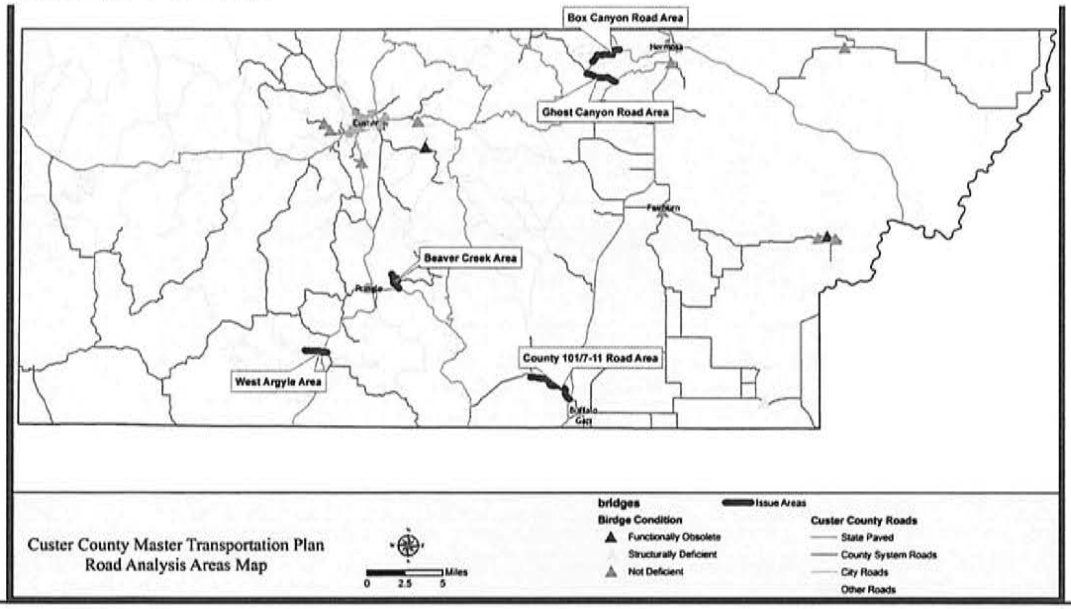
Crash Analysis Results



Crash Analysis Results



Issue Areas



General Conclusions

- Most county roads are low volume with some exceptions
- Single access subdivisions / road standards under review
- Relatively high number of severe crashes
- Steep slopes, blind curves among identified safety issues

Comments and Questions?

- Project Website: http://sddot.com/transportation/highways/planning/specialstudies/CusterCo/default.aspx
- When visiting the website, please take our online survey!
- Comments are due by November 2, 2016

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
CUSTER COUNTY

Notice of
Public Open House & Informational Meetings

Custer County Master Transportation Plan

Meeting 1: June 13th, 2017
5:30 to 7:00 PM
Hermosa Elementary School — Gymnasium
11 4th Street, Hermosa, SD

Meeting 2: June 14th, 2017
8:30 to 9:00 AM
Custer County Courthouse — Commission Room
420 Mount Rushmore Road, Custer, SD

The South Dakota Department of Transportation (SDDOT), in conjunction with Custer County, will hold public open house and informational meetings to discuss and receive public comment on the Draft Custer County Master Transportation Plan (MTP). The Custer County MTP development process was initiated in August 2016. The MTP addresses a full range of transportation options and issues, most specifically related to gravel pavement management and road safety. The purpose of these public meetings is to present the Draft Custer County MTP for public feedback.

Custer County is preparing the MTP with funding from SDDOT. The Custer County MTP is a long range (20 year) plan that addresses current and projected needs for county highway and bridge infrastructure within Custer County. Staff from Custer County, SDDOT and their consultant will be available to discuss the Draft Custer County MTP.

All persons interested in commenting on the Draft Custer County MTP are invited to attend either meeting to share your views. Public and written comments will be taken as part of each public input meeting. Written comments should be sent to the attention of KLJ, Attn: Custer County MTP, 2969 Airport Road, Suite 1B, Helena, MT, 59601. Written public comment will be accepted on the Custer County MTP through July 2nd, 2017.

Copies of the Draft Custer County MTP are available for public viewing at the County Auditor's Office and at the Custer and Hermosa Libraries. For more information regarding the Custer County MTP contact KLJ Project Manager, Steve Grabill, at (406) 441-5783. Information about the Custer County MTP is available online at www.custercountysd.com.

Notice is hereby given to individuals with disabilities that this open house meeting is being held in a physically accessible place. Please notify the SDDOT ADA Coordinator at least two business days prior to the open house meeting if you have special needs for which this agency will need to make arrangements.

The telephone number for making special arrangements is 605-773-3540 or 1-800-877-1113 (Telecommunication Device for the Deaf).

Notice published twice at the total approximate cost of $326.26

Affidavit of Publication

State of South Dakota)
)ss.
County of Custer)

Charles W. Najacht of said county, being duly sworn, on oath says that he is publisher of the Custer County Chronicle, a weekly newspaper printed and published in Custer City, said County of Custer and has full and personal knowledge of all the facts herein stated; that said newspaper is a legal newspaper and has a bona-fide circulation of at least two hundred copies weekly, and has been published within said County for fifty-two successive weeks next prior to the publication of the notice herein, mentioned, and was and is printed wholly or in part in an office maintained at said place of publication: that the

KLJ - SD Department of Transportation - Custer County - Public Open House & Meetings - Display Ad

a printed copy of which, taken from the paper in which the same was published, is attached to this sheet, and is made a part of this Affidavit, was published in said newspaper at least once each week for two successive week(s), on which said newspaper was regularly published, to wit:

May 24, 2017; _____, _____;
June 7, 2017; _____, _____;
_____, _____; _____, _____;
_____, _____; _____, _____;
_____, _____; _____, _____;

the full amount of the fees for the publication of the annexed notice is $ 326.26.

Charles W. Najacht

Subscribed and sworn to me before this 7th
of June, 2017;

Norma Najacht
NOTARY PUBLIC
MY COMMISSION EXPIRES: May 5, 2018

NORMA NAJACHT
NOTARY PUBLIC
SOUTH DAKOTA

SOUTH DAKOTA DEPARTM
CUSTER
Noti
Public Open House & I
Custer County Maste
Meeting 1: Ju
5:30 to
Hermosa Elementary S
11 4th Street,
Meeting 2: Ju
8:30 to
Custer County Courthou
420 Mount Rushmo

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on the Custer County MTP through Jul

Copies of the Draft Custer County MTF
County Auditor's Office and at the Cu
information regarding the Custer Cour
Steve Grabill, at (406) 441-5783. Inforr
available online at www.custercountysc

Notice is hereby given to individuals with
is being held in a physically accessible
Coordinator at least two business days
have special needs for which this agen

The telephone number for making s
or 1-800-877-1113 (Telecommunicati

Notice published twice at the total appr

Record of Meeting
Custer County Master Transportation Plan (MTP)
Public Input Meeting (PIM) #2A
June 13, 2017
5:30pm - 7:00pm
Hermosa Elementary School Gymnasium

1. Meeting Attendees

There were 22 people in attendance at the meeting. A copy of the meeting sign-in sheet is attached.

2. Welcome & Introductions

Those in attendance were greeted and introductions were made.

3. Review Project Displays

Prior to and after the presentation, the public had the opportunity to meet with staff and review boards on display. Mr. Grabill reviewed and summarized the six boards that were displayed. The boards covered the key issue locations, field inventory, and locations for potential road connections.

4. Provide PowerPoint Presentation

Mr. Grabill provided a PowerPoint presentation. The presentation covered the project purposes, public and stakeholder input received to date, online survey results, project schedule, description of the study area, and results of the field inventory. Photographs of many issues seen throughout the county were included as examples. Guidance for when conversion of gravel roads to asphalt was reviewed.

The presentation provided the following general conclusions as they were included in the Draft Custer County Transportation Master Plan:

- Paving more county roads was not recommended
- Custer County should continue current pavement maintenance practices

- County bridges are generally well maintained. Applications should continue to be submitted seeking Bridge Improvement Grants for upgrades to functionally obsolete or structurally deficient bridges
- Box Canyon and Ghost Canyon Roads should be redesignated as minor collector roads. Dust control strategies should be implemented. Formation of a district to spread the local costs of dust control was recommended.
- Short and long range project recommendations were reviewed for priority corridors. Priority corridors included Box Canyon Road, Ghost Canyon Road, Beaver Creek Road, 7-11 Road, East Argyle Road, and Dewey Road.
- Potential future road connection locations were reviewed and discussed. It was emphasized that these were based only on review of aerial photography and that no surveys, environmental analysis, engineering, or landowner contacts or coordination had been completed. Mr. Grabill said it was recognized that these would be very difficult to implement and likely would only proceed with landowner support and with development that enabled right of way dedication and roadway construction to proceed.
- Custer State Park preliminary plans were noted for a future connection of Mickelson Spur Trail from Custer/Stockade Lake to Legion Lake/Game Lodge.
- Locations of substandard cross sections throughout the county were shown on a map. The County intended to bring these roads up to standards over time.
- Tables highlighting short and long range project recommendations and estimated construction costs were shown.

Mr. Grabill opened the meeting to comments and questions.

5. Comments and Questions

Mr. Grabill asked for comments and questions regarding the draft Report. Two copies of the Report were available for viewing at the meeting. Feedback he received is summarized in the following bullets:

- The draft Plan is not available on the website. Mr. Grabill responded that it would be put on the website. He noted that copies were also available at the

Hermosa and Custer Libraries, and at the Custer County auditors and planning offices.

- Has there been any consideration for weight limits to be placed on gravel roads? Mr. Grabill responded that he didn't think so, but that he'd check with County staff to find out. Following the meeting, County staff said the only time they would put load limits on the gravel roads was if the road was getting soft spots in it or if it was showing damage to the surface.
- A resident said that Box Canyon Road is too narrow where it crosses over a culvert.
- Residents asked how the proposed dust control district for Box Canyon Road and Ghost Canyon Road would be organized. They suggested that the County should take a lead role in getting the district formed. Mr. Grabill said he would mention that at the County Commission public meeting scheduled for the next morning. He said it would be up to the County Commission whether they wanted to undertake a lead role in forming the district.
- Some residents noted that road districts may have difficulty finding funds to pay for dust control. A lengthy discussion ensued about the Secondary Road Taxes that had been diverted to the road districts some years ago, and that these were funds that the County didn't have access to that could have gone to road maintenance. It was stated that the road districts could raise their mill levy to pay their share of dust control costs.
- Mr. Grabill summarized the comments of attendees regarding formation of a dust control district, stating that there was general agreement that a dust control district was a good idea, but that there was a desire for the County to play a lead role in coordination. Those in attendance agreed this was accurate.
- Some residents said that there was no law enforcement along Box Canyon Road or Ghost Canyon Road. They said they had requested a greater police presence and they didn't think it ever happened. They wanted people to be ticketed for speeding. Mr. Grabill suggested that they contact law enforcement or their commissioners to seek greater presence by law enforcement. He also stated

that law enforcement would need to determine how this would fit among other priorities.

- A comment was received that there were no blind curves along 7-11 Road. After the meeting, the individual changed his mind and noted that there were blind curves. The same resident noted that there were many more crashes that have occurred along 7-11 Road than has been reported. Mr. Grabill acknowledged that not all crashes are reported and this holds true for all roads.
- A resident noted that 7-11 road gets a lot of through traffic and he said that phone applications direct people onto 7-11 road. Residents along other roads noted similar occurrences. Mr. Gramm said that some applications direct people along the shortest route and that the phone applications do not always pick a paved road for people to use.
- Residents thought that impact fees should be assessed to cover the damages of heavy trucks from heavy truck generators.
- A resident asked if projects in the plan were prioritized. Mr. Grabill said that the short-range projects were prioritized by year. The long-range projects were not prioritized. He noted that the County annually reviews their short-range project list and determines which projects from the long-range project list should be moved onto the short-range project list. He said it would be very difficult to determine an order of priority for long range projects, given that County needs and priorities change over time.
- A resident asked that the comment period be extended beyond July 2, 2017 so that she could seek feedback from her Subdivision District. Mr. Grabill agreed to extend the timeline for comments to July 10, 2017.

6. Adjournment

Mr. Grabill adjourned the meeting at 7:40 p.m.

ATTENDANCE LIST

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Public Input Meeting – 5:30 – 7:00 PM, Tuesday, June 13, 2017

Hermosa Elementary School Gymnasium

Name	Organization/Business/Address
Steve Gramm	SDDOT
② Terrance/Anita Racine	Box Canyon, Hermosa
Ron Williams	KLJ
Steve Grabill	KLJ
Jason Ferguson	Custer chronicle
Rex Harris	Custer County Planning
① Don & Jamie Kiger	① [signature]
② Jim & Kara Greer	Homeowner Blue Bean Tr.
Jackie Fuehrer	Ghost Canyon Rd.
Ken R. Couch	Buffalo Gap SD.

ATTENDANCE LIST

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Public Input Meeting – 5:30 – 7:00 PM, Tuesday, June 13, 2017

Hermosa Elementary School Gymnasium

Name	Organization/Business/Address
Scout Sudbeck	SDDOT
Kyle Thum	24596 Tiffany Ln.
Clyde & Nancy Straatmeyer	Outback Trail-Hermosa
Gene & Margy Mikusta	13939 Battle Creek Rd Herm
Stephanie Karlinski	24637 139th Ave.
MIKE PETERSON	24577 OUTBACK TRL
TARA PETERSON	RIDGETOP ROAD HERMOSA

Record of Meeting
Custer County Master Transportation Plan (MTP)
Public Input Meeting (PIM) #2B
June 14, 2017
8:30am - 9:00am
Custer County Commission Meeting Room

1. Meeting Attendees

There were 31 people in attendance at the meeting. A copy of the meeting sign-in sheet is attached.

2. Welcome & Introductions

The public meeting was held as an agenda item within a regularly scheduled County Commission meeting. Gary Woodford greeted those in attendance and introduced Steve Grabill.

3. Provide PowerPoint Presentation

Mr. Grabill provided a PowerPoint presentation. The presentation covered the project purposes, public and stakeholder input received to date, online survey results, project schedule, description of the study area, and results of the field inventory. Photographs of many issues seen throughout the county were included as examples. Guidance for when conversion of gravel roads to asphalt was reviewed.

The presentation provided the following general conclusions as they were included in the Draft Custer County Transportation Master Plan:

- Paving more county roads was not recommended
- Custer County should continue current pavement maintenance practices. This included keeping load limits on paved roads year-round.
- County bridges are generally well maintained. Applications should continue to be submitted seeking Bridge Improvement Grants for upgrades to functionally obsolete or structurally deficient bridges.

- Box Canyon and Ghost Canyon Roads should be redesignated as minor collector roads. Dust control strategies should be implemented. Formation of a district to spread the local costs of dust control was recommended. Mr. Grabill noted that at the previous night's public meeting, there was general consensus that formation of a dust control district was a good idea, though attendees requested that Custer County take a lead role in coordinating formation of the district.
- Short and long range project recommendations were reviewed for priority corridors. Priority corridors included Box Canyon Road, Ghost Canyon Road, Beaver Creek Road, 7-11 Road, East Argyle Road, and Dewey Road.
- Potential future road connection locations were reviewed and discussed. It was emphasized that these were based only on review of aerial photography and that no surveys, environmental analysis, engineering, or landowner contacts or coordination had been completed. Mr. Grabill said it was recognized that these would be very difficult to implement and likely would only proceed with landowner support and with development that enabled right of way dedication and roadway construction to proceed.
- Custer State Park preliminary plans were noted for a future connection of Mickelson Spur Trail from Custer/Stockade Lake to Legion Lake/Game Lodge.
- Locations of substandard cross sections throughout the county were shown on a map. The County intended to bring these roads up to standards over time.
- Tables highlighting short and long range project recommendations and estimated construction costs were shown.

Mr. Grabill opened the meeting to comments and questions.

4. Comments and Questions

Feedback he received is summarized in the following bullets:

- A County Commissioner questioned the recommendation to maintain load limits year-round. Mr. Grabill said that if the County were to increase the asphalt

depth to handle increased loadings, then the corridor would have greater ability to handle the added truck traffic without significant deterioration.

- A County Commissioner commented that it was a good plan. The Commission thanked Mr. Grabill for the efforts made in preparing the plan.

5. Adjournment

Mr. Grabill adjourned the meeting at 8:50 a.m.

ATTENDANCE LIST

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Public Input Meeting – 8:30 – 9:00 AM, Wednesday, June 14, 2017

Custer County Courthouse Commission Room

Name	Organization/Business/Address
Mark Hartman	
Jesse Sorenson	
Travis Bies	
PHIL LAMPERT	
Jim Lintz	
TRACY L. KELLEY	
RICH ZACHER	SD DOT
Jess Doyle	Custer County Hwy.
TODD LEGLER	CUSTER COUNTY HWY.
Ray Harris Dani Schade	Custer County Planning

ATTENDANCE LIST

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

Public Input Meeting – 8:30 – 9:00 AM, Wednesday, June 14, 2017

Custer County Courthouse Commission Room

Name	Organization/Business/Address
Steve Grabill	KLJ
Mary Baddeley	10 W. Canal St.
Terri Cornelison	Custer Co DOE
Cathrine Fierberg	210 S. 1st St. Custer
Jeffrey Fierberg	210 S. 1st St Custer
Lesa McDermott	25833 Sidney Trl Custer
Kevin Treloar	Custer County Highway
Paul Nabholz	Fall River Co Commissioner
Kevin Klein	Circle K Horse Camp
Steve Gramm	SDDOT
Scout Sudbeck	SDDOT
Jason Ferguson	Custer chronicle again

ATTENDANCE LIST

KLJ

CUSTER COUNTY MASTER TRANSPORTATION PLAN

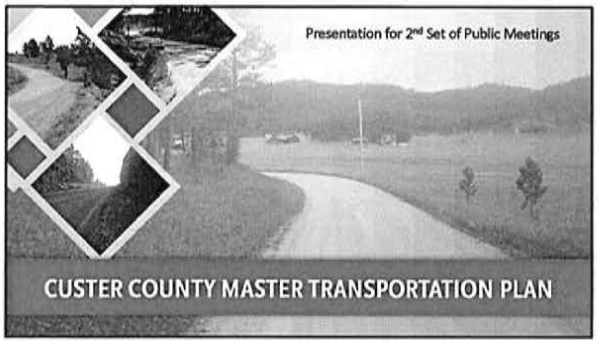
Public Input Meeting – 8:30 – 9:00 AM, Wednesday, June 14, 2017

Custer County Courthouse Commission Room

Name	Organization/Business/Address
Gary Woodford	County Highway
MARTY MECHACEK	CUSTER CO SHERIFF'S OFFICE
Oneth Wood	landowner / Rancher
Sheila Green	Broker Landowner / Green Real Est. & Investments

Custer County Transportation Plan

Name (Print	Organization
Mike Carter	Custer Co
Tim Holland	" "
Dean Lovell	Co Hwy
~~Gerald Brown~~	~~Attorney~~
Steve Gramm	SDDOT
Scott Sudbeck	SDDOT



Project Purposes

- Inventory existing transportation conditions
- Identify and address transportation needs
  - Consider multimodal needs within the County
  - Focus on road and bridge maintenance and preservation
- Identify and evaluate safety issues
- Develop a proactive program to address projected needs
- Update roadway standards within the County
- Examine available funding and assist with project prioritization

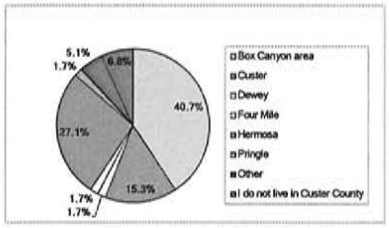
Public and Stakeholder Input to Date

- October 2016 Public Meetings
  - Most comments pertained to conditions along Box Canyon and Ghost Canyon Roads (especially road dust concerns)
- Stakeholder Meetings
  - Winter snow maintenance, blind curves, road and cattle guard maintenance, load restrictions
- 3 County Commission Updates
  - Study process/initial findings review and feedback
- Study Advisory Team Meetings
  - General study input and guidance

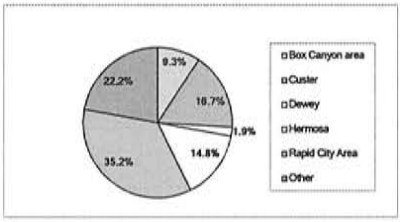
Online Survey Results

- 60 responses
  - Age 30 and older
  - 93% live in Custer County
- Written comments were received
  - Most written comments pertained to Box Canyon Road and Ghost Canyon Road dust and safety conditions
  - Written comments included in Report Appendix

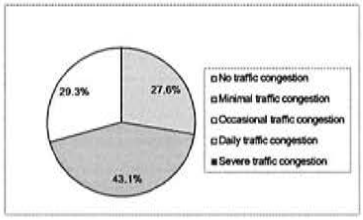
In/near which community do you live?



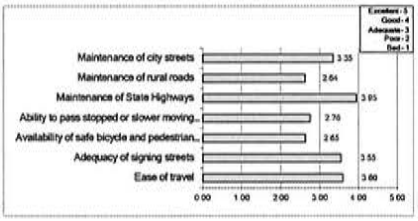
In/near which community do you work?



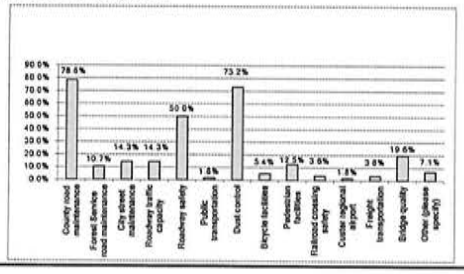
Please rate overall traffic congestion in Custer County



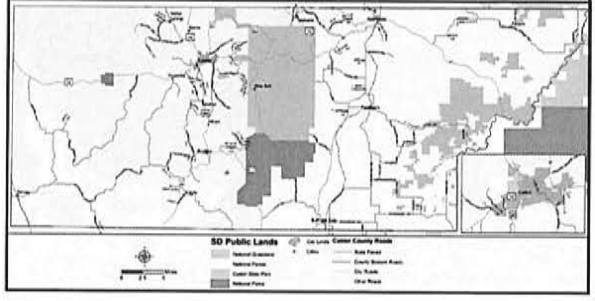
Please rate satisfaction with various components of Custer County's transportation network.



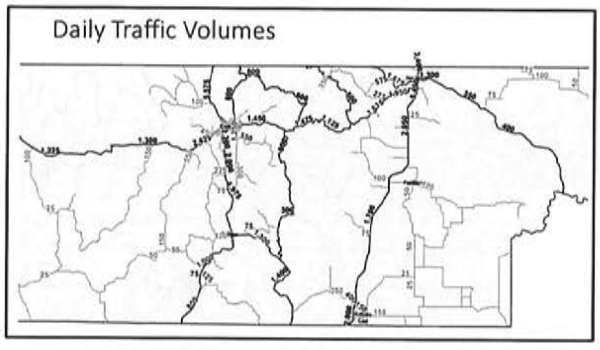
What transportation improvements are most important to you?



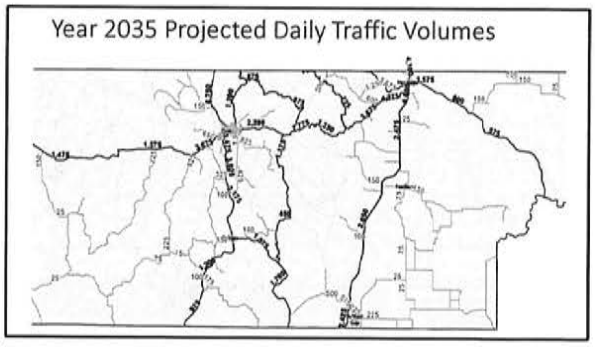
Study Area



Daily Traffic Volumes



Year 2035 Projected Daily Traffic Volumes



Conversion of Gravel to Asphalt

- Guidance from SD Local Transportation Assistance Program
  - Serious consideration suggested when traffic volumes reach 400-500 vehicles/day
- Other factors
  - High cost of paving and maintenance
  - Road preparation
  - Ongoing maintenance
  - Custer County does not have equipment to maintain asphalt roads
  - Many SD counties are converting asphalt back to gravel
    - They don't have funds to maintain pavements

County Gravel Roads Above 400 Vehicles/Day

- Box Canyon Road (575 vehicles/day)
- Hazelrodt Cutoff (550 vehicles/day)
- Pleasant Valley Road (North end at 550 vehicles/day)
- Upper French Creek Road (South end at 450 vehicles/day)
- 7-11 Road (East end at 400 vehicles per day)

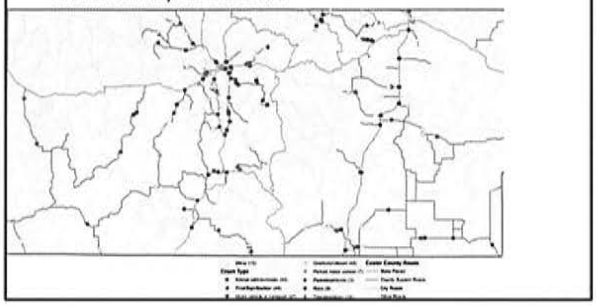
Paving More County Roads is not Recommended

- Widening would be required to meet standards
- Limited right of way
- Steep inclines
- Insufficient funding

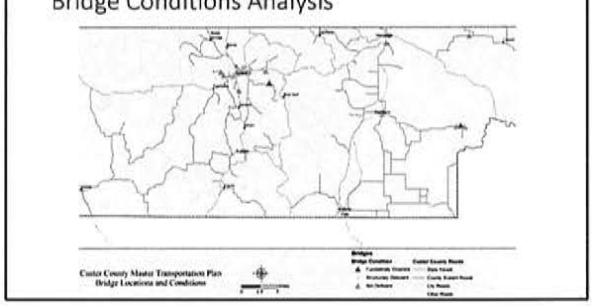
Paved Road Maintenance Strategies

- Sidney Park Road and Playhouse Road
  - Maintain year-round 6-ton load limit
  - Continue county program to chip seal, fog and restripe every 4 years
- Funds are currently unavailable to pave additional county roads
- Other roads may eventually need to be converted back to gravel
  - Missile Road, Mineral Drive, and segments of County Roads 345 and 753

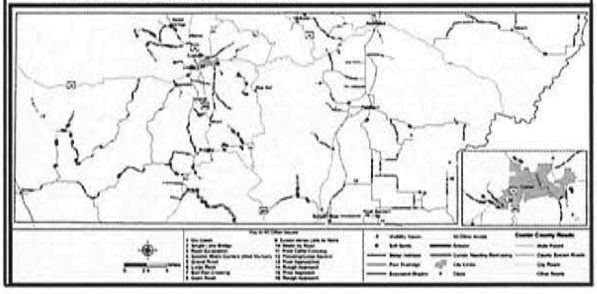
Crash Analysis Results



Bridge Conditions Analysis



Field Inventory Results



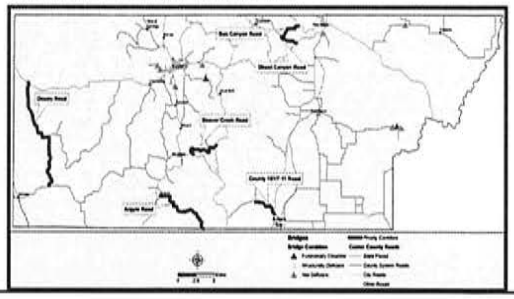
Blind Curve Examples

Steep Sides Examples


Excessive Grades Example


Erosion Examples


Priority Corridor Locations



Box Canyon Road Conclusions

- Safety analysis
  - 3 reported crashes in the past 5 years
  - Dust mitigation was identified by public as a high level need
- Change road designation from local to minor collector
  - Recognizes increased use and corridor needs
- Reduce excessive grades (proposed as a long range project)
  - Additional right of way is needed to address excessive grades
- Consider potential road connections to reduce traffic
- Implement dust control strategies

Dust Control Strategies

- Increased dust control can reduce ongoing maintenance costs
- Continued use of MgCl is recommended
  - Soybean oil should be tested as an alternative application
- Custer County provides blading and dust control upon request
  - The County covers half the cost
  - MgCl costs approx. $400/mile
- More funding for dust control is proposed in the long range plan

Dust Control Strategies

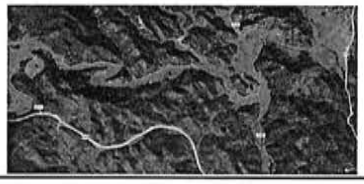
- Box Canyon Road and Ghost Canyon Road have unique conditions
  - Higher traffic volumes
  - Multiple subdivisions rely on these roads
  - Cost of dust mitigation borne by adjacent landowners
- A more comprehensive response to dust control is needed
  - Formation of a district to apply dust palliative annually
    - Leverage secondary road taxes for needed dust control projects
    - Spread the cost of dust mitigation among more landowners
    - Other roads can be included in the district
    - Can be implemented immediately

Ghost Canyon Road Conclusions

- Safety analysis
  - 8 reported crashes in the past 5 years
  - No crash pattern was identified
- Change road designation from local to minor collector
  - Recognizes increased use and corridor needs
- A long range project is proposed to address steep inslopes
  - additional right of way is needed to address steep inslopes
- Implement dust control strategies

Beaver Creek Road Conclusions

- Safety analysis
  - 2 reported crashes in the past 5 years
- Continue efforts to remove trees that block sight distances
- Continue efforts to flatten curves



7-11 Road (County Road 101) Conclusions

- Safety analysis
  - 6 reported crashes in the past 5 years
- Short range project added to address blind curves and visibility issues
- Long range project proposed for ongoing maintenance in response to heavy truck traffic

East Argyle Road (County Road 333) Conclusions

- Safety analysis
  - 6 reported crashes in the past 5 years
  - Pattern of run-off-the-road and rollover crashes
- Short range project added to reshape curves and provide additional aggregate
- Steep inslopes addressed within proposed county-wide steep inslopes/install guard rail projects (long range)

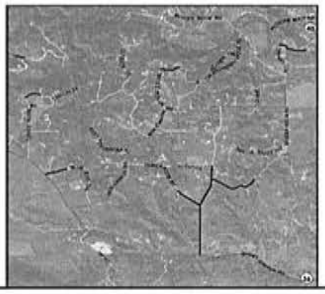
Dewey Road (County Road 769) Conclusions

- Safety analysis
  - 2 reported crashes in the past 5 years
  - Roadway flooding has been observed along the corridor
- A phased approach is needed to bring Dewey Road to county standards
  - Long range cross section improvements phased over time
    - Drainage improvements to reduce roadway flooding
    - Roadway surfacing improvements
    - New bridge along Dewey Road
- Additional improvements may be needed if uranium mining activity increases
- A rail loading facility may be needed near Dewey Road if limestone mining becomes active

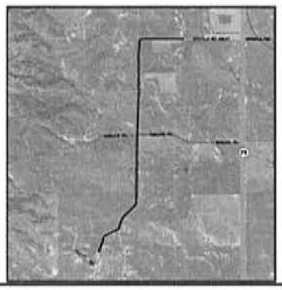
Potential Road Connections

- Improve access for emergency services
- Provide alternative access in case of road closure
- Reduce traffic impacts on existing streets and intersections
- Potential connections are approximations only
  - feasibility for implementation would be decided at a later date

Potential Road Connections West of Hermosa

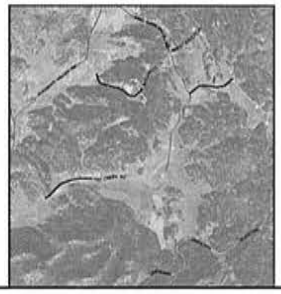


Potential Road Connections West Missile Road



Potential Road Connections Sidney Park Road

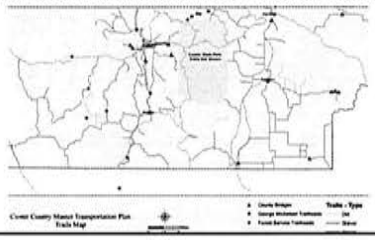
Potential Road Connections Southwest of Custer



Potential Road Connections West of Argyle

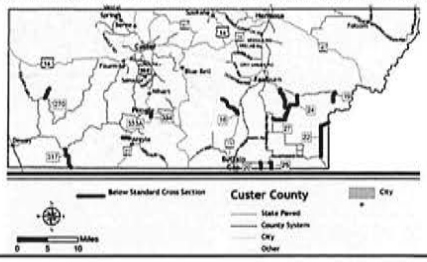
Conclusions – Bike and Pedestrian Trails

- Custer State Park has preliminary plans to connect Mickelson Spur Trail from Custer/Stockade Lake to Legion Lake/Game Lodge



Conclusions – Substandard Cross Sections

- Custer County intends to bring these roads up to standards over time



General Investment Strategies

- Implement a program to place gravel on all gravel roads over time
- Continue current paved road maintenance and load limits program
- Turn other paved roads to gravel if maintenance is too costly
- Continue applications for Bridge Improvement Grant funds to address bridge deficiencies
- Invest in County Highway Department facilities
  - Expansion of Highway Department shop
  - Addition of new salt shed by Hermosa

Short Range Project Recommendations

Project Number	Short Range Project	Estimated Construction Year	Estimated Construction Cost
1	Sidney Park Road Chip Seal/Fog - June	2017	$144,600
2	Playhouse Road Chip Seal/Fog - June	2017	$115,600
3	Sidney Park Road Pavement Marking - June	2017	$8,000
4	Bridge 1-J-268-004 Replacement - June	2017	$400,000
5	County Wide Grading and Re-Surfacing	Annual	$600,000
6	County Wide Small Structure Replacement	Annual	$100,000
7	Bridge 17-535-143 Replacement	2018	$650,000
8	Sidney Park Road Chip Seal/Fog	2021	$170,000
9	Playhouse Road Chip Seal/Fog	2021	$136,000
10	Sidney Park Road Pavement Marking	2021	$9,000
11	County Dust Control Program	Annual	$70,000
12	Beaver Creek Road Tree Removal/Cross Section Improvements*	2017 - 2018	+$10,000
13	East end of County Road 18 (East French Creek Rd)*	2017-2018	+$10,000
14	North end of County Road 18 (Bison Lane)*	2018	+$10,000
15	East end of County Road 21 (Cottonwood Cutoff)*	2017-2018	+$10,000
16	County Road 101 east of Highway 79*	2017	+$10,000
17	Curve Reshaping and Added Aggregate Along Argyle Road	2018-2019	+$10,000
18	Curve Reshaping Along Squaw Creek Road	2020-2021	+$10,000
19	Expansion of County Highway Department Shop Facilities	2013-2021	Unknown
20	Addition of a New Salt Shed By Hermosa	2017-2021	unknown
21	Hazelnoit Cutoff/Lower French Creek Rd Int (steep)*	2021	+$10,000

* Project to address identified blind curve or visibility issue

Long Range Project Recommendations

Project Number	Long Range Project	Estimated Construction Cost
22	Repair Bridge 17-150-147 over French Creek (11 miles E & 25 miles S of Fairburn)	$231,199
23	Repair Bridge 17-431-030 over Spring Creek (1 mile S of Hermosa)	$50,000
24	Repair Bridge 17-547-020 over Spring Creek (12 miles E of Hermosa)	$207,265
25	Repair Bridge 17-379-260 (0.4 miles E of Buffalo Gap)	$201,839
26	Annual County Wide Grading and Re-Surfacing	$600,000
27	Annual County Wide Small Structure Replacement	$120,000
28	Annual County Dust Control Program	$100,000
29	Sidney Park Road Chip Seal/Fog (every 4 years starting in 2025)	$200,000
30	Playhouse Road Chip Seal/Fog (every 4 years starting in 2025)	$165,000
31	Sidney Park Road Pavement Marking (every 4 years starting in 2025)	$13,000
32	Box Creek Road - Reduce Excessive Grades	Unknown
33	Annual County Wide Address Steep Inslopes/Install Guard Rail	Unknown
34	Dewey Road Cross Section Improvements (Phased over time)	Unknown
35	New Bridge along Dewey Road	Unknown
36	7-11 Road - Ongoing Maintenance in Response to Heavy Truck Traffic	Unknown
37	Ghost Canyon Road - Address Steep Inslopes	Unknown
38	New Roads to Improve Connectivity	Unknown

Project Schedule

• Notice to Proceed	8/1/16
• Existing Conditions Inventory	8/1/16 – 10/18/16
• Stakeholder Meetings	Ongoing
• Public Input Meetings (1st Set)	10/18/16 – 10/19/16
• Revenue Analysis & Draft Standards	10/19/16 – 2/15/16
• Issues Analysis & Plan Development	12/1/16 – 3/30/17
• Draft Report	May 2017
• Public Input Meetings (2nd Set)	6/13/17 – 6/14/17
• Final Report	July 2017

Comments and Questions?

- **Project Website:** www.custercountyzd.com

Stakeholder Meeting Notes

Several Custer County stakeholders were contacted from October 2016 through February 2017 to seek their input concerning the MTP. Copies of the public meeting notices were also sent to many of these stakeholders.

1. Prairie Hills Transit (PHT) - Contact: Barb Cline, Director

   Prairie Hills Transit operates a demand-response public transportation system. They stay mostly to the state routes and operate mostly within a 3-mile radius of city limits. They have a strong preference for paved roads as they limit wear and tear on their buses. Road maintenance and winter plowing are also important issues.

2. Custer County School District - Contact: Mark Naugle - Superintendent

   Bus services contracted with Harlow Bus Service, 1 route going north out of Custer. There is a school on the east edge of town. They provide some bus stops in town. Also, some routes to the west and south of town and through Custer State Park and Hermosa.

   High school kids are bussed from Hermosa to Custer. Some kids go to other schools. Winter maintenance is a big deal, especially the connection to Hermosa. The County and State do a great job. Some kids who live close walk or bike to school. Hermosa has done some SRTS improvements. Tourist season can present problems for kids crossing busy roads.

3. Custer Area Chamber of Commerce and Visitors Bureau - Contact: Dave Ressler, Executive Director

   Signage has been an issue. Sent email and copy of public notice.

4. Wind Cave - Contact: Tom Farrell Sent email on 10/14.

5. Large Manufactures/Agricultural Producers/Gravel Pit Operators (trucking interests)
   - Croell Redi-Mix - Contact: Less Jacobs, Regional Manager - Spearfish

     I explained what the Custer County MTP was about. I asked whether he knew of any issues or concerns? He said, not initially. I also asked about any plans for future facilities within the county. He said he would call me back after talking to people in the field.

   - Neiman Enterprises (Timber Company) - Contact: Kelly DeBusk, Transportation Manager

     Fixing blind curves would be nice. Our trucks can be difficult to pass. A lot of traffic during the tourist season. I also left a message for James Neiman, President.

6. Custer County Airport - Contacts: Jerry Stites, Rod Senn, KLJ Airport Manager

   There are 6000 estimated enplanements based on FAA records and from comments by Jerry Stites. No clear numbers. Plans for expansion? A 5-year plan. Freight? Needs? Would like an extension to the runway. Airport supportive of tourism April through October. 16 base aircraft, life flight helicopter, frequent medical transports from Custer Hospital, National Guard uses airport for training, Charter and corporate activity, firefighting base for forest service (main base for the Black Hills), Hot Springs is the next nearest Airport. Widening of runway is their top priority.

7. Custer County Ambulance Service - Contact: Ruth Airheart, Director

   No specific concerns. General maintenance - some roads in poor condition, some cattle guards are not maintained well at the edge of the guards, they serve everything from the Wyoming border to the east gate of Custer State Park, some areas subcontracted out. Some newer developments need to have roads built up to specifications (some private roads don't build roads to meet specifications). They need to accommodate cars meeting side by side, ambulances and fire trucks.

8. Custer Volunteer Fire Department - Referred to Custer County Fire Department

9. Elk Mountain School District - Contact: Superintendent Susan Ostenson

   No comments received.

10. Black Hills Electric Cooperative - Contact: Jesse Sorenson, System Coordinator

    They are seeing significant east-side development, noted in the Box Canyon and Beaver Creek areas. Traffic has tripled on Sidney Park Road, dusty with deep, steep inslopes through gravel area. Dust can be a safety hazard when passing other cars.

11. Black Hills Energy (Rapid City) - Contact: Corey Virtue, Construction Representative

    Nothing new for expansion is planned. We don't do much freight movement. South of Pringle along Hwy 89 and Argyle area has a lot of development going on since rural water has gone in.

12. Custer County Fire Department - Contact: Jim Lion

    They have concerns with general road maintenance. No specific concerns. Cattle guards get broken in or are not properly maintained. Also, trouble with some of the newer developments getting in and out due to the condition of the roads.

13. Southern Black Hills Water System (Hot Springs) - No response

14. Custer State Park - Contact: Jayme Severyn, Engineer

Jayme said the Custer State Park is in the preliminary planning stage of connecting the Mickelson Spur trail (the trail between Custer City and Stockade Lake) to Legion Lake and Game Lodge.

15. Dispatchers - Was routed to Rick Wheeler who raised no additional issues.

16. Black Hills Forest Resource Association (BHFRA) in Rapid City - Contact: Tom Troxel

    A trade association working with the sawmills. Hauling logs to the saw mills going over county and forest service roads. Concerned with design loads, weight restrictions, snow plowing in winter, maintenance. Safety on hills. Logging trucks are big trucks on narrow roads. Dust abatement because it impacts home owners.

17. City of Custer - Contact: Elmer Claycomb

    He raised a concern about Park Avenue still being shown as if it is a collector or arterial street. It should be a local street. He said that better alternative routes around Custer were needed. Would like Custer to have a bypass.

18. City of Hermosa - Contact: Dan Halsworth

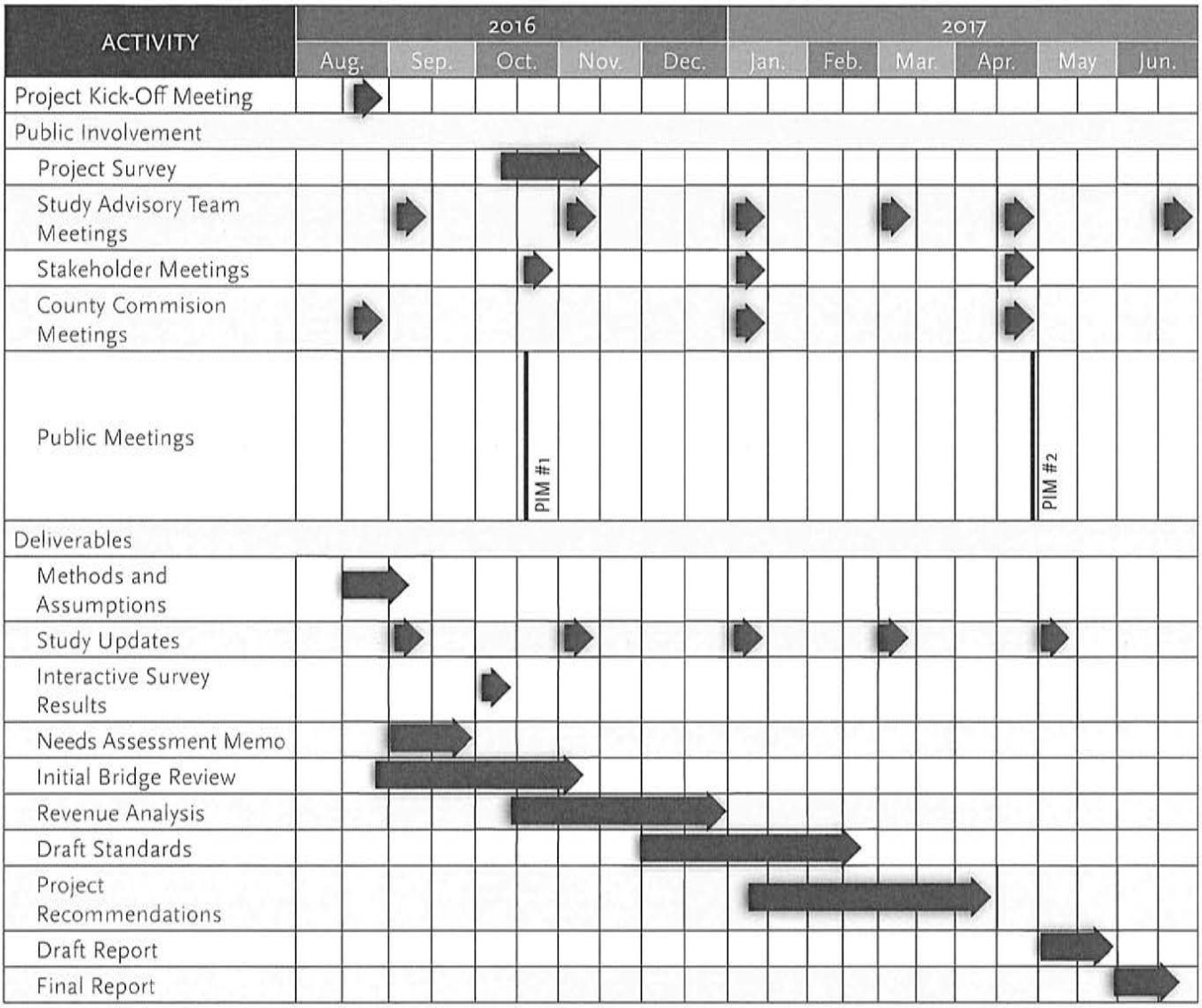
    He said that the City of Hermosa has had a lot of success using soybean oil to stabilize gravel and it performs well in reducing dust.

Custer County, SD

MASTER TRANSPORTATION PLAN (MTP)

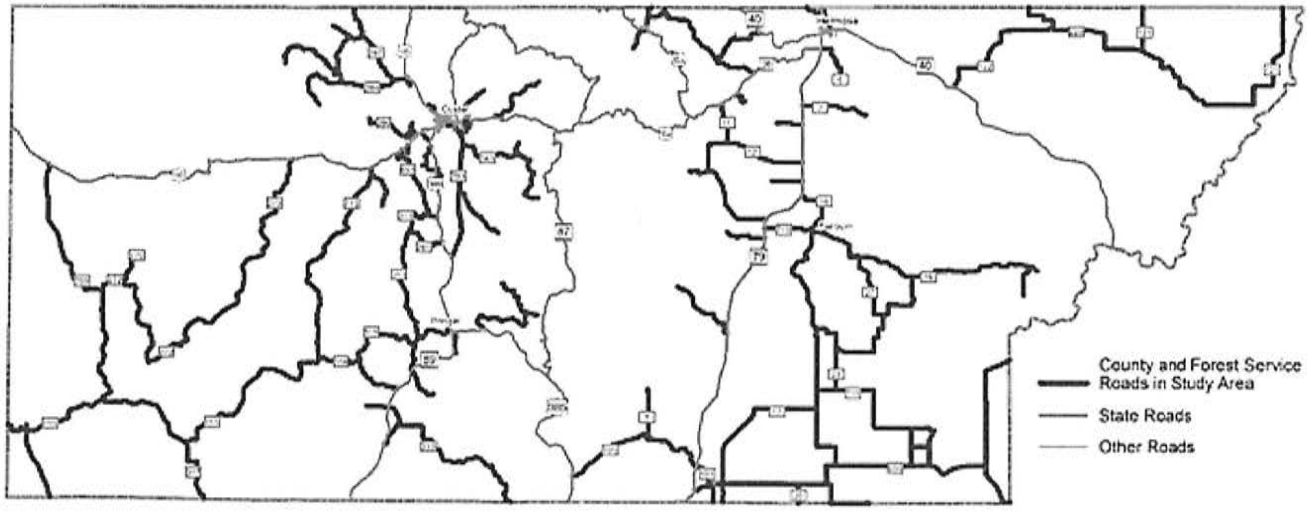
County Commission Brief
September 21, 2016

STUDY SCHEDULE:



SPECIFIC MILESTONES:			
Notice Proceed	8/1/2016	Issues Analysis and Plan Development	12/1/2016 to 3/30/2017
Study Advisory Team (SAT) Meeting #1	8/31/2016	SAT #5	4/19/2017
Custer County Commission	**9/21/2016 – We are Here**	Custer County Commission	4/19/2017
SAT#2	10/18/2016	Draft Report	5/1/2017
Public Involvement Meeting #1	10/18/2016 and 10/19/2016	Draft Plan Public Involvement	5/16/2017 and 5/17/2016
Stakeholder Meetings	10/18/2016 and 10/19/2016	SAT #6	June 2017
SAT #3	1/17/2017	Submit Final Plan	6/15/2017
Custer County Commission	1/17/2017	Closeout Project	7/28/2017
SAT #4	3/15/2017		

Study Area:



COUNTY MASTER TRANSPORTATION PLAN HIGHLIGHTS:

- Covers all County Roads and County maintained Forest Service Roads
- Provides a detailed evaluation of existing conditions
- Addresses roads, freight, pedestrian, bicycle, air, rail and transit travel
- Focuses analysis to address key problem locations
- Considers access needs for existing and future subdivisions
- Evaluates safety conditions of existing transportation system
- Develops typical sections for various road classifications
- Policy plan examines triggers for asphalt paving
- Financial and investment plan for short and long range needs
- Assists the county with future project prioritization

PUBLIC INVOLVEMENT OPPORTUNITIES:

- Six Study Advisory Team Meetings
- Meetings with several key County Stakeholders
- Two Sets of two Public Input Meetings
- Two meetings with the County Commission
- SDDOT website and County Needs Survey

Public Meeting 1: October 18th, 2016
5:30 to 7:00 PM
Custer County Commission Room
420 Mount Rushmore Road, Custer, SD

Public Meeting 2: October 19th, 2016
5:30 to 7:00 PM
Hermosa Elementary School – Lunch Room
11 4th Street, Hermosa, SD

South Dakota DOT
Connecting South Dakota and the Nation

KLJ

Custer County

Custer County

Custer County, SD
Master Transportation Plan (MTP)

County Commission Brief
April 26, 2017

Study Schedule:

• Notice Proceed	8/1/2016
• Study Advisory Team (SAT) Meeting #1	8/31/2016
• Custer County Commission	9/21/2016
• SAT#2	10/18/2016
• Public Involvement Meeting #1	10/18/2016 & 10/19/2016
• Stakeholder Meetings	10/18/2016 & 10/19/2016
• SAT #3	1/17/2017
• Custer County Commission	1/17/2017
• SAT #4	3/15/2017
• Issues Analysis and Plan Development	12/1/2016 to 3/30/2017
• Custer County Commission	4/26/2017 - We are Here
• SAT #5	4/27/2017
• Draft Report	5/15/2017
• Draft Plan Public Involvement	Mid-June
• SAT #6	June 2017
• Submit Final Plan	6/30/2017
• Closeout Project	7/28/2017

Online Survey Results

- Sixty people responded to the online survey.
- Almost 94% live in Custer County. Of those who responded, only 42.6% work in Custer County.
- Roughly 70% said there is minimal or no traffic congestion in Custer County. The other 30% said traffic congestion is only occasional.
- Over 82% walk or bike in Custer County
- Over 60% said overall traffic safety in Custer County is very safe or somewhat safe.
- Almost 70% said gravel road conditions in Custer County are in excellent, good, or fair condition.
- When asked, what transportation improvements are most important to you, the top three responses were county road maintenance, dust control, and roadway safety. Other improvements were listed as being significantly less in importance.
- Concerns regarding Box Canyon Road and Ghost Canyon Road dominated written responses.

Draft County Master Transportation Plan Highlights

1. Dust control program recommendations
2. Triggers identified for when gravel roads should be considered for conversion to asphalt – no roads recommended due to lack of funding
3. Detailed analysis of Box Canyon, Ghost Canyon, Beaver Creek, 7-11, East Argyle, and Dewey Roads
4. Potential future road connections to improve subdivision road connectivity
5. Short range project list expanded to address identified safety issues
6. Long range project list prepared to address needs having no identified funding source

Record of Meeting
Custer County Master Transportation Plan (MTP)
Study Advisory Team (SAT) #1
August 31, 2016
10:00 am - 12:00 pm, 12:30 pm - 2:30 pm
SDDOT District Meeting Room & Commission Meeting Room

Meeting Attendees

Gary Woodford, Custer County
Rick Wheeler, Custer County
Travis Bies, Custer County Commission
Phil Lampert, Custer County Commission
Rex Harris, Custer County Planning
Troy Schmidt, Custer County GIS
Jeff Knutson, Black Hills National Forest
Tracy Anderson, Black Hills National Forest
Rich Zacher, SDDOT Custer Area
Stacy Bartlett, SDDOT Rapid City Region
Jeff Brosz, SDDOT
Steve Gramm, SDDOT
Wade Dahl, SDDOT
Ron Williams, KLJ
Thomas McMurtry, KLJ
Steve Grabill, KLJ

1. Welcome & Introductions

Introductions were made. Mr. Grabill said that KLJ was excited to initiate the Master Transportation Plan (MTP) development for Custer County. Mr. Gramm provided a brief background on the intent of the Custer County Master Transportation Plan (MTP) and the intent behind the Methods and Assumptions (M&A) documentation.

2. Review of Draft Methods & Assumptions (M&A) Document

Mr. Grabill introduced Attachment 1 which was KLJ's suggested M&A for the Custer County MTP. Committee members recommended revisions to be incorporated into the final M&A document. These included the following:

- Addition of more stakeholders to be met with
- Addition of the Tie with Argyle to Mountain Lion development as an issue area
- Agreement to only address the 13 county bridges over 20 feet in length
- Various minor wording edits to be incorporated into the final draft

3. Review of Project Schedule

Mr. Grabill reviewed the project schedule. The SAT agreed with the schedule and the date and time for the first presentation to the County Commission was set for 8:30 on September 21.

4. Concur with Study Area

The SAT concurred that the study area will not include the City of Custer

5. Discuss Approach to Data Collection and Systems Analysis

Mr. Grabill said KLJ intended to start an existing conditions review of the overall road system by the week of September 19. He asked the SAT about the types of conditions that are prevalent on Custer County's road system.

Gary Woodford stated that the existing gravel road surfaces generally vary from 16 - 26 feet wide and normally within 66 feet of right of way. He said the County did not have typical sections and Mr. Grabill was referred to the SDDOT Local Road Plan.

SAT members noted there are issues with blind curves. SDDOT will provide KLJ with crash data. Regarding multimodal needs, there is a desire to connect Mount Rushmore to Michelson Trail. The SAT said that no effort should be expended to look at connections to hiking trail heads. KLJ said there would be minimal effort focused on air travel. The SAT said that if uranium exploration happens in SW part of the County, it could impact freight activity. Currently, the biggest freight type is timber.

6. Adjourn

Mr. Grabill adjourned the meetings at 12:00 and 2:30 respectively.

Record of Meeting
Custer County Master Transportation Plan (MTP)
Study Advisory Team (SAT) #2
October 18, 2016
2:00pm - 3:00pm
SDDOT District Conference Meeting Room

Meeting Attendees

Gary Woodford, Custer County	Rich Zacher, SDDOT
Rex Harris, Custer County	Steve Grabill, KLJ
Steve Gramm, SDDOT	Ron Williams, KLJ

1. Welcome & Introductions

Introductions were made.

2. Review Results from Field Inventory

Mr. Grabill explained how the field inventory was conducted. He said KLJ drove all the county roads and county maintained forest service roads and took geo-referenced photographs at the beginning and ending points of issue locations. This allowed the issues to be mapped. The results of the mapped issues were shown on boards that were to be used in the first set of public meetings.

Mr. Grabill also stated that KLJ had mapped crash data provided by SDDOT from 2011 through 2015. He said he was surprised at the number of severe crashes that had occurred on the system. Mr. Grabill highlighted some of the other issues that had been identified.

Mr. Gramm noted that other counties such as Pennington, Brookings, Yankton and maybe Brown County had adopted their own versions of road hierarchies to reflect differing road standards they wanted to adopt. He said these should be available on the SDDOT website. Mr. Grabill said he would review these and provide options for Custer County to consider.

3. Discuss status and use of MDT Website

Mr. Grabill said that the project was now on SDDOT's website. He said an online survey is also available on the website and he encouraged SAT members to take the survey. The survey was intended to examine travel patterns within Custer County. He said the website and survey are shown on the PowerPoint presentation used in the public meetings, as well as the comment sheets provided at the public meetings.
Mr. Gramm suggested that a poster be prepared that lists the website and online survey. He said this could be provided to Custer County for placement in stores and other public places.

4. Review Results from Stakeholder Interviews to date

Mr. Grabill said he has talked with most of the stakeholders that had been identified. Feedback he has received is summarized in the following bullets:

- Custer County School District - The county and state do a great job with maintenance. Tourist season can present problems with kids crossing busy roads.
- Croell Redi-Mix - They will provide a response in the coming days.
- Neiman Enterprises - They would like blind curves to be fixed.
- Custer County Airport - They plan to expand their runway. They have a 5 year plan that will be incorporated into this study.
- Custer County Ambulance Service - They are most concerned with general maintenance. Some cattle guards are not maintained well. Some development roads needs to be built to better standards.
- Black Hills Energy- They don't do much freight activity. They noted that south of Pringle a lot of development has occurred since rural water has gone in.
- Custer County Fire Department. They noted problems with cattle guards and with some of the newer developments getting in and out due to road conditions.
- Black Hills Forest Resource Association - Concerned with design loads, weight restrictions, snow plowing in winter and general maintenance. Also dust abatement as it impacts home owners.

Mr. Grabill asked for assistance with some stakeholder contacts. Mr. Gramm provided contact information for the railroads. Mr. Harris provided contact names for the cities of Custer and Hermosa.

5. Present PowerPoint to be Used at the Public Input Meetings

Mr. Grabill presented the PowerPoint that had been prepared for the public input meetings. He had revised it from an earlier version sent to SAT members. The newer version included photos that were examples of many of the conditions observed in the field.

Mr. Grabill reviewed the locations where new traffic data were collected. Mr. Gramm requested that KLJ send him the raw data.

6. Review Upcoming Scheduled Tasks

Mr. Grabill reviewed upcoming tasks that had been listed on the meeting agenda. There were no comments regarding the project schedule.

7. Additional Comments

No additional comments were received from SAT members.

8. Adjournment

Mr. Grabill adjourned the meeting at 3:00 p.m.

Record of Meeting
Custer County Master Transportation Plan (MTP)
Study Advisory Team (SAT) #3
January 25, 2017
2:00pm - 3:00pm
SDDOT District Conference Meeting Room

Meeting Attendees

Gary Woodford, Custer County	Stacy Bartlett, SDDOT
Travis Bies, Custer County	Wade Dahl, SDDOT
Rick Wheeler, Custer County	Jeff Knutson, Black Hills National Forest
Steve Gramm, SDDOT	Steve Grabill, KLJ
Rich Zacher, SDDOT	Ron Williams, KLJ

1. Welcome & Introductions

Introductions were made.

2. Discuss status and use of SDDOT Website

Mr. Grabill said that the project was on SDDOT's website. He said the website and online survey had been posted in stores and other public places. Only 6 responses had been received. The SAT discussed methods to get more people to respond to the online survey.

It was decided that Gary would ask the newspaper to place an article encouraging people to take the online survey. Mr. Grabill will send out emails to people who attended the public meeting and who had left an email address. The emails will encourage them to take the survey and to forward the email to their friends.

3. Review Results from First Set of Public Meetings

Mr. Grabill said public meetings were held in Custer and Hermosa on October 18 and 19 to receive input on Custer County transportation issues. There were 11 people who attended the Custer meeting and 49 people who attended the Hermosa meeting. The clear majority of people at the Hermosa meeting came to discuss dust and speeding

issues along Box Canyon Road and Ghost Canyon Road. There is also a desire to see fewer trucks along these corridors.

There was significant discussion regarding the use of soybean oil to control dust on gravel roads. Wade said he'd received some information from LTAP some time ago, which he recalled indicated that soybean oil didn't perform well under truck traffic or higher traffic volumes. He said he'd try to find the information and send it to Mr. Grabill. Mr. Grabill said he wanted the Transportation Master Plan to provide a strategy for ongoing dust control within the county.

4. Present Needs Assessment Document

Mr. Grabill said he met with Gary for the entire morning prior to the SAT meeting. He said the meeting was very valuable as he was able to verify issue locations, planned project information and to discuss possible additional corridor project needs. He noted that the public had asked that speed limits and speeding issues be addressed by the study. SAT members stated that speeding should be addressed as an enforcement issue.

Mr. Gramm said he had several minor edits he would send to Mr. Grabill. Mr. Grabill said he would incorporate these, as well as additional safety information and send out a final version of the Needs Assessment to the SAT.

5. Review Preliminary Analysis of Subdivision Road Connections

Mr. Grabill presented a map showing possible future road connections in the vicinity of Box Canyon and Ghost Canyon roads. He said this was likely to be controversial but he felt it was important to include in the plan and to seek feedback from the public. The SAT agreed. The SAT asked whether additional connections would be proposed elsewhere within the County. Mr. Grabill said yes, though they hadn't been mapped yet.

6. Discuss Pedestrian and Bicycle Facility Needs

Mr. Grabill said that based on KLJ's review of the existing system, most facilities are either in the towns or in the parks away from the County road system. He said they

had not identified any existing or future needs to date. The SAT agreed there might not be any County-related pedestrian or bicycle needs. Mr. Gramm suggested Mr. Grabill check with Custer State Park on whether they had any needs that should be addressed in the plan.

7. Review Recent and Upcoming Scheduled Tasks

Mr. Grabill said he gave the County Commission an update of the project status earlier that morning. He said a County Commissioner commented he was glad they were undertaking the study. Mr. Grabill said the revenue analysis was ongoing and that it was a challenge tying down projected revenues and expenditures. He said the next SAT meeting was tentatively scheduled for March 15, 2017. He said this may be a conference call. There were no comments regarding the project schedule.

8. Additional Comments

No additional comments were received from SAT members.

9. Adjournment

Mr. Grabill adjourned the meeting at 3:00 p.m.

Record of Meeting
Custer County Master Transportation Plan (MTP)
Study Advisory Team (SAT) #4
March 23, 2017
9:30am - 10:15am
Go To Meeting Conference Call

Meeting Attendees

Steve Gramm, SDDOT
Stacy Bartlett, SDDOT
Wade Dahl, SDDOT
Jeff Knutson, Black Hills National Forest
Steve Grabill, KLJ
Ron Williams, KLJ
Wade Kline, KLJ

1. Welcome & Introductions

Introductions were made. Some SAT members had issues with the Go To Meeting program and were unable to attend. Therefore, the meeting was cancelled.

2. Discussion of How to Proceed Next

Mr. Grabill said that KLJ was ahead of schedule and he hoped to submit a draft MTP Report in early April. This will allow the SAT to review and comment on the draft MTP Report at the next SAT meeting. He said he intended to attend the County Commission meeting in April along with the next SAT meeting. Steve Gramm will send a Doodle Poll to coordinate the meeting date and time.

The website survey was briefly discussed. Mr. Grabill said 60 people responded to the survey. Steve Gramm asked whether emails or an ad in the paper resulted in the increased response. Mr. Grabill responded that he believed the emails had the greatest impact. Mr. Grabill will send out an email to the SAT asking for any input he was hoping to obtain from today's SAT meeting.

3. Adjournment

Mr. Grabill adjourned the meeting at 10:15 a.m.

Record of Meeting
Custer County Master Transportation Plan (MTP)
Study Advisory Team (SAT) #5
April 27, 2017
1:00pm - 3:00pm
SDDOT District Conference Meeting Room

Meeting Attendees

Steve Gramm, SDDOT
Rich Zacher, SDDOT
Jeff Brosz, SDDOT
Gary Woodford, Custer County
Rex Harris, Custer County
Jeff Knutson, Black Hills National Forest
Steve Grabill, KLJ

1. Welcome & Introductions

Introductions were made.

2. Discuss Results of Completed Online Survey

A copy of the online survey results had been emailed to the SAT prior to the meeting. Mr. Grabill said 60 people responded to the survey. He pointed out that the survey asked people what transportation improvements were most important to them, the top three responses were county road maintenance, dust control, and roadway safety. Other improvements were listed significantly fewer times as being important.

Mr. Grabill commented that the draft MTP seemed to address these items well. He reviewed elements of the report that addressed the top three survey responses.

3. Discuss Project Development Efforts Since Last SAT Meeting

Mr. Grabill said he attended the Custer County Commission meeting on April 26 and gave them an update. He reviewed the project schedule, online survey results, and highlighted major items that would be included in the draft MTP. He said a commissioner expressed interest in proposed subdivision connections that were being proposed by the plan. He asked whether Bender Ridge Road was included. Mr. Grabill

determined that is was. Another commissioner commented that the public had been quieter than usual since the MTP process started. He felt this indicated people are waiting for the results to come out and are hoping that the issues they care about are being addressed.

Mr. Grabill reviewed the draft MTP with the SAT. The draft plan had been emailed on April 14, 2017. He noted there were issues with some page numbers that would be corrected. He had also received comments from Mr. Gramm via email.

On page 28 of the draft report, County staff commented that the County does not have a mechanism in place to fund non-county road improvements. The County will provide blading and dust control on these roads if the subdivision provides a 50% match. There was also discussion on the County design standards starting on page 48. Mr. Gramm suggested that substandard County roads be identified. Mr. Woodford will provide a list of substandard roads to be included in the MTP. Mr. Harris stated that one of the Custer County typical sections was in the process of being dropped. Mr. Grabill will note that change in the document.

There was significant discussion regarding the Investment Strategies and Recommendations chapter of the report. Mr. Gramm noted that on many county plans, an analysis would address whether there are insufficient funds now, and how much more funding is needed in the future. Mr. Grabill pointed out that based on his conversations with Mr. Woodford, there are many county roads that would benefit from improvements but cannot be upgraded due to lack of funds. Mr. Grabill agreed to note this in the report. However, precise funding needs and project cost estimates were not possible in many cases given the uncertainty of how much the county will invest in many of the listed projects. More explanation of this will be included in the next draft of the MTP.

Mr. Grabill asked for direction in how to distribute the draft MTP for County Commission review. It was determined that Mr. Grabill will incorporate the comments

he's received into the draft MTP and send 10 hard copies to Mr. Woodford for distribution.

4. Review Remaining Scheduled Tasks

Mr. Grabill said he had proposed only 1 final public meeting be held in Hermosa to receive input on the project. Given that the County Commission can conduct their review as part of a public meeting, the Commission meeting will also be addressed in the ad. The following is a list of remaining tasks and a schedule for completion:

- Incorporate comments into draft MTP 5/5/17
- Deliver 10 copies to Mr. Woodford for Co. Commission review 5/5/17
- Make draft MTP available for public viewing 5/24/17
    - SDDOT Website
    - County Auditor's Office
    - Custer and Hermosa Libraries
- Advertise for public meetings 5/24/17 & 6/7/17
- Conduct public meeting in Hermosa 6/13/17
- County Commission review/public meeting 6/14/17
- Close public comments period 7/3/17
- SAT Meeting #6 7/11/17
- Submit Final MTP 7/18/17
- Commission Accepts Final MTP 7/26/17
- Project Closeout 8/15/17

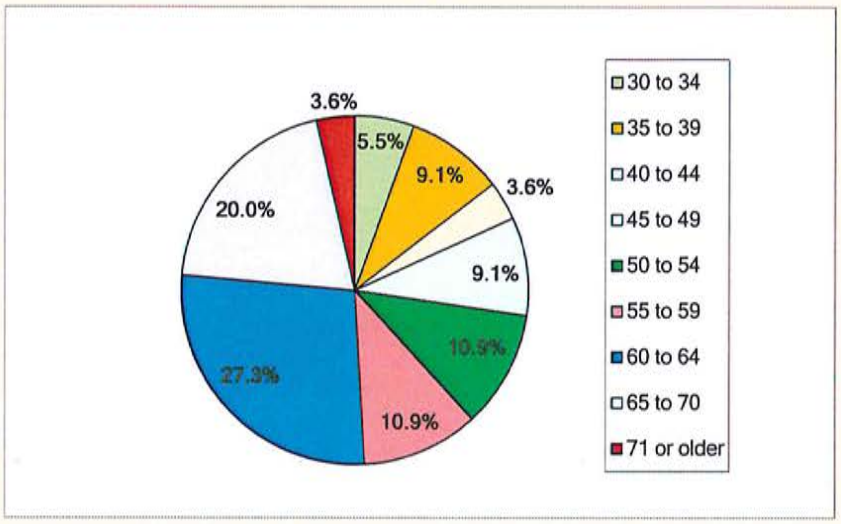
Mr. Gramm stated that Mr. Grabill will need to request a time extension

5. Adjournment

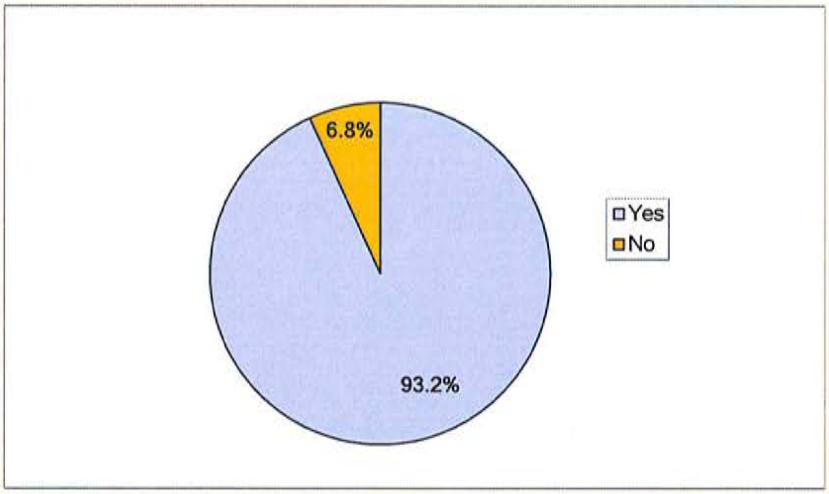
Mr. Grabill adjourned the meeting at 3:00 p.m.

Appendix II
FREIGHT SAFETY ANALYSIS

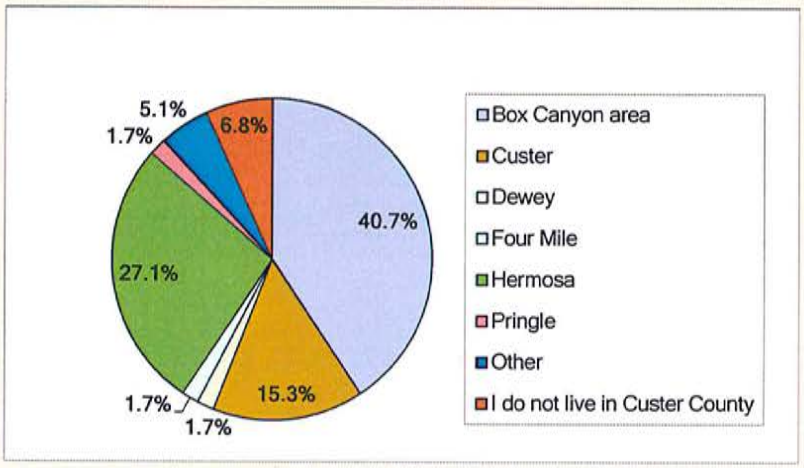
What is your age?



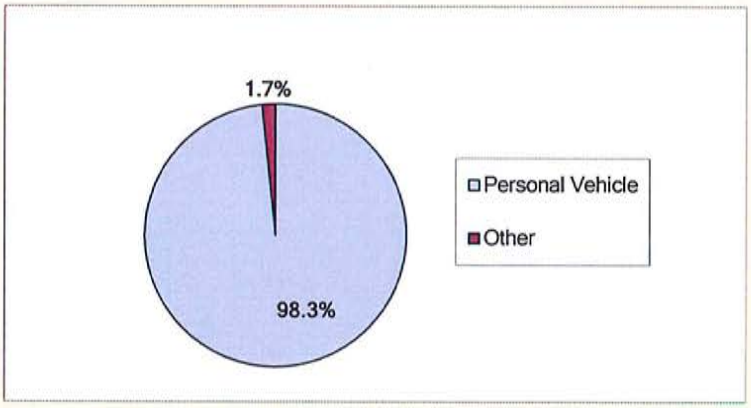
Do you live in Custer County?



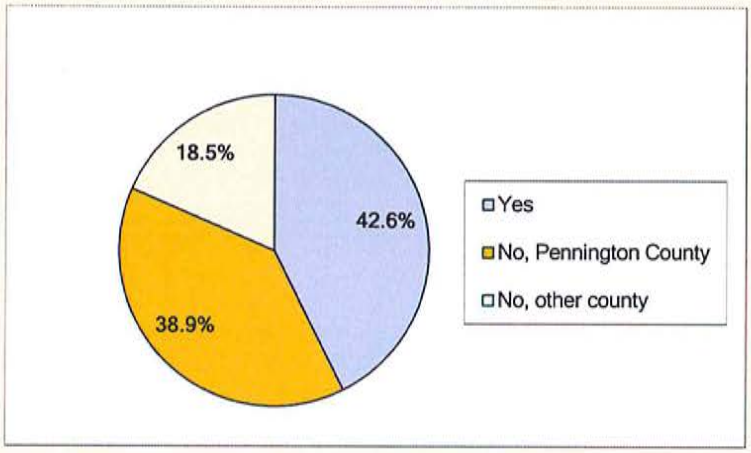
In/near which community do you live?



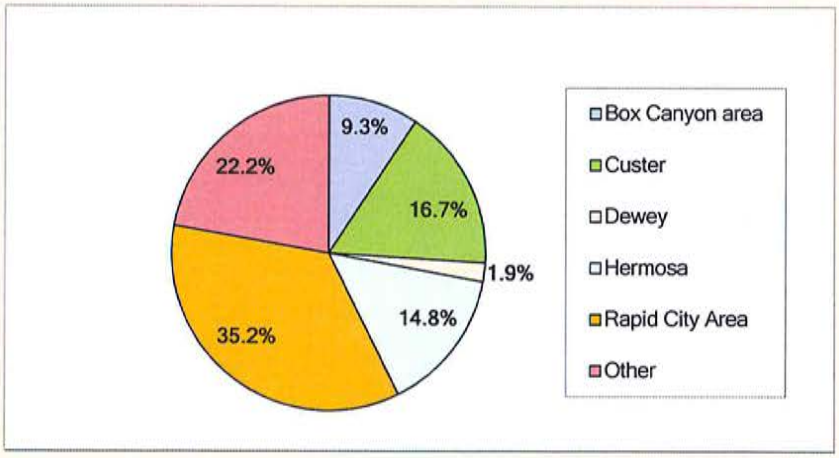
In general, what mode of transportation do you most often use for local travel within Custer County?



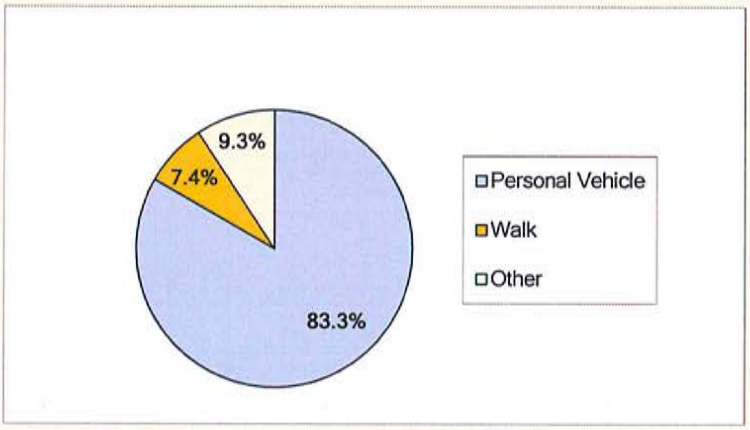
Do you work in Custer County?



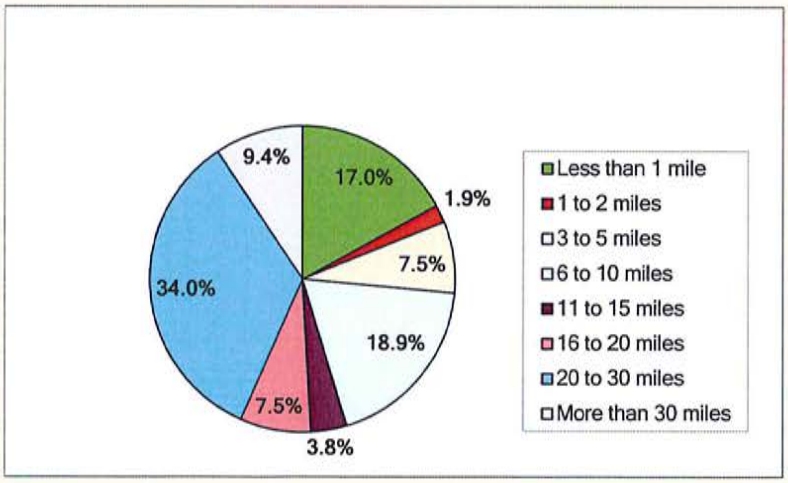
In/near which community do you work?



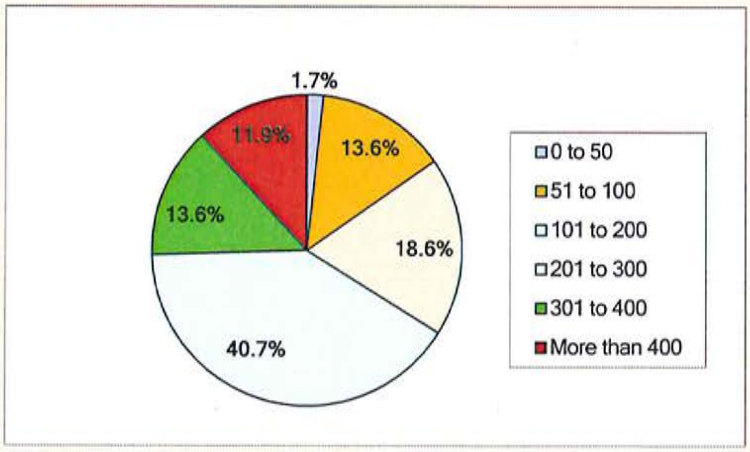
What mode of transportation do you most often use to get to work?



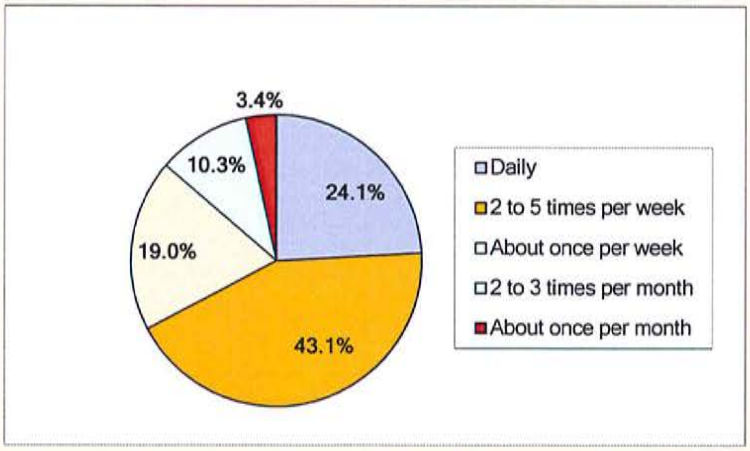
Approximately how many miles is your commute to work (one-way)?



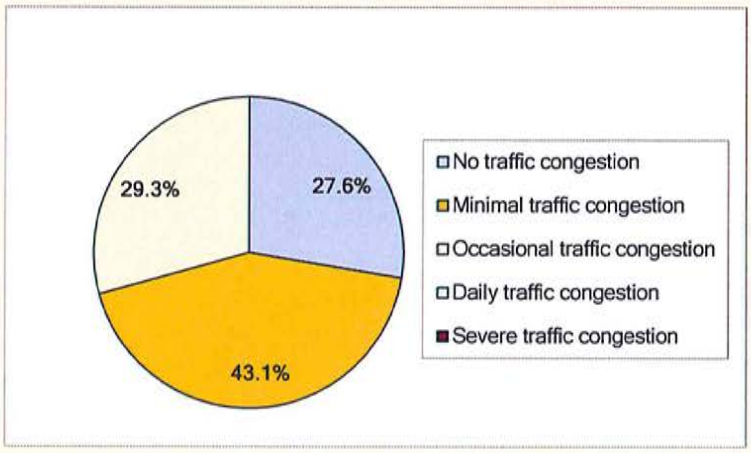
On average, how many miles do you drive in one week?



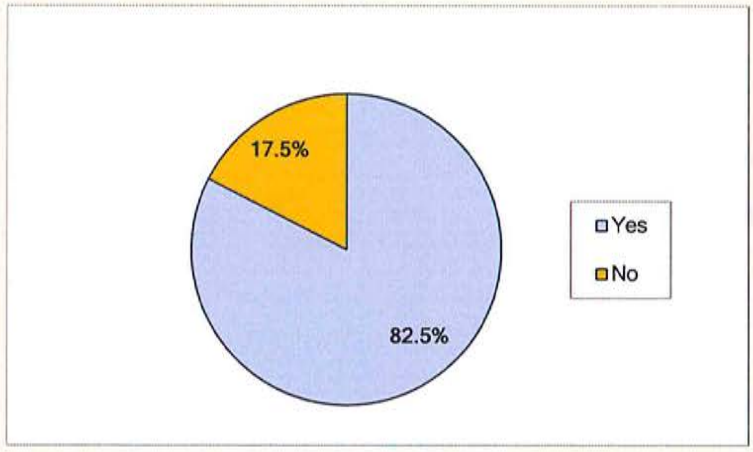
On average, how often do you travel to Rapid City/Pennington County?



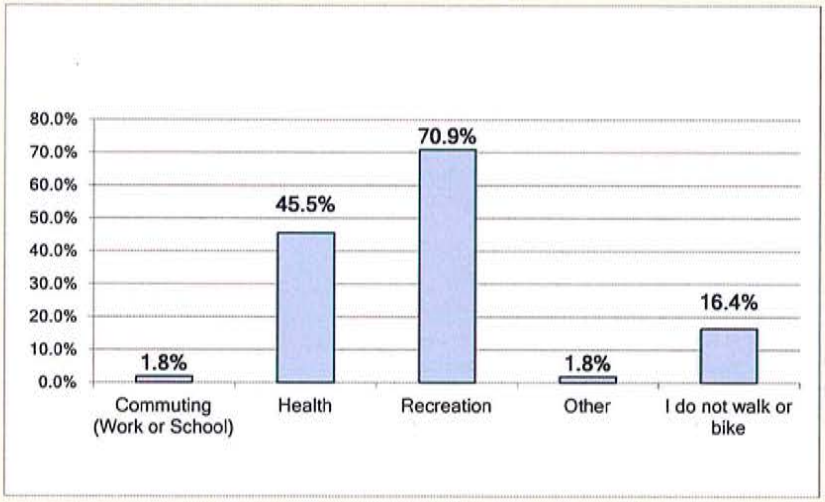
Please rate overall traffic congestion in Custer County



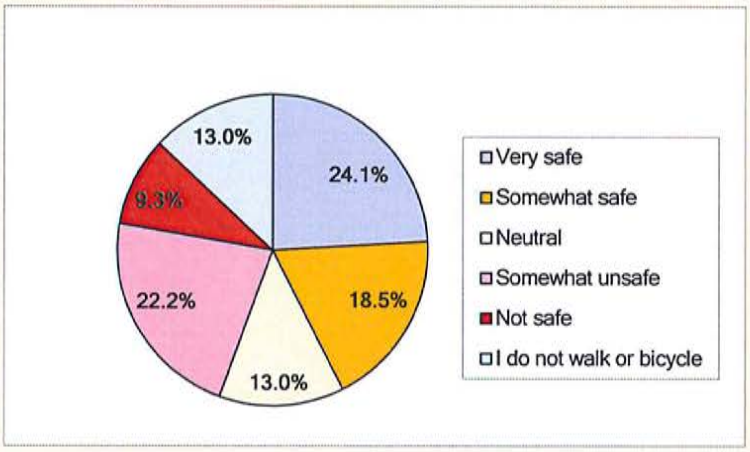
Do you walk or bike in Custer County?



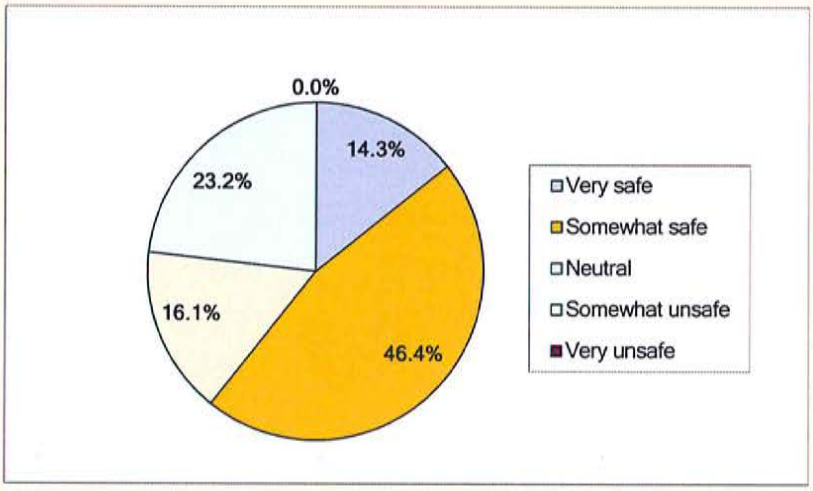
What are your primary reasons for walking or biking in Custer County?



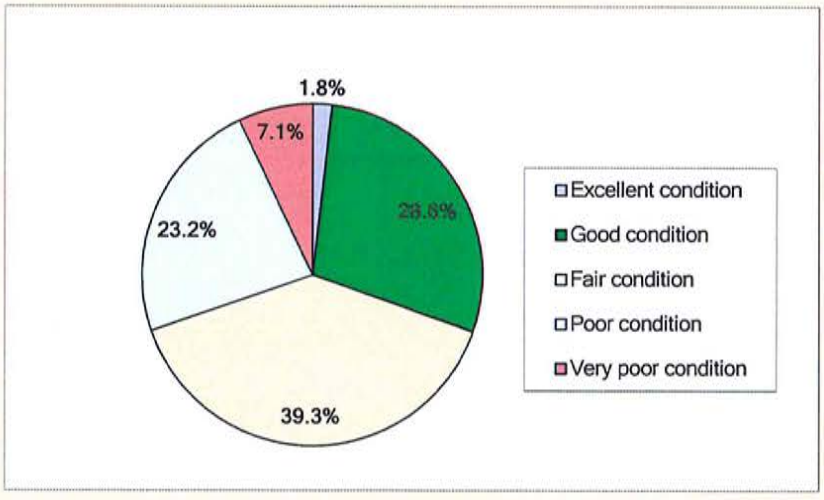
How would you rate your safety as a walker or bicyclist?



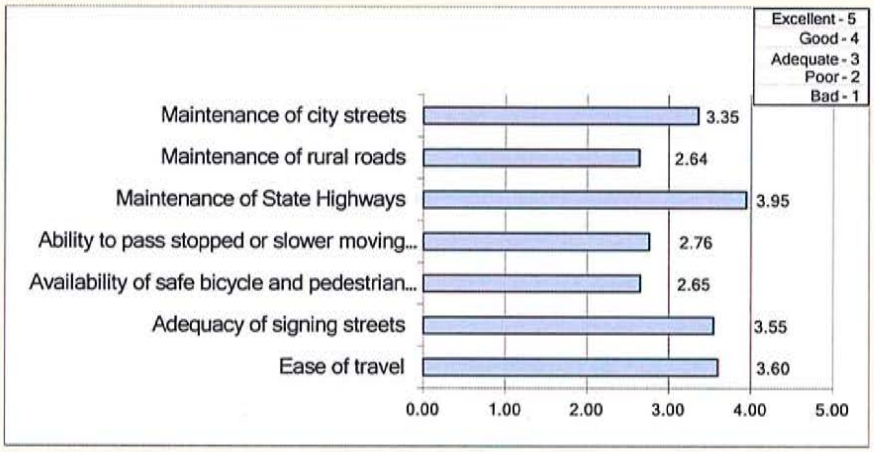
Please rate overall traffic safety in Custer County



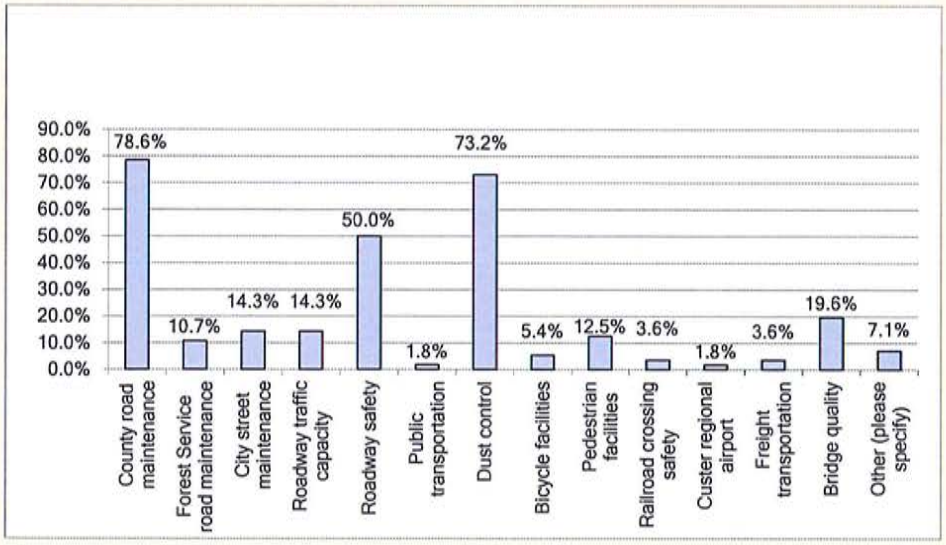
Gravel road conditions throughout Custer County are generally in:



Please rate satisfaction with various components of Custer County's transportation network.



What transportation improvements are most important to you?



Are there destinations in Custer County that you would like to walk or bike to that you currently cannot due to lack of adequate connections and/or unsafe routes? Please describe these destinations, current available route and what makes them unsafe.

1. From Four Mile to Custer. A separate path is needed otherwise a person has to walk/bike on the highway shoulder. And in the summer it is very dangerous sue to high volume of traffic.
2. Into town from the west there are no bike paths, riding or walking paths. The Mickelson Trail goes north and south. The Mickelson extension goes east of town. Bridges on Hwy 16 are particularly unsafe.
3. Bicycle riding isn't safe on the Box Canyon roads due to the loose gravel.
4. Dirt roads (dust) in Box Canyon and on Ghost Canyon Rd
5. Not enough shoulder to walk safely
6. City of Custer
7. I live in West Custer County, the roads are not well maintained by the "Road Crew". The roads are never sufficiently graveled - gravel is larger than 3/4" as required by code. Emergency Vehicles will have a great deal of difficulty reaching interior streets.
8. I would like to walk or bike on Ghost Canyon Road but the speeding traffic and dust make it dangerous and unhealthy.
9. Box Canyon Road
10. hike in Custer State Park and along Battle Creek Road -- Ride bike in Custer State Park
11. no
12. wilderness areas have been shut off to biking.
13. Box Canyon area. Traffic goes way to fast and they DO NOT slow down
14. There are no walkways to do this safely in the Hermosa area.
15. Live off Box Canyon Road. Live in the country we don't walk walking or biking trails
16. Not for me but kids going to school could benefit from a connection to the Mickelson Trail down to the school.
17. We ride horses in and around the community roads and do not consider them to be particularly safe for man or beast.
18. Try to bike from our home on Outback Trail to the Health and Education Center on Battle Creek Rd by way of Box Canyon and Bender Ridge. High speed traffic on gravel with narrow roadway make it unsafe.
19. Drivers that do not adhere to the speed limit on Box Canyon Road make walking and biking unsafe. Combine that with the dust and poor visibility - not healthy.
20. Trying to walk or bike on Ghost Canyon is dangerous due to the speed people drive and lack of manners in slowing down when they see people on the side of the road.

Are there any specific safety issues that you are aware of or concerned about?

1. The intersection of Wind Song Valley Rd. and Sweet Breeze Lane is a blind intersection. There has been a potentially serious accident in the last year. There has been a significant increase in traffic on Wind Song in the last 15 years.
2. Yes, at the intersection of Wind Song Valley Rd. and Woodnote Lane. This is a blind intersection due to a hill and curves that is used as a school bus turnaround. We asked to

have the roadbed lowered this intersection over 15 yrs. ago. Nothing has been done despite recent accidents at this location. There is a lot more traffic here now than 15 yrs. ago.

3. no
4. Not many posted MPH signs
5. Heavy dust on Box Canyon Road. At times, you cannot see.
6. Sidney Park Road needs improved.
7. When roads are dry the dust on box canyon makes visibility difficult
8. Better roads
9. Additional guard rails need to be installed in Hell Canyon; 3rd Street in the City of Custer needs to be paved; and all county roads would be better maintained by the County Highway Department. Road Crews can't keep up with the demands.
10. Ungraded gravel roads
11. Box continues road is VERY dusty and hard to see oncoming traffic especially on the big hill. Lots of traffic on that road
12. Box canyon road is steep at open cut and two steep hills before Ghost Canyon road. Also, extremely slippery when snow gets packed due to the plow not getting down to the gravel and the drop off on the side of the gravel has caught many cars and trucks and pulled them into the ditches, can't tell where the road edge is and the ditch starts due to the plowing level even with the road but is actually in the ditches.
13. People speeding and driving dangerously
14. Foreign drivers that stop in the middle of the road to view wildlife
15. better signage
16. Many roads are dirt or gravel. Dust results in sometimes not being able to see the traffic in front or coming from behind.
17. Box Canyon Road - extreme dust, speeders Battle Creek Road - narrow bridge and curves
18. dust on Ballt Creek Road - creates a diminished visibility and breathing risk
19. Excessive dust on Box Canyon which effects visibility.
20. traffic overload on some roads has deteriorated the road base.
21. Aggressive driving on Box Canyon Road speeding
22. Light duty dully pickups parking on US HWY 16 in downtown Custer. People not using crosswalks.
23. Box Canyon Road
24. Dust from box canyon road
25. Box Canyon at top of hill is unsafe, guard rails are a joke, especially in winter
26. During certain times of the day and especially during tourist season the intersection on hwy 79 and hwy40 at flying j truck stop can be quite treacherous. Even with reduced speed to 55 mph in approach to Hermosa the terrain and slope of the hwy make it difficult for oncoming and crossing traffic. With semi traffic, campers and private vehicles there seems to have been more accidents in this location than I think acceptable. As a local resident who travels this route with my children I would appreciate the county looking into this location as a safety concern. Thank you for your time and attention.
27. Hill on Box Canyon
28. Gravel roads have cut too deep on curves on Box Canyon road and has made it treacherous for two vehicles to travel at the same time when traveling in opposite directions.

29. speeding
30. There are numerous blind corners/hills on roads that were built 50 plus years ago. Early Commissions imposed no standards let alone the standards of the day. They continue to backpedal on any standards such as were developed in the early 2000's. Again, political interests intervene to save some developer money.
31. Hills, curves, narrowness, and speeds traveled, as well as size of trucks.
32. Speed on Box canyon road, dust decreases visibility
33. High traffic, speed and dust on Box Canyon.
34. Dust control on Box Canyon and the erosion of the roads and especially the big cut in the hill. The ruts are so bad that my vehicle bounces all over the road when doing the speed limit or less than the speed limit.
35. Drunk drivers
36. Narrow, winding roads
37. I have seen many accidents or near-accidents near the Crazy Horse Memorial intersection.
38. The speed people travel on dirt roads.
39. Narrow highways

Please note specific locations of Poor or Very Poor gravel conditions.

1. Box Canyon road, ghost canyon road - poor snow removal, lack of ice melt, narrowing of box canyon road with deep ditches cause vehicles to slide off the road, the last time ghost canyon road was replaced was 2007 after the Hermosa flood. D
2. Battle Creek, Bender Ridge, Box Canyon, and Ghost Canyon Roads, but has improved somewhat over past 6 or so months.
3. Box Canyon Road
4. Sidney Park road needs improved.
5. Entrance to Battle Creek Road at hey 40 usually has pot holes
6. Custer Highlands
7. Rock Road, Frontage Road, Mountain Shadow...
8. Ghost Canyon Road Box Canyon Road
9. Box canyon road is very dusty and can be hard to see oncoming traffic
10. Box Canyon Road
11. All gravel need dust control
12. Box Canyon Road
13. Argyle Road (333) and Argyle Loop
14. The south end of Argyle Loop needs work - we reported a problem right off Hwy 89 and it was never addressed. The Loop needs gravel - not just blading
15. Ghost Canyon and Box Canyon. Lack of gravel or the type of gravel chosen may be the cause of unreasonable dust. Trucks coming and going from a local gravel pit probably are a factor in the quality of the road surface and the amount of dust.
16. Box Canyon Road; Battle Creek Road
17. Battle Creek, Box Canyon and Ghost Canyon
18. Ghost Canyon is terrible. When dry, the dust is so bad you have to stop when you meet a car. My pasture is always covered in dust. Not good for the livestock either or our health.

19. Battle Creek, bender ridge, box canyon. Slopes to outer edge, slide off in snow or mud!!! Ruts! Rough roads! Excessive washboards!!! Steep hill up box canyon: the top should be shaved off and lowered!
20. Box Canyon Rd., Lower Spring Creek Rd.
21. Hill on Box Canyon Road
22. Box Canyon Road
23. Box Canyon road at top of hill and up the hill is very bumpy again. And terribly dusty...
24. Box Canyon Road VERY DUSTY lot of times can't see when someone goes by and hope no one is passing them
25. Box Canyon Road
26. Box Canyon Road
27. The gravel surfaces are not bad but continuing maintenance is an issue. The Highway Dept. has spent a lot of time laying gravel but, again, original design is an issue such as the first 1/2 mile of Limestone/Medicine Mtn where snow blows in and sight lines are problematic. The whole Box Canyon Rd. issue is one caused by the Commission in 2003 or so when Commissioner Marv Bishop pushed through putting the road on the system as it was a financial boon to him and his brother. The tie in to Ghost Canyon made it a through way and exacerbated an exiting problem. The "hill" has not been as big a problem as we originally thought but it does not meet anyone's standards. Argyle Road from 89 in for a mile or two needs to be straightened. However, it does slow traffic down. Maybe that is the element that needs to be thought through. What are the unintended consequences of whatever we do? Sometimes we do not see that.
28. Box Canyon Road
29. Box Canyon dusty conditions.
30. When the roads are graveled in Box Canyon, this fix only lasts up to a month and they are back to as bad, if not worse, than before the gravel was laid. I have grown up my whole life living on gravel roads but have not experience the poor conditions that I have with our road. Maybe it is the type of materials being used to build the roads? The roads are hard on our vehicles and bring down our property value.
31. Cannot think of any.
32. Pretty wash-boardy on Ghost Canyon area roads.

Are there any specific transportation improvements you think would be beneficial to Custer County in the next 20 years?

1. Repaving ghost canyon road and box canyon road with a product other than gravel to withstand the volume of traffic and control dust. Gravel with tar for a permanent hard surface or blacktop would be a better solution
2. Walking/bike path from Custer to Four Mile along Hwy 16 similar to the Mickelson Trail extension from Custer to Custer State Park. Improve dangerous intersections throughout the county.
3. A safe walking/biking/equestrian route on the west side of Custer out to Fourmile area that ties in to the Mickelson Trail.
4. no

5. Cutting down height of cut going up Box Canyon Road; chip-sealing or treatment of some sort on the gravel roads to decrease dust; treating icy roads w/ gravel/salt during snow season
6. Dust control on Box Canyon Road and Ghost Canyon Road
7. Get rid of corrupt road districts where they pocket the money instead of maintaining the roads.
8. Maintaining rural roads needs to be done by the Highway Department. Paving rural roads would lessen the damage done by the need of snow plowing in the winter months. The areas that may be graveled are upturned and additional potholes are created. This can be detrimental under snow. Please consider taking over the maintenance.
9. Improve maintenance and dust control on rural gravel roads
10. Paving box canyon road
11. Keeping up with the wear and tear on county gravel roads. Box canyon road has 400 plus vehicles per day, including heavy trucks which is very hard and noisy, Jake braking on hills daily in the spring summer and fall. The road needs to have a maintenance plan to keep the gravel in place and stable, pot holes, groves, dust and such. riding a motorcycle is very scary with these items to dodge.
12. Dust control and speed control
13. Something will need to be done about the cut and Box Canyon Road. The road 'improvement ' last summer narrowed the curves, made deep crowns on the sides of the road and the snow plowing straight across these areas put many vehicles in the ditch this winter when the deep snow grabbed the vehicles tires and pulled them down into the graded sides
14. You can start putting the wheel tax and unimproved road tax to use on the unimproved roads in the county.
15. Continued maintenance of county roads. Better winter plowing on Hwy 89
16. Primarily would like to see Box Canyon and Ghost Canyon from 36 to Box Canyon paved. If this is not feasible, these roads could be treated with mag water without requiring the homeowners to foot the bill.
17. Fix Box Canyon Road for safety for sure
18. pave Battle Creek - Box Canyon and Ghost Canyon
19. Paving Battle Creek Rd/Bender Ridge and Box Canyon Road
20. Widen and pave ghost canyon rd
21. Strict requirements on developers that impact our current roads with increased traffic. Make more of new road costs fall on the developers.
22. Box Canyon road and hill. Too much traffic for a gravel road. Top of hill very dangerous.
23. Paving box canyon road
24. Definitely dust control on Box Canyon area
25. Bridges are very important for safety and local economy.
26. People moving out of Box Canyon and Ghost Canyon because of the dust on the roads
27. The cut on box canyon road & dust control on box canyon road & ghost canyon road
28. Another road in to Box Canyon as the building keeps going and one road cannot handle the traffic
29. There needs to be less political tinkering with the process and let the staff do its work. In case you have not figured it out I am a former Custer County Hwy Supt. If you would like to visit more Rich Zacher can put you in touch with me. I have a unique perspective

as I am a social scientist who was put in that position in 2002. I try to be fair but the complexity of the issues seems to be lost on the politicians at times. Couple that with a Commissioner or two who at times puts self-interest above public interest.

30. Start paving the more heavily trafficked roads.
31. Dust control, widening and speed control on Box Canyon Rd.
32. Paving high use gravel roads
33. More passing lanes to allow residents to pass brain dead tourists
34. Can't think of any.

Appendix III

SUPPLEMENTAL SAFETY ANALYSIS REPORT

Memorandum

Date: 2/14/2016

To: Custer County Study Advisory Team

Copy to:

From: Steve Grabill

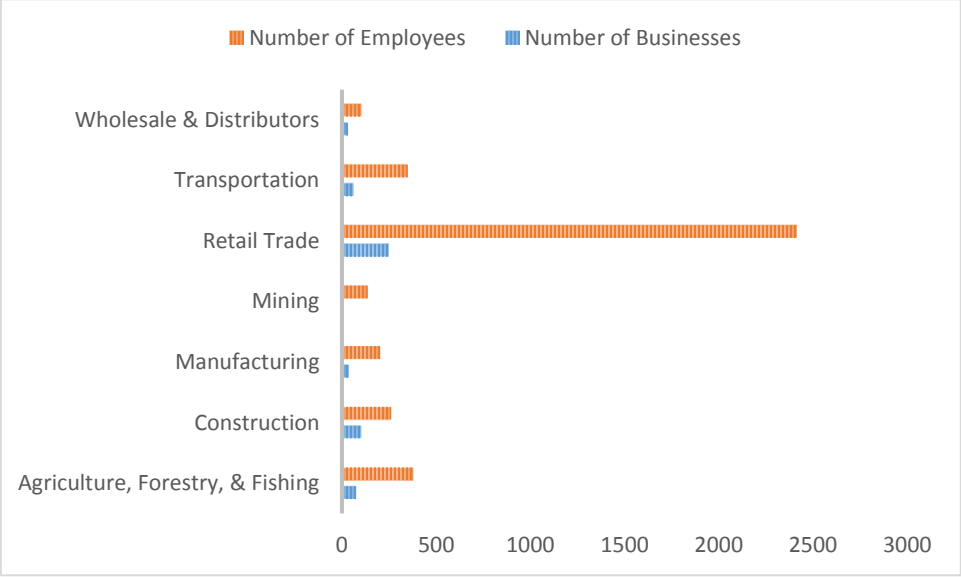
RE: Custer County Master Transportation Plan (MTP) – Freight and Safety Analysis

Custer County Freight Overview

Freight Trends

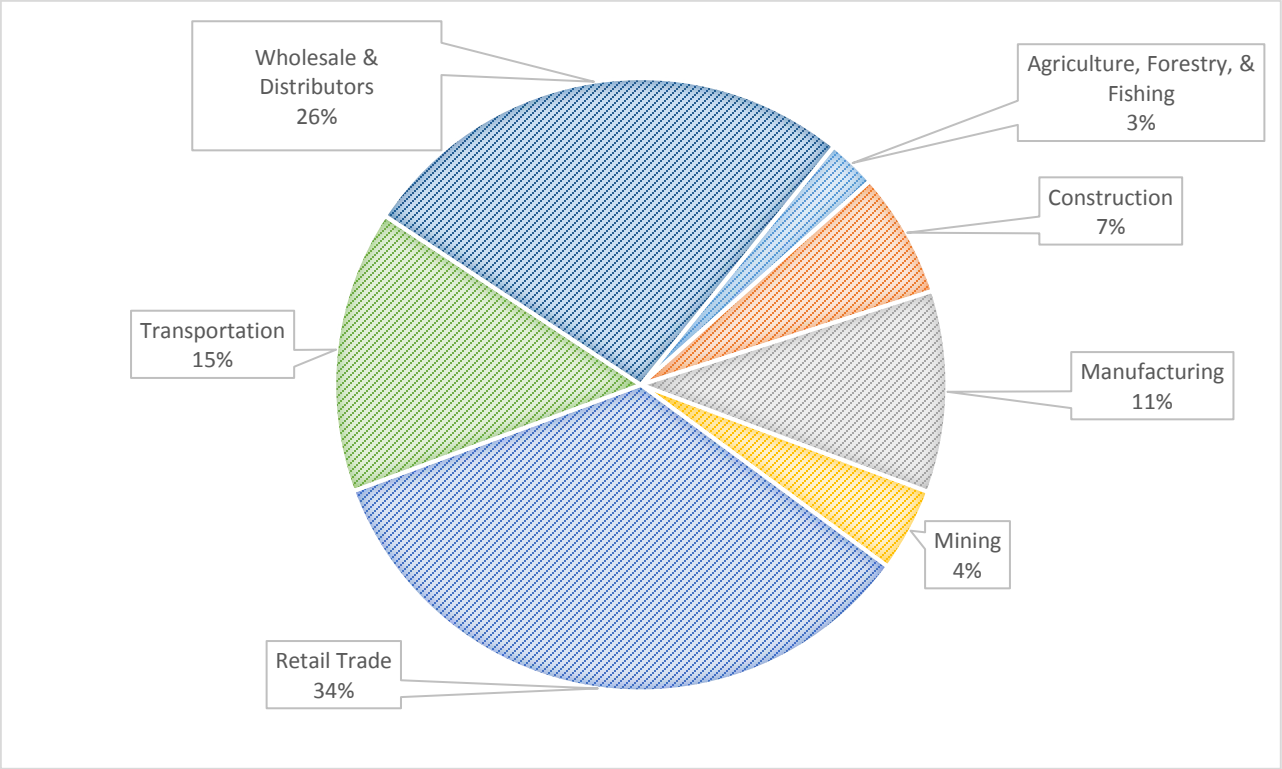
The following subsections document freight trends and infrastructure for Custer County, South Dakota. While Custer is largely a rural county, there is a considerable amount of freight being generated and consumed by its residents. Understanding freight patterns will assist the county in identifying critical investments to provide efficiencies and improvements for Custer County residents and businesses. According to recent employment data, there are approximately 570 businesses and 3,800 employees that are engaged in the supply chain at some level. **Figure 1** depicts these statistics across the seven broad freight-related industry sectors.

Figure 1 Employment and Businesses by Industry Sector



In addition, these businesses represent over $700 million in annual sales for the region. **Figure 2** provides an overview of sales by sector. Retail Trade, Wholesale & Distribution, and Transportation comprise over three-quarters of sales.

Figure 2 Annual Sales by Industry Sector



In order to drill-down into these trends, this section is organized as follows:

1) Commodity Flow Analysis
2) Highway Infrastructure
3) Rail Infrastructure and Data;
4) Air Cargo Infrastructure and Data; and
5) Needs and Issues

Commodity Flow Analysis

The Freight Analysis Framework (FAF)—produced by Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA)—is generally regarded as an authoritative source on characterizing broad freight trends in the United States. The dataset integrates data from a variety of sources including Commodity Flow Survey (CFS) and international trade data from the Census Bureau, data from agriculture, extraction, utility, construction, service, and other sectors. The project team has taken FAF analysis one step further and disaggregated the dataset to a county level. The information below is Custer County specific and depicts freight flows to and from Custer County by mode, tonnage, and value. One important note is that FAF data does

not include through freight—goods moving to and from destinations outside of Custer County that use the County's infrastructure.

Table 1 Custer County Freight Flow Summary

	Tons 2012 (thousands)	Tons 2045 (thousands)	Value 2012 (millions)	Value 2045 (millions)
Intra-Custer	3.51	6.13	$0.38	$0.54
Custer Destination	421.65	648.50	$221.77	$358.03
Custer Origin	708.97	1,236.30	$190.17	$320.41
Total	1,134.13	1,890.93	$412.32	$678.98

Source: FAF 4.2

Direction

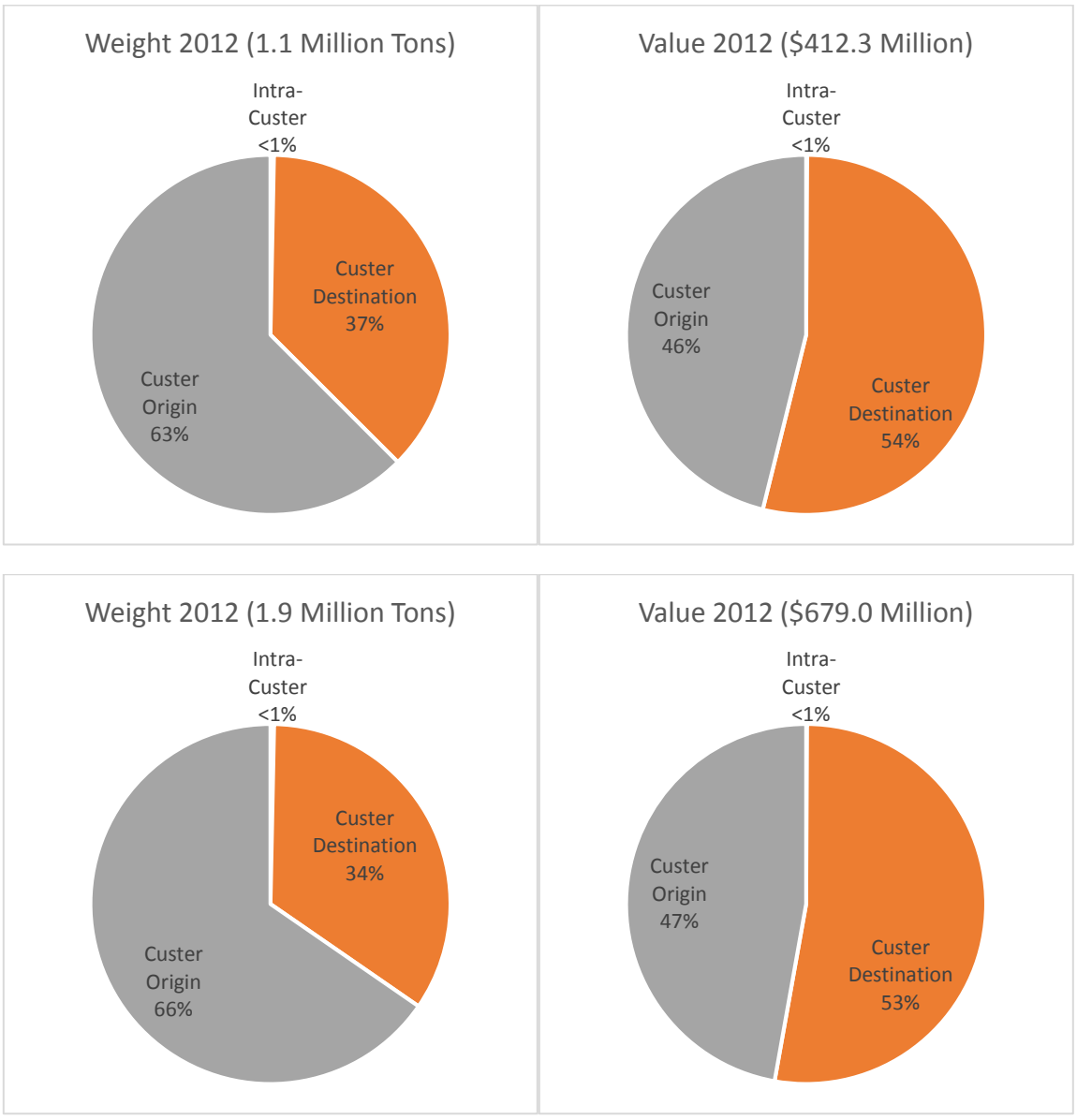
The dominant direction of commodity flows shift depending on the measurement unit. By weight, the majority of shipments are outbound from Custer County, accounting for 63 percent of the more than 1.1 million ton total in 2012. By value, the majority of goods are inbound to Custer County. Inbound goods accounted for 54 percent of the total value of shipped goods in 2012. In both cases, less than 1 percent of the goods stay within Custer County.

By 2045, the total weight flowing into and out of Custer County is expected to grow by approximately 67 percent, with a 65 percent growth in value. Internal flows by both measures are projected to remain below 1 percent.

The figure below shows the directional flow of goods by weight and value in 2012 and 2045. In total, the County shipped or received a little over 1.1 million tons of goods by weight and slightly more than $412 million in goods by value in 2012. By 2045, those totals are projected to grow to approximately 1.9 million tons and $679 million dollars, respectively.

Figure 3 Inbound, Outbound, and Intra- Custer County, SD Freight Flows

Weight and Value, 2012 and 2045



Source: FAF 4.2

Custer County Outbound

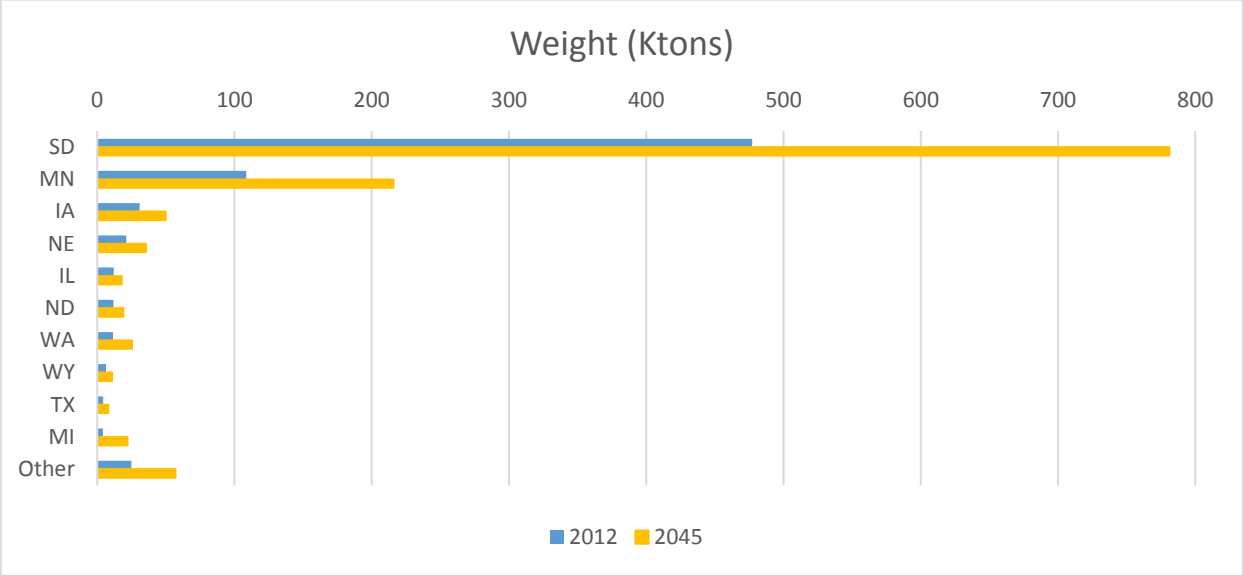
Domestic shipment destinations by weight in 2012 and projected for 2045 are shown below.[1] Approximately two-thirds of the outbound total weight stayed within South Dakota in 2012. Minnesota was the only other destination accounting for more than 10 percent of the total flow (15.2 percent) with other coal and petroleum products comprising 58 percent of the total weight bound for that State, followed by gravel and crushed stone with 32 percent combined.

[1] Note that internal Custer County flows were counted in both the destination and origin flows.

By 2045, total outbound weight will increase, though the amount staying within South Dakota is projected to decrease to 63 percent. Minnesota's share of goods will increase to 17.4 percent, followed by Iowa (4.0 percent), Nebraska (2.9 percent) and Washington (2.0 percent).

Figure 4 Custer County, SD Destination States by Weight

2012 and 2045

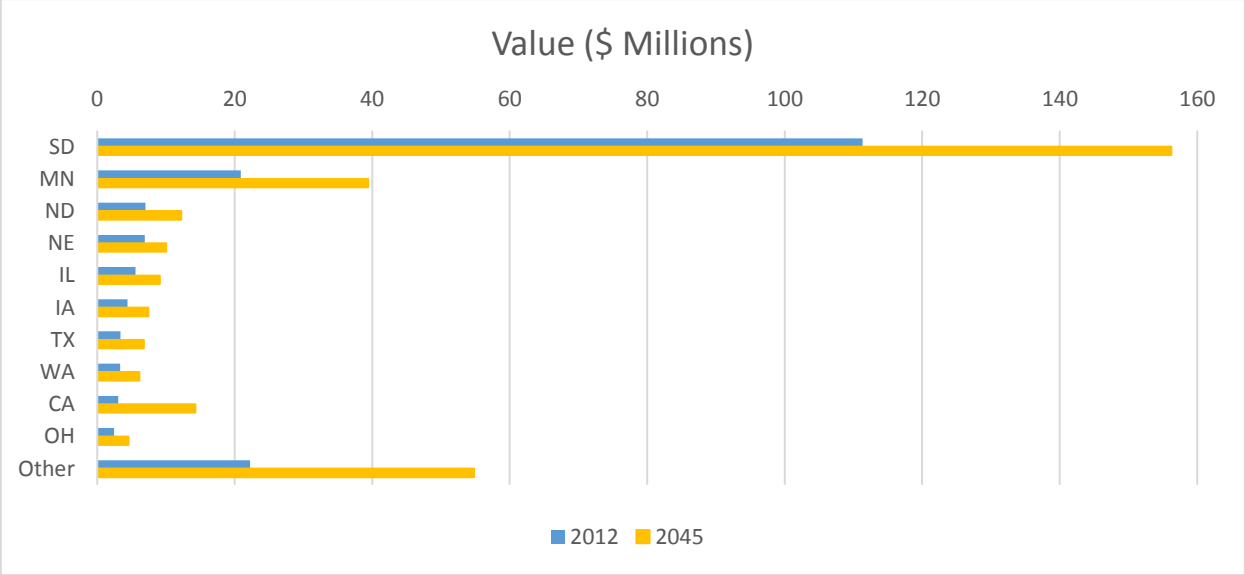


Source: FAF 4.2

By value in 2012, 58.4 percent of shipments stayed within South Dakota. Minnesota was again the largest recipient of goods outside the State mainly based on shipments of other coal and petroleum products n.e.c., accounting for 11 percent of the total value. Minnesota was followed by North Dakota (3.7 percent) and Nebraska (3.6 percent). No other state accounted for more than 3 percent of the total. By 2045, South Dakota's share of the value of goods shipped from Custer County is projected to drop to 48.7 percent with Minnesota's share rising to 12.3 percent and California jumping from 9th to 3rd in value attracted with 4.4 percent.

Figure 5 Custer County, SD Destination States by Value

2012 and 2045



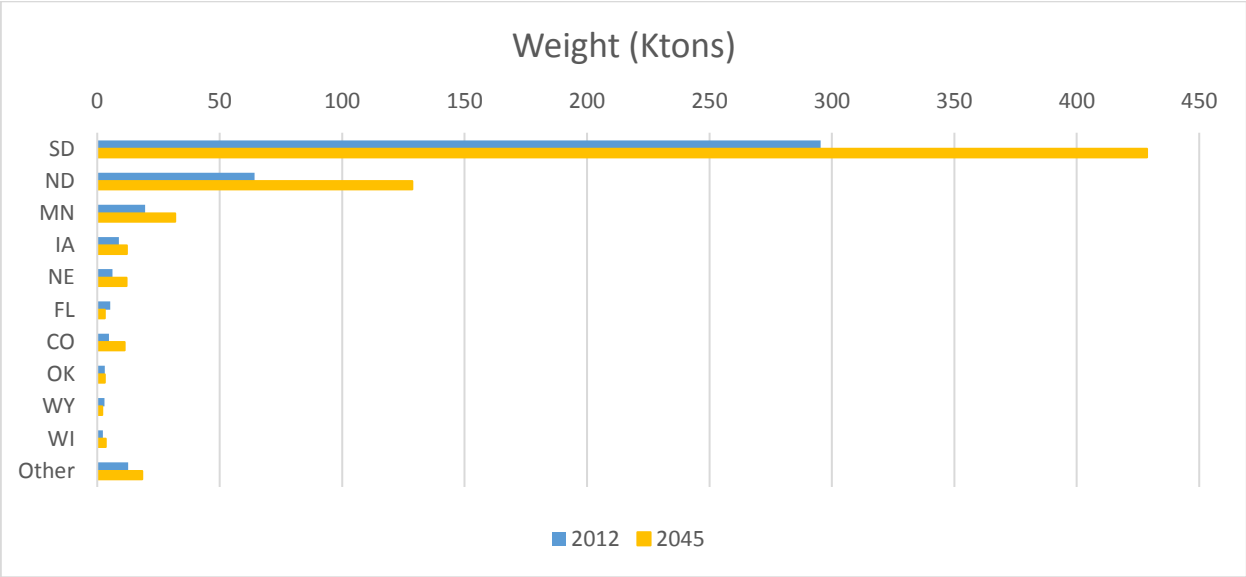
Source: FAF 4.2

Custer County Inbound

In 2012, Custer County received nearly 70 percent of its goods by weight from origins within South Dakota followed by North Dakota (15.1 percent) and Minnesota (4.6 percent). Other coal and petroleum products was the main inbound commodity from North Dakota, accounting for 87 percent of the total weight inbound from that State. By 2045, the top three origins are projected to remain the same, with a slight decline in South Dakota shipments (65.5 percent), and a rise in goods from North Dakota (19.7 percent) and Minnesota (4.9 percent).

Figure 6 Custer County, SD Origin States by Weight

2012 and 2045



Source: FAF 4.2

By value in 2012, the largest source of goods inbound to Custer County was South Dakota (41.7 percent) followed by Minnesota (9.7 percent) and North Dakota (8.9 percent). Minnesota's top inbound commodity was mixed freight followed closely by animals and fish (live) and pharmaceutical products. Origins outside the top 10 accounted for 16.2 percent of shipments. By 2045, the top three origins will remain the same, though South Dakota's share is projected to drop to 36.3 percent with Minnesota and North Dakota both accounting for 10.9 percent.

Custer County To/From South Dakota

Within South Dakota, the largest trading partner for Custer County is Minnehaha County. Combined inbound/outbound flows between Custer and Minnehaha counties accounted for 16.3 percent of the intra-state flow by weight and 18.6 percent by value. These totals are projected to increase slightly by 2045. The largest commodity by weight was gravel and crushed stone, the largest commodity by value was live animals and fish. Pennington County was the second highest trading partner by weight (8.4 percent) followed by Lawrence County (5.0 percent). By value, the second highest trading partner was Brookings County (5.0 percent) followed by Pennington County (4.4 percent).

Mode

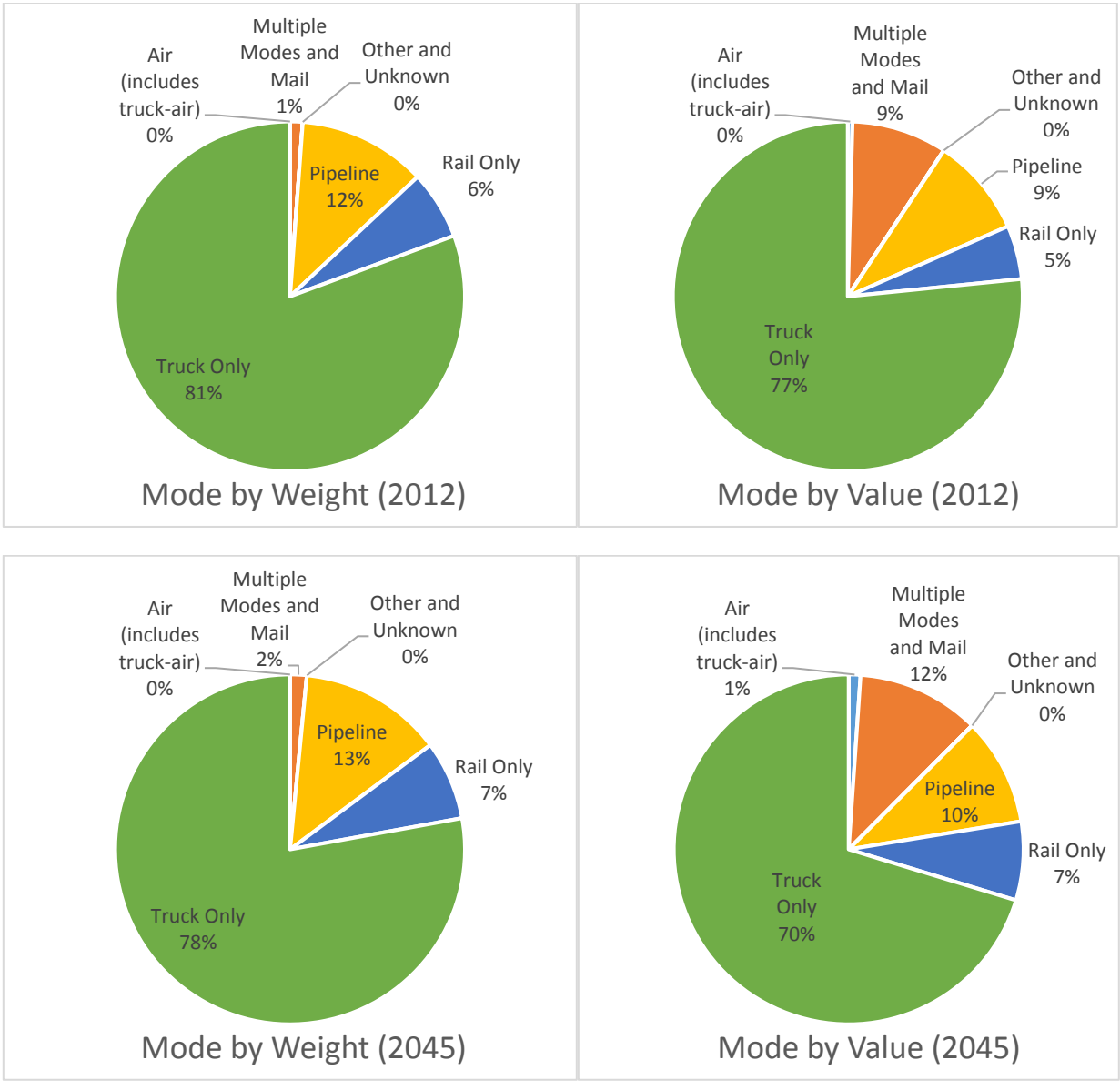
By both weight and value, trucks is the dominate mode of domestic transportation, accounting for 81 percent of shipments by weight and 77 percent of shipments by value. Pipeline was the second highest mode for both at 12 percent by weight and 9 percent by value followed by rail at 6 percent and 5 percent respectively. Air accounts for less than 1 percent by both measures, likely tied to the lack of a major airport in the vicinity of Custer County. Multiple modes and

mail is the main source of difference between the two measures, accounting for 1 percent of shipments by weight and 9 percent by value. Commodities using this mode with more than $4 million in value shipped included pharmaceutical products, miscellaneous manufactured products, crude petroleum, and electronic and other electric equipment and components.

By 2045, the percent carried by truck is projected to decrease 3 percent by weight and 7 percent by value with corresponding rises in pipeline, rail, and multiple modes and mail. Air is projected to climb above 1 percent of the total value carried by value by 2045.

Figure 7 Custer County, SD Mode Split

Weight and Value, 2012 and 2045



Source: FAF 4.2

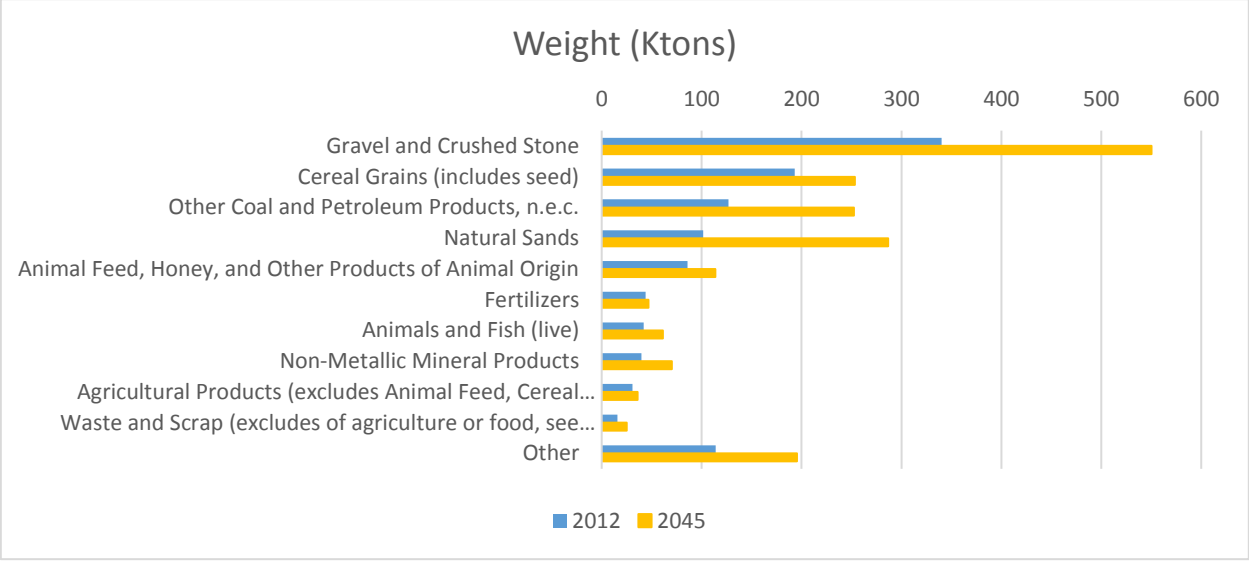
Commodity Analysis

By weight in 2012, the top three commodities shipped into, out of, and within Custer County were gravel and crushed stone (30.0 percent), cereal grains (17.0 percent), and other coal and petroleum products (11.2 percent). No other commodity represented more than 10 percent of the weight shipped though there are a number of agriculture-related products in the top 10. Combined, these commodities which include cereal grains, animal feed/honey/other products of animal origin, fertilizers, live animals and fish, and agricultural products, accounted for 34.9 percent of the total weight. The top 10 commodities combined accounted for approximately 90 percent of the weight shipped.

By 2045, the top three commodities by weight will shift slightly as natural sands will grow rise to second from fourth, growing from 9.0 percent to 15.2 percent of the total weight. Gravel and crushed stone will retain the top spot accounting for 29.1 percent of the weight. Cereal grains and other coal and petroleum products will account for 13.4 percent and 13.3 percent respectively. The total tonnage of agricultural-related products is projected to rise to 511,000 tons though the percent of weight carried will decrease to 27.0 percent. The top 10 commodities in general will remain relatively static in relationship to each other, with only other non-metallic minerals replacing waste and scrap as a top commodity (10th).

Figure 8 Custer County, SD Top Commodities by Weight

2012 and 2045



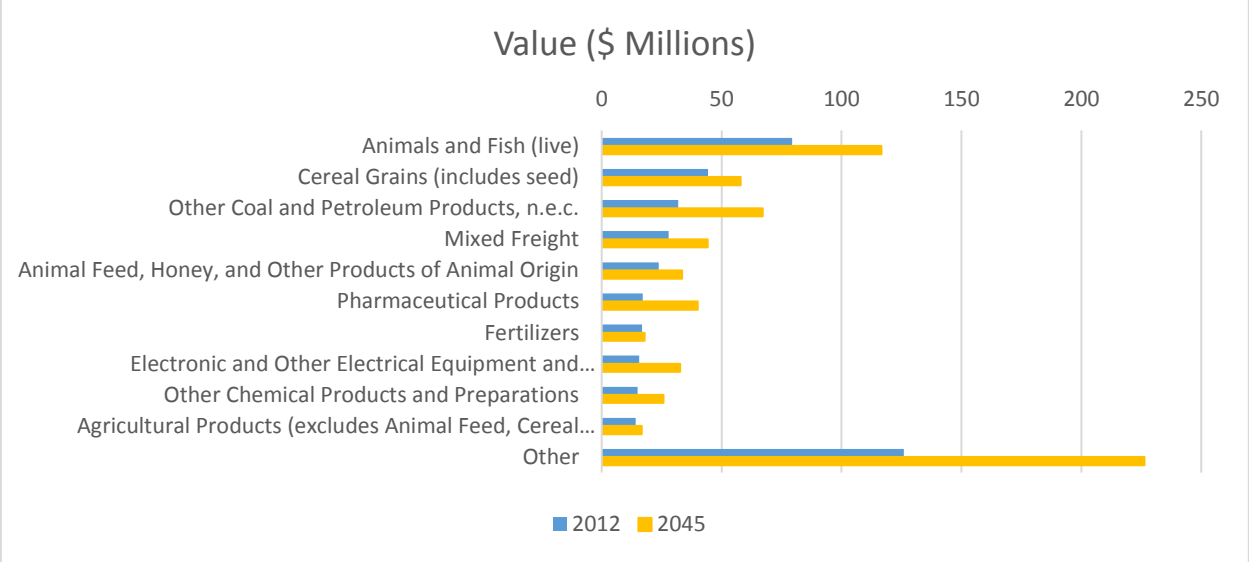
Source: FAF 4.2

By value in 2012, the combined total of the top 10 commodities accounted for only 69.5 percent of the total, indicating that the value of goods moved was spread out amongst a wider range of commodities than the weight of goods. The top three commodities moving into, out of, and within Custer County were live animals and fish (26.5 percent), cereal grains (10.8 percent), and other coal and petroleum products n.e.c. (7.7 percent). Agricultural related goods in the top 10 as described above represented 37.8 percent of the total weight of goods shipped.

In 2045, the top three commodities by value are projected to remain the same, though their share of the total is projected to decrease to 35.6 percent. The top 10 commodities will remain relatively stable, with miscellaneous manufactured products and plastics and rubber replacing fertilizers and agricultural products (excluding animal feed, cereal grains, and forage products) in the top 10.

Figure 9 Custer County, SD Top Commodities by Value

2012 and 2045



Source: FAF 4.2

Imports/Exports

Overall, Canada was the most important foreign trading partner for Custer County SD by both weight and value for imports and exports in 2012. 2045 projections indicate that it will generate and attract a higher percent of both imports and exports in the future, with Eastern Asia growing in importance as a foreign trade partners.

Imports

Custer County SD imported 2,773 tons of goods from foreign countries in 2012. More than 2,400 of those tons arrived from Canada (88 percent through North Dakota), just less than 250 tons from East Asia (65 percent through Washington), and the rest of the world combined sent approximately 122 tons. By value, Canada was responsible for approximately half of the $3.4 million total value of goods imported. The majority of these goods came through North Dakota, though approximately 24 percent arrived through Michigan. Eastern Asia was the second largest source of foreign goods by value, followed by the rest of the Americas[2] with New Jersey as the main state of entry.

[2] Does not include Mexico.

By 2045, the total imported weight is projected to rise to more than 5,000 tons, with Canada responsible for nearly 83 percent. Canada will also be responsible for approximately $5.0 million of the approximately $12.2 million of goods imported by 2045, followed by East Asia ($3.8 million), Rest of Americas ($1.1 million) and Europe ($1.0 million). North Dakota and Michigan will be the states of entry for the majority of Canadian goods, California will process 47 percent of the shipments from East Asia, and 96 percent of the inbound goods from the rest of the Americas will arrive through New Jersey.

Exports

Custer County exported approximately 11,000 tons in goods in 2012--approximately 52 percent of that was exported to Canada, followed by smaller amounts to Eastern Asia (21 percent), SE Asia and Oceania (14 percent), Mexico (11 percent), and all other destinations less than 1 percent. Nearly all of the outbound goods to SE Asia departed through Washington, and nearly all of the goods bound to Mexico departed through Texas. The majority of the weight bound for Canada departed through Michigan (61 percent), followed by North Dakota (32 percent), and shipments to Eastern Asia were almost all routed through Washington.

By value, a similar story appears with the majority of the $4.4 million in goods bound for Canada (51 percent) followed by Mexico (22 percent) and Eastern Asia (11 percent). North Dakota, Texas, and Washington were the largest domestic destinations, respectively.

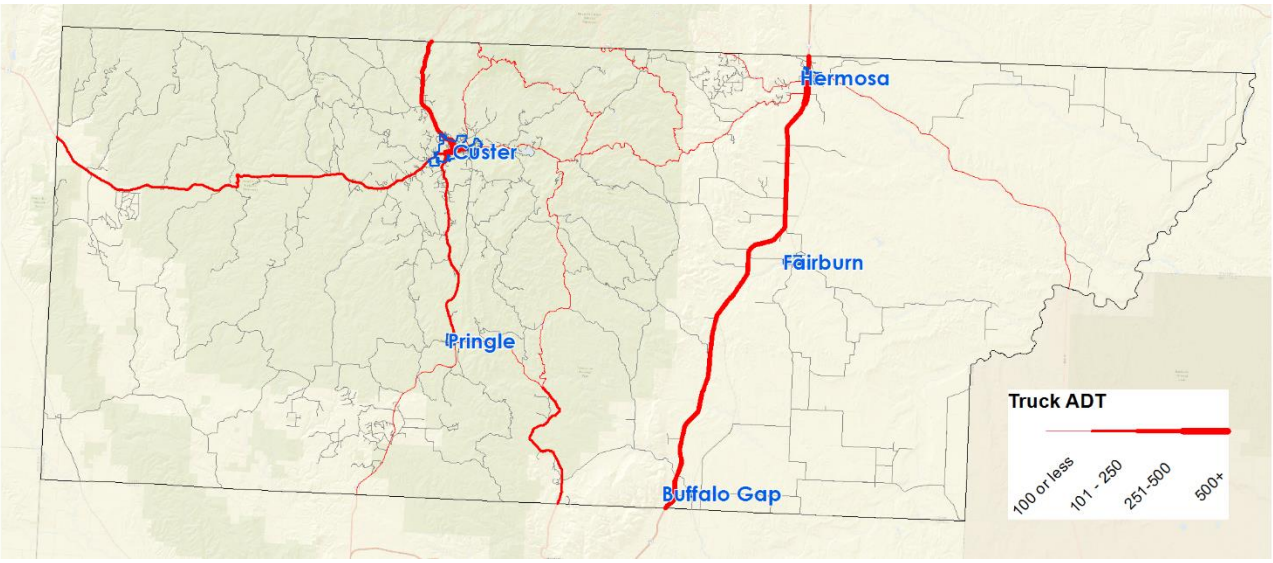
By 2045, total export weight will more than quadruple to approximately 45,700 tons. Canada's share of those shipments will rise to 58 percent, with shipments to Eastern Asia accounting for 30 percent. By value, the approximately $22.1 million in goods bound to foreign destinations from Custer County will mainly be heading for Canada (64 percent) with smaller amounts bound for Eastern Asia (13 percent) and Mexico (8 percent).

Highway Infrastructure and Data

The Custer County system includes 1,094 miles of road. The State DOT is responsible for 207 miles of Interstate, U.S., and State routes, with the remaining mileage divided between city, town, and county jurisdiction.[3] The Custer County Highway Department is responsible for the maintenance and upkeep of 398 miles of gravel road, 14 miles of bituminous road, and 17 miles of unimproved roads/trails.[4] This network supported more than 16 million vehicle miles travelled in 2015.

Truck traffic counts for the county are somewhat limited, however counts available for the state network indicate that the highest truck volumes occur State Route 79, US Highway 385, and US Highway 16 (**Figure 10**).

Figure 10 Custer County Truck Traffic



Rail Infrastructure and Data

South Dakota's current rail network is shown in **Figure 12** below. There are 1,839.5 miles of currently operating rail lines in the State.[5] Custer County is bisected by two freight railroads. Burlington Northern & Santa Fe (BNSF) is a Class I railroad. BNSF's Powder River Division runs through the southwest corner of the County with a crew change point in the City of Edgemont in Fall River County, just south of Custer County.

The Rapid City, Pierre & Eastern (RCPE) is a Class III railroad owned and operated by Genesee & Wyoming Inc. (G&W). G&W is a holding company that owns and leases 121 shortline railroads around the world. The RCPE interchanges with three Class I railroads in or near South Dakota including BNSF, Union Pacific (UP) and Canadian Pacific (CP). None of the interchanges are within Custer County—the closest is an interchange with BNSF in Crawford, NE. Railcars on the RCPE between Rapid City and Crawford are limited to 263,000 (263k) pounds Gross Weight, and

[3] http://www.sddot.com/transportation/highways/traffic/docs/VMTTrucks.pdf
[4] http://www.custercountysd.com/highway-department/
[5] http://www.sddot.com/transportation/railroads/current/Default.aspx

cars between Rapid City and Pierre are limited to 73 feet in length and a gross weight of 263k.[6] Statewide, the line handles approximately 52,000 carloads annually with shipments of grain, bentonite clay, ethanol, and fertilizer as the key commodities.[7]

There are no intermodal or rail transload facilities in Custer County. The closest facility is the Midcontinent Transload and Freight Solutions operation just east of Box Elder, Pennington County. The facility has 120,000 square feet of warehouse capacity and can hold 120 railcars.[8]

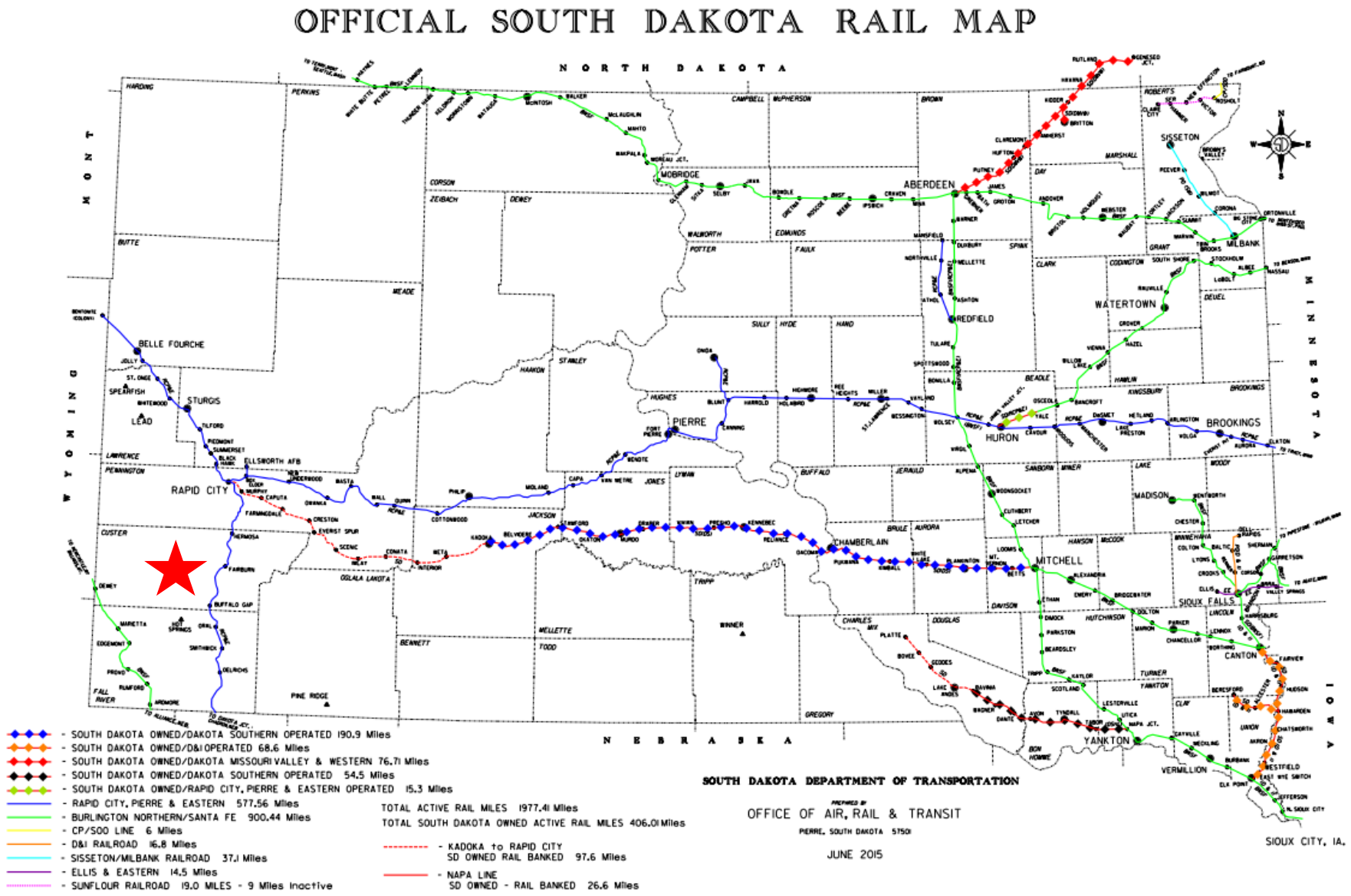
Custer County has approximately 40 miles of trackage, but approximately 42 total highway-railroad crossings are located throughout the county. 9 of these are public, at-grade, and the remainder are private roads (**Figure 11**).

Figure 11 Custer County Rail Crossings

Private At-Grade Crossings	26
Other Private Crossing Types	3
Public At-Grade Crossings	9
Total Crossings	42

[6] https://www.gwrr.com/railroads/north_america/rapid-city-pierre--eastern-railroad#m_tab-one-panel
[7] https://www.up.com/customers/shortline/profiles_q-s/rcpe/index.htm
[8] https://www.gwrr.com/railroads/north_america/rapid-city-pierre--eastern-railroad#m_tab-one-panel

Figure 12 South Dakota Rail Map



Source: http://www.sddot.com/transportation/railroads/docs/railmap.pdf

Air Infrastructure and Data

The Custer County Airport is owned by Custer County and is used for private, corporate, and air ambulance service in addition to providing a base of operations for the U.S. Forest Service. The airport is not used for freight operations.[9]

Rapid City Regional Airport[10] in Rapid City is the nearest airport which supports goods movement. Rapid City originated 2,070,345 pounds of freight in 2015. More than 98 percent of that weight was bound to Sioux City, with an almost even split carried by Federal Express Corporation and Empire Airlines Inc. Minneapolis/St. Paul (MSP) received the second highest total weight, with the nearly 20,000 pounds evenly split between Delta, Empire Airlines, and Federal Express. 657 pounds was bound for Dallas/Ft. Worth (DFW), nearly all carried by Envoy Air.

Inbound weight totaled 2,581,431 pounds, with nearly 98 percent inbound from Sioux City, evenly split between Empire Airlines and Federal Express. MSP (20,641 pounds), Casper/Natrona (CPR) in Wyoming (9,924 pounds) and DFW (2,131 pounds) also contributed goods inbound to Rapid City.[11]

[9] Custer County Airport. "Airport Layout Plan Narrative Update." April, 2016.
[10] http://www.rcgov.org/departments/airport.html
[11] BTS Transtats T100 http://www.transtats.bts.gov/Fields.asp?Table_ID=293

Safety Analysis

Custer County Safety Overview

The safety element of the study focuses on crashes occurring on County and Forest Service roads and locations adjacent to those roadways (within 100 feet of a county roadway). From 2011 to 2015, 222 crashes occurred, of which 9 were on City roads, 62 were on State roads and 141 were on County roads. Table 1.1 summarizes the breakdown of the crash injury severity. While there were a significant number of wild animal crashes, none is recorded as resulting in an injury. Fortunately, no fatalities were recorded. The majority of crashes resulted in non-severe or no injury, which can be attributed partially to the fact that most crashes occurred on low-speed gravel roads. A large number of wild animal hits were recorded (25) but none that resulted in injury.

Table 1 County Road Crash Severity

Injury Severity		Crash Count
Incapacitating		17
Non-incapacitating		26
Possible		40
No injury		114
Wild animal hit-no injury		25
Grand Total		**222**

Figure 1 displays the locations and severity of crashes on County and Forest Service roads and crashes occurring within 100 feet of these roads (e.g., at intersections with State roadways). Given some crashes are clustered very close together or at the same location not all dots representing all crashes are visible in this map. Most crashes are clustered around Custer City, which reflects the higher volumes of traffic around the municipality. However, a significant number are located on 7-11 Road connecting Routes 385 and 79 and Buffalo Junction in the southern portion of the county, as well as at intersections along Route 79. Figure 2 shows only injury crashes. Similarly, this map gives a sense of the distribution of severe crashes but does not clearly show the location of every individual incident as in some cases multiple crashes have occurred very close to each other and the dots overlap.

Figure 1 **Crashes by Severity on and Adjacent to Custer County and Forest Service Roads**

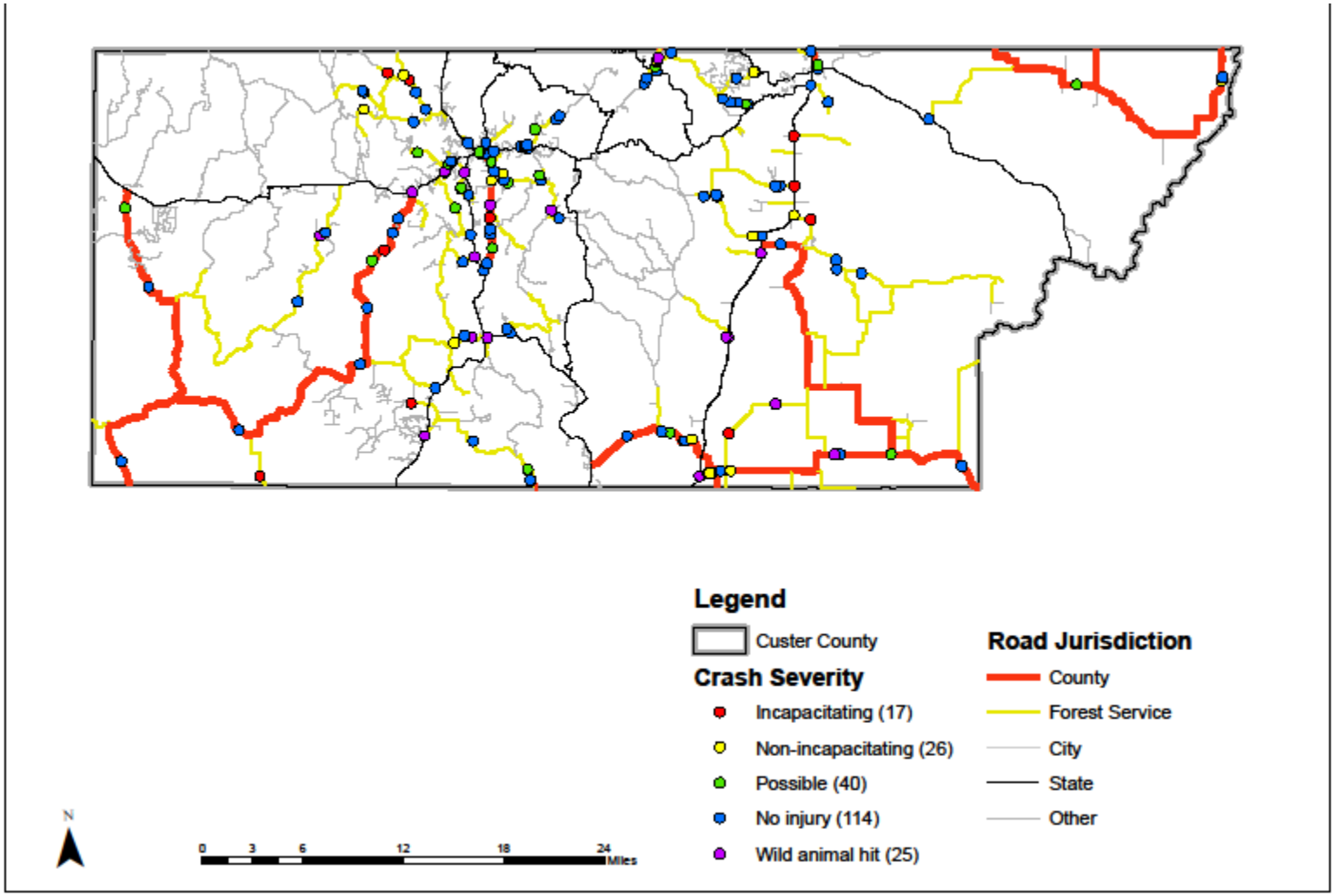


Figure 2 **Injury Crashes on and Adjacent to County and Forest Service Roads**

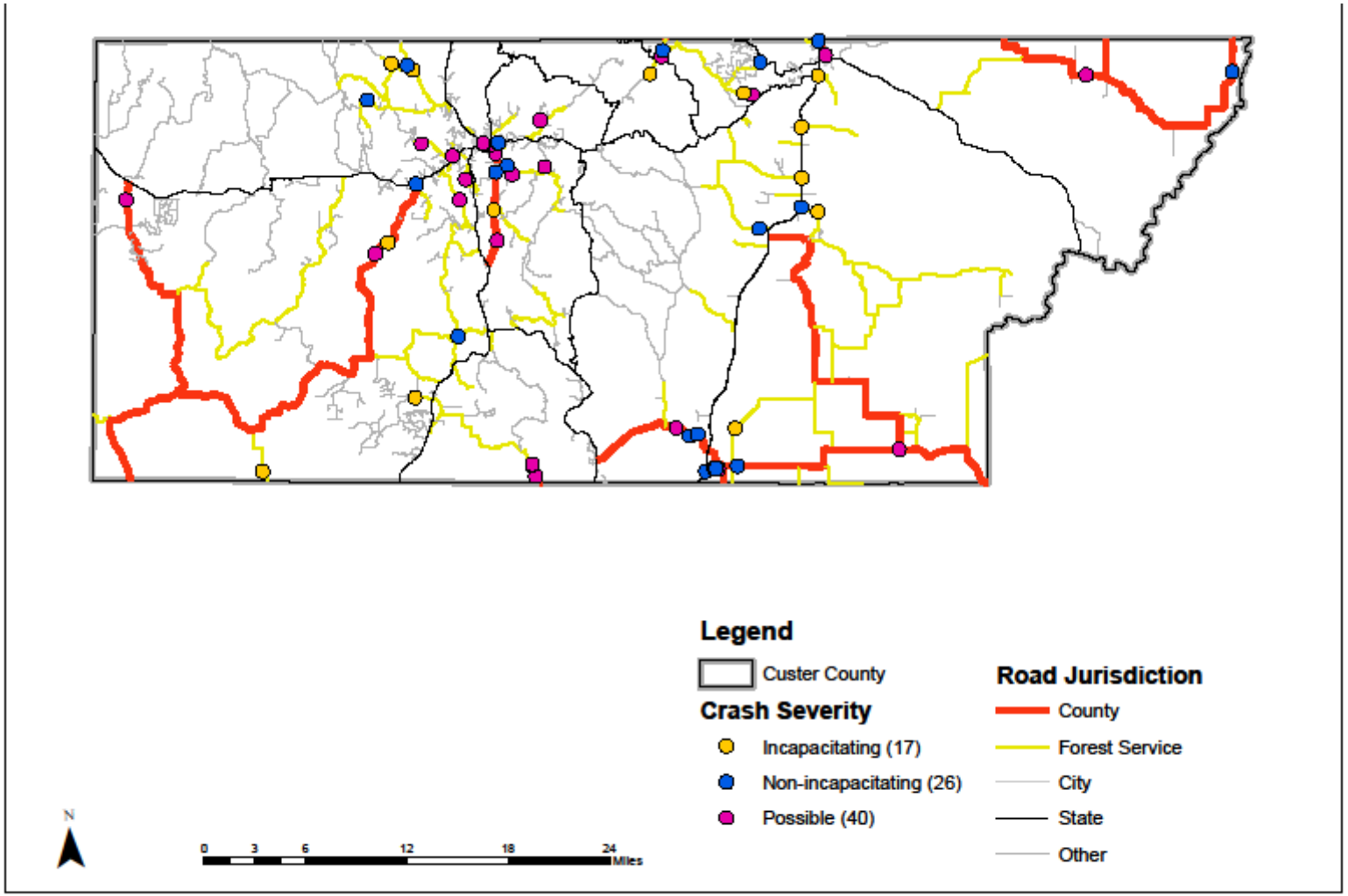


Table 2 shows the first harmful event recorded for crashes by severity. This gives an indication of what occurred during the crash. The two most common events for injury and non-injury crashes were crashing into another vehicle or experiencing a rollover.

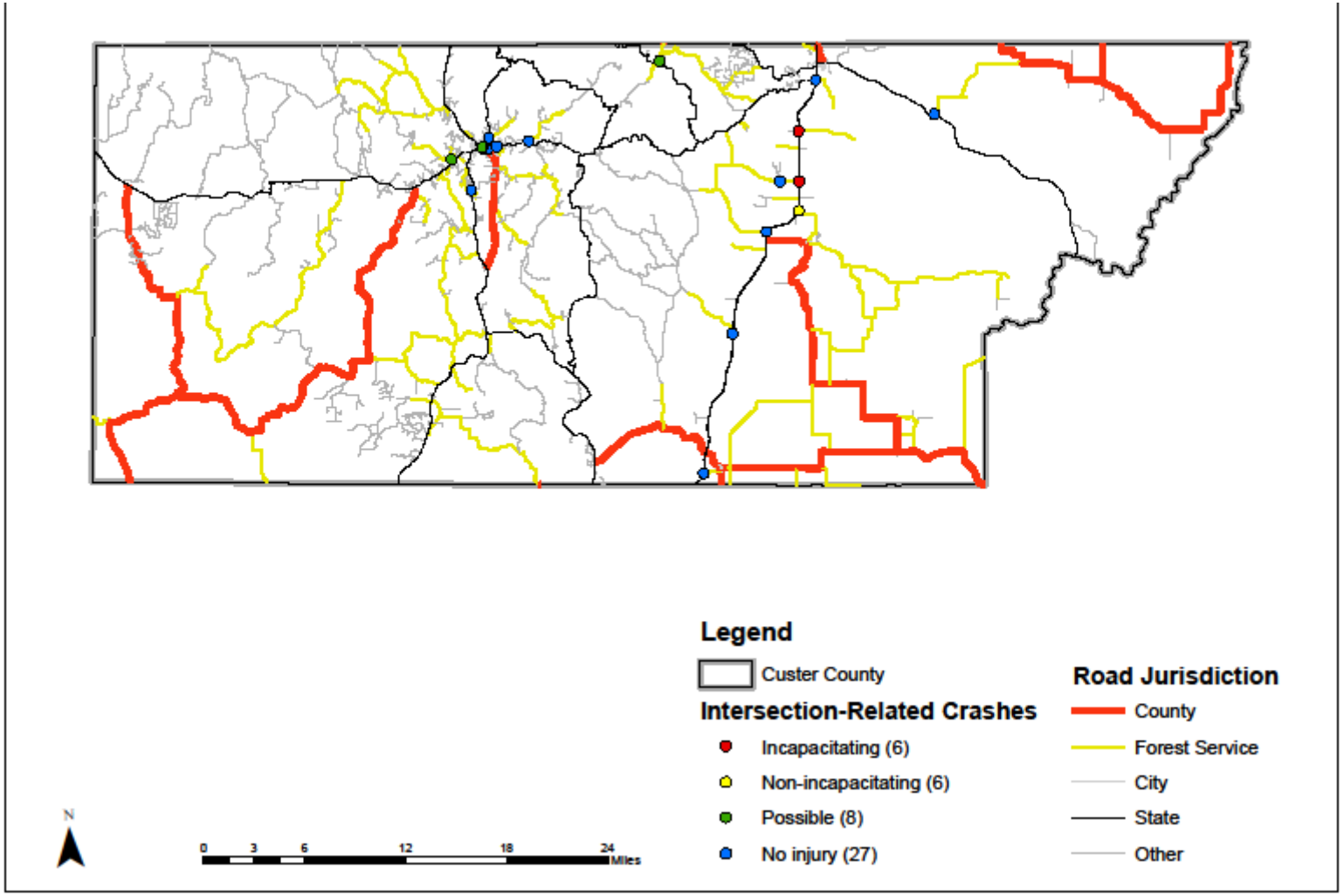
Table 2 First Harmful Event

First Harmful Event	Incapacitating	Non-incapacitating	Possible	Wild animal hit	No injury	Total
Animal - wild		2		25	5	32
Animal - domestic			3		5	8
Bridge rail		2			2	4
Culvert	1				1	2
Delineator post			2		1	3
Ditch		2	1		2	5
Embankment	1		1		1	3
Fence			2		19	21
Fire/explosion					1	1
Guardrail face					1	1
Highway traffic sign post/sign					7	7
Jackknife					2	2
Mailbox					6	6
Motor vehicle in transport	6	5	9		27	47
Motor vehicle used as equipment (snowplow plowing)		1			1	2

Other post, pole, or support			1			1
Overturn/rollover	7	8	12		16	43
Parked motor vehicle			1		6	7
Pedalcycle			2			2
Pedestrian	1					1
Rock	1	2	2		4	9
Tree/shrubbery		3	4		7	14
Utility pole		1				1
(blank)						
Grand Total	17	26	40	25	114	222

Figure 3 shows the location of crashes at intersections (intersection related crashes and those at 4-way, Y, and T intersections). For this map, there are also a higher number of incidents than dots appearing in the map given some crashes overlap. Most intersection related crashes are in or near Custer City and a number are at locations where county and Forest Services roads intersect with Route 79.

Figure 3 Intersection Crashes



As shown in Table 3, most crashes did not occur during inclement weather. Snow was a factor in two non-incapacitating and one possible injury crash, as well as 11 non-injury crashes. Rain was a factor in three non-injury crashes.

Table 3 Weather Condition

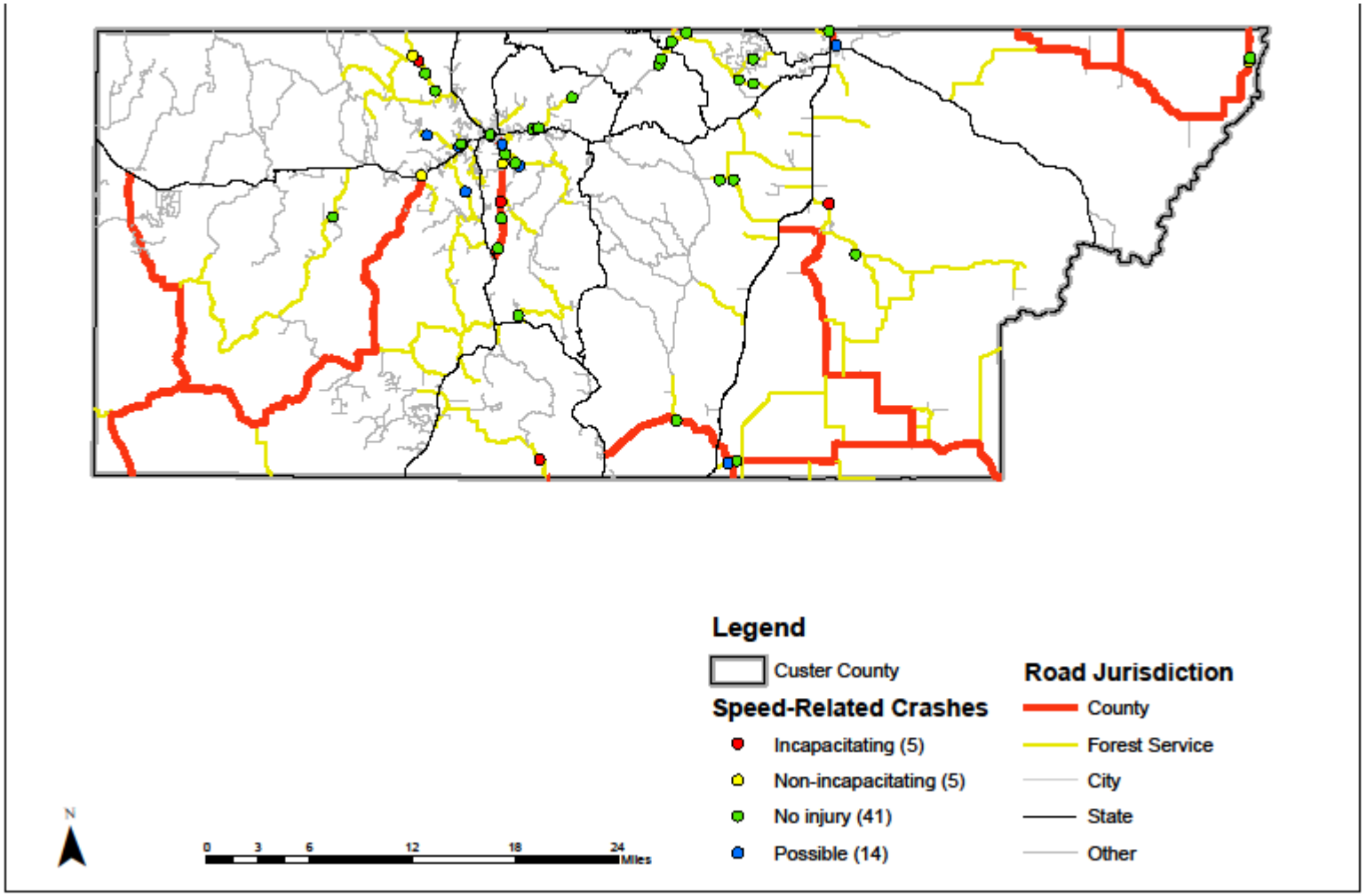
Injury Severity	Clear	Clear/Fog/smog/smoke	Cloudy	Cloudy/Rain	Cloudy/Snow	Rain	Snow	(blank)	Total
Incapacitating	15		2						17
Non-incapacitating	19		4	1	2				26
Possible	32		7				1		40
Wild animal hit - no injury	21	1	2			1			25
No injury	81		16	2	5	2	6	2	114
Grand Total	**168**	**1**	**31**	**3**	**7**	**3**	**7**	**2**	**222**

The county and forest service roadways are nearly all gravel and are intended for drivers to operate vehicles at lower speeds of 35 to 45 miles per hour. Table 4 shows speeding was recorded as a factor in 10 incapacitating and non-incapacitating crashes. Typically speeding is coded by law enforcement when the driver is driving too fast for conditions and may not always mean that the speed limit was exceeded.

Table 4 Speeding Involvement in Crashes

	Crash Injury Severity					
Speeding	**Incapacitating**	**Non-incapacitating**	**Possible**	**Wild animal hit**	**No injury**	**Grand Total**
N	12	21	26	25	73	157
Y	5	5	14		41	65
Grand Total	**17**	**26**	**40**	**25**	**114**	**222**

Figure 4 Speed Related Crashes



Proper use of a seatbelt has a major impact on the level of severity of a crash. While the crash might still have occurred, the injury might have been far less severe if all occupants were wearing safety belts properly. As shown in Table 5, for the majority of incapacitating injury crashes, seatbelts were not used or not worn properly. For nearly half of non-incapacitating injury crashes a safety belt was not used or not worn properly. A large number of records (47) did not have this data recorded, so the number of crashes involving unbelted occupants may be higher.

Table 5 Safety Equipment Used

Injury Severity	**Helmet used**	**Helmet not used**	**Safety belt used properly**	**Safety belt used improperly**	**No safety belt used**	**blank**	**Total**
Incapacitating			5	6	6		17
Non-incapacitating		3	11	2	10		26
Possible	1		22	5	8	4	40
Wild animal hit				0	0	25	25
No injury			79	8	9	18	114
Grand Total			117	21	33	47	222

As shown in Table 6, alcohol was recorded as a factor in one incapacitating injury crash and nearly one third (9 of 26) of non-incapacitating injury crashes.

Table 6 Alcohol Involvement in Crashes

Injury Severity	N	Y	Grand Total
Incapacitating	16	1	17
Non-incapacitating	17	9	26
Possible	37	3	40
Wild animal hit	25		25
(blank)			
No injury	107	7	114
Grand Total	**202**	**20**	**222**

The study team conducted a field review of all County roads and identified locations with apparent (based on visual review) geometric characteristics that could pose safety problems including.

- Steep sides
- Blind curves/visibility issues
- Flat curves/curves needing reshaping
- Poor approaches
- Steep curves and
- Excessive grades

While some of these issues are maintenance issues others may require significant investment. Low-cost solutions such as signing may be appropriate and able to be implemented quickly. The team conducted an analysis of crash locations within 100 feet of a segment with one of the above defined safety issues, shown in Figure 5. Of 22 locations where crashes occurred near one of the potential roadway issues, one involved an incapacitating injury, three involved a non-incapacitating injury and four involved a possible injury. Details on each of these crashes are shown in Table 7. Of the eight injury or possible injury crashes, two involved alcohol and four involved speed. At three of the eight locations, a warning sign is in currently in place. Erosion was the most common issue at a location where a crash occurred, followed by a need for curve reshaping.

Figure 5 Crashes Proximate to Identified Roadway Issues on/adjacent to County and Forest Service Roads

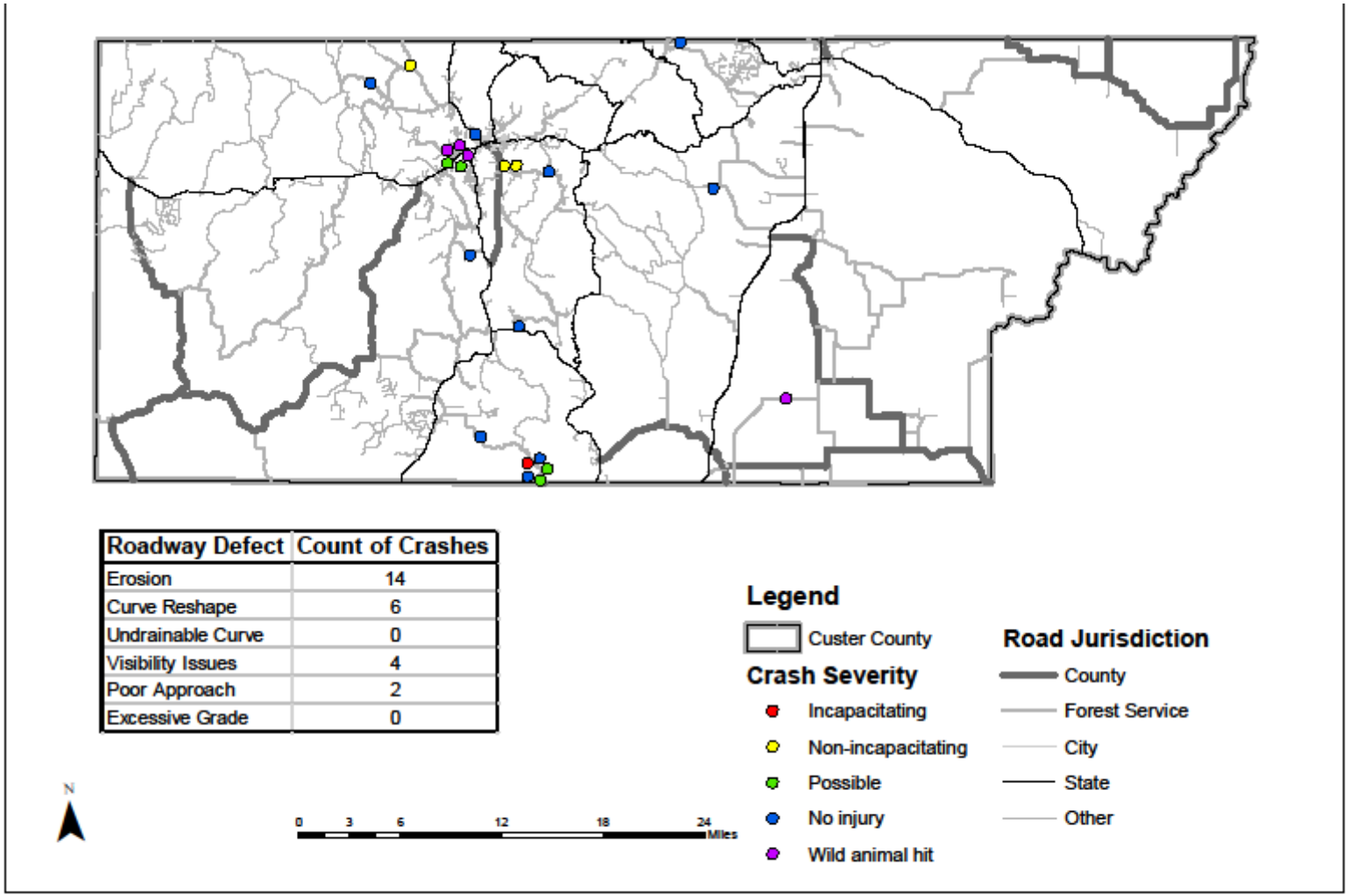


Table 7 Crashes Proximate to Identified Roadway Issues

ID	Road Conditio	First Harmful Event	Traffic Devi	Spee	Alcohol Use	InjurySeverity	Manner Of Collision	Speed Limit	Road Surfa	LightConditio	Junction	Hwy Classificatio	AlignmentD	ROADNAME	Erosion	Curve_ Reshap	Visibility Issue	Poor Approa
263	Dry	Overturn/rollover	Warning sign	Y	N	Incapacitating	Single Vehicle	40	Gravel	Dusk	Non-junction	County Road	Curve and hill crest	ARGYLE RD	0	1	1	0
687	Snow	Mailbox		N	Y	No injury	Single Vehicle	40	Gravel	Daylight	Non-junction	County Road	Curve and level	ARGYLE RD	0	1	0	0
776	Dry	Motor vehicle in transport		N	N	No injury	Sideswipe, opposite direction	40	Gravel	Daylight	Non-junction	County Road	Curve and hill crest	ARGYLE RD	0	1	1	0
250	Dry	Fence		N	N	No injury	Single Vehicle	40	Gravel	Dark - roadway	Non-junction	County Road	Curve and level	ARGYLE RD	1	1	0	0
683	Ice	Tree/shrubbery		N	N	No injury	Single Vehicle	0	Gravel	Daylight	Non-junction	County Road	Curve on grade	BEAVER CREEK RD	1	0	0	0
243	Ice	Embankment		N	N	No injury	Single Vehicle	0	Gravel	Daylight	Non-junction	County Road	Straight on grade	MAYO RD	1	0	0	0
760	Dry	Overturn/rollover	Warning sign	Y	N	No injury	Single Vehicle	35	Gravel	Daylight	Non-junction	County Road	Curve and level	LH RD	0	0	1	0
1199	Snow	Highway traffic sign post/sign		N	N	No injury	Single Vehicle	35	Gravel	Dusk	Non-junction	County Road	Curve on grade	HAZELRODT CUTOFF	1	0	0	0
534	Dry	Motor vehicle in transport		N	N	No injury	Rear-end (front to rear)	35	Asphalt (	Daylight	Non-junction	State Road	Straight on grade	BAVARIAN HILLS RD	0	0	0	1
158	Dry	Animal - domestic		N	N	No injury	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	ELLIOT RD	1	0	0	0
245	Dry	Overturn/rollover		Y	N	No injury	Single Vehicle	0	Gravel	Dusk	Non-junction	County Road	Curve and hill crest	GHOST CANYON RD	1	0	0	0
473	Sand, mud,	Tree/shrubbery		N	N	Non-incapacitating	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	HAZELRODT CUTOFF	1	0	0	0
473	Sand, mud,	Tree/shrubbery		N	N	Non-incapacitating	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	HAZELRODT CUTOFF	1	0	0	0
143	Dry	Utility pole	Warning sign	Y	N	Non-incapacitating	Single Vehicle	35	Gravel	Daylight	Non-junction	County Road	Curve on grade	MEDICINE MOUNTAIN RD	1	0	0	0
246	Dry	Overturn/rollover	Warning sign	N	Y	Possible	Single Vehicle	40	Gravel	Dark - roadway	Non-junction	County Road	Curve on grade	ARGYLE RD	0	1	0	0
365	Dry	Overturn/rollover		N	N	Possible	Single Vehicle	40	Gravel	Daylight	Non-junction	County Road	Curve on grade	ARGYLE RD	0	1	1	0
487	Ice	Tree/shrubbery		Y	Y	Possible	Single Vehicle	0	Gravel	Dark - roadway	Y- intersection	County Road	Curve on grade	UPPER FRENCH CREEK RD	1	0	0	0
487	Ice	Tree/shrubbery		Y	Y	Possible	Single Vehicle	0	Gravel	Dark - roadway	Y- intersection	County Road	Curve on grade	UPPER FRENCH CREEK RD	1	0	0	0
93	Sand, mud,	Animal - wild		N	N	Wild animal hit	Wild animal hit - damage only	50	Wild ani	Daylight	Non-junction	County Road		OLD HWY 79	0	0	0	1
859	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0
931	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0
932	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0

Needs and Issues

Many of the freight and safety issues identified in this memo are out of the control of Custer County officials—crashes will be reduced if drivers do not operate a vehicle while impaired by alcohol or drugs, do not drive too fast for conditions, and always wear a safety belt. Improving safe driving behaviors will likely involve working with the State of South Dakota on its behavioral safety efforts, particularly those targeted to State Routes, as many of the trips on county roads also likely involve traveling on the State routes.

Key needs and issues are highlighted below, along with potential strategies for dealing with each. Freight needs and issues focus primarily on heavy trucks, due in part to the low number of rail-highway crossing accidents in the past five years (averaging less than one per year), and the fact that the county does not own trackage.

Needs and Issues

- Local road funding.[12]
    - As in many rural areas of the country, county roads typically have lower design standards and often receive a disproportionate amount of impact from truck traffic on the system; either from state and federal highway system traffic diversion, first and last mile connectivity, or other heavy truck travel patterns. This makes it difficult for counties to continually maintain roadways, particularly for counties that are primarily gravel roads.
    - Potential strategies could be as follows:
        - Establish preferred truck routes and prioritize funding and investments appropriately for these segments
        - Work with SDDOT to identify funding opportunities available at the federal level, currently this could include Critical Rural Freight Corridor designation and FASTLANE/TIGER Grant opportunities
        - Analyze key freight generators in the county and determine common loads and configurations to target key infrastructure investment and maintenance needs. For example, given the substantial gravel and crushed stone commodity flows, more emphasis on road maintenance may be needed around gravel pits and mining areas. Similarly, areas near grain-handling facilities should be further explored for freight mobility needs.

[12] http://custercountychronicle.com/roads-bridges-top-county-talks/

- Local road connectivity and safety
    - Infrastructure defects played a role in a large number of the county crashes. In addition, heavy truck operators indicated they are concerned with design loads, weight restrictions, snow plowing in winter, and maintenance. Safety on hills and large trucks on narrow roads were also identified as safety concerns.
    - Potential strategies could be as follows:
        - To identify improvements needed in specific locations, county roadway staff will likely want to conduct some fieldwork in locations flagged with the data as having crash history or apparent infrastructure issues. In some locations County staff may wish to consider conducting a roadway safety audit to gain a comprehensive understanding of what types of countermeasures can be implemented. Roadway safety audits could also identify blind curves and other impediments to truck and passenger vehicle safety.
        - Survey freight-related businesses in the county to determine specific local needs and concerns. These surveys often reveal that relatively small roadway improvements such as signage changes, turning radii modification, and improvements near business entry points can greatly improve transportation mobility for a business or group of businesses.
        - Explore options for dust abatement to lower the impact of traffic on home owners. This could focus near areas of heavy truck traffic generation as a starting point.
        - Further explore areas with high percentages of crashes involving rollovers, crashing into other vehicles, and wild animal crashes, and determine which targeted countermeasures could be applied to reduce the three largest types of occurrences in the county.
        - Consider passing lanes on high volume routes. It was noted that commercial vehicles can be difficult to pass, and can also present traffic obstacles, particularly during peak tourist travel. Passing lanes on hills could potentially alleviate these concerns.

Appendix IV

SUPPLEMENTAL SAFETY ANALYSIS REPORT

CAMBRIDGE SYSTEMATICS

Custer County Safety Analysis

report

prepared for

Custer County

prepared by

Cambridge Systematics, Inc.

December 2, 2016

www.camsys.com

report

Custer County Safety Analysis

Subtitle

prepared for

Custer County

prepared by

Cambridge Systematics, Inc.
115 South LaSalle Street, Suite 2200
Chicago, IL 60603

date

December 2, 2016

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Safety Analysis

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Figure 1 Crashes by Severity on and Adjacent to Custer County and Forest Service Roads

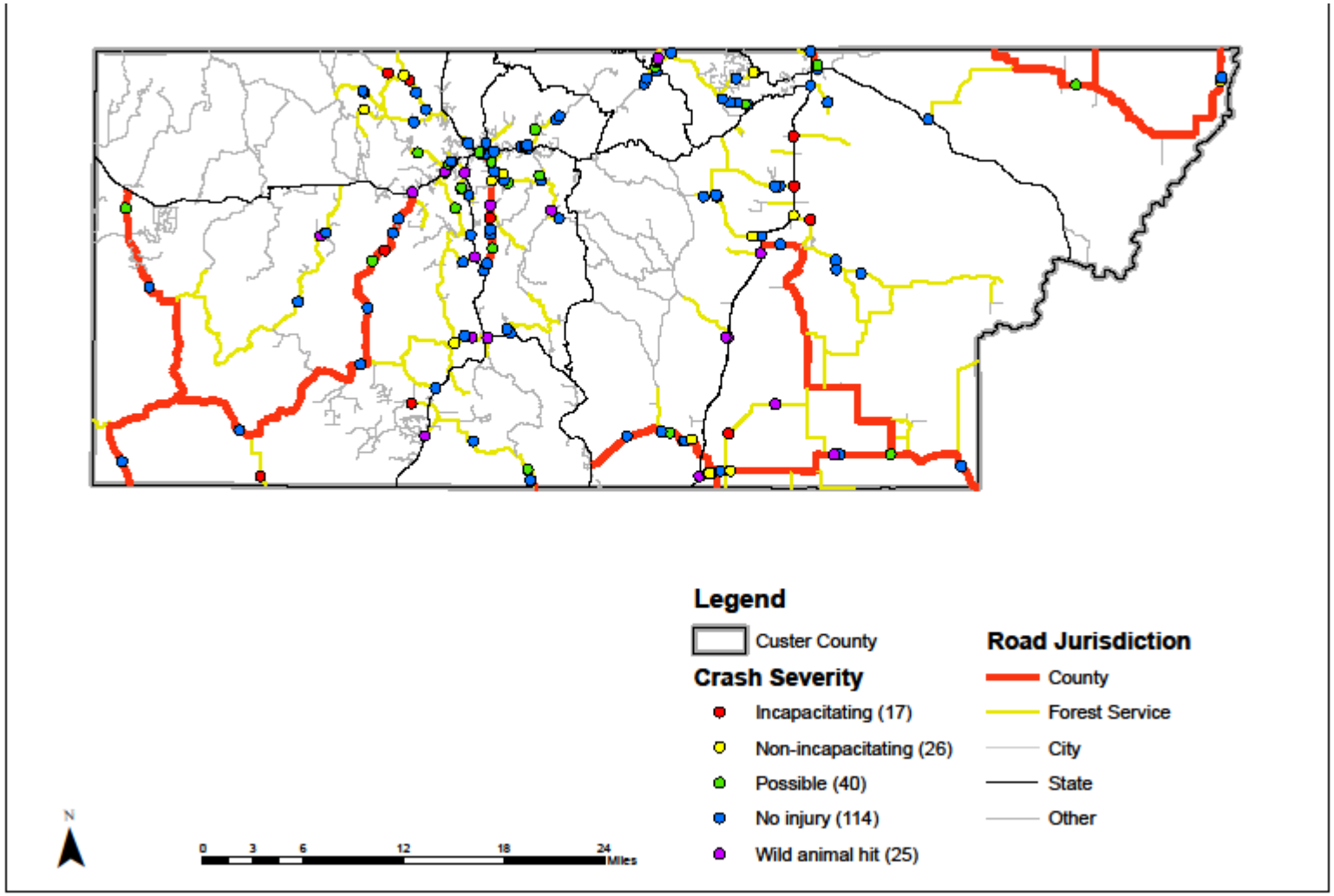


Figure 2 Injury Crashes on and Adjacent to County and Forest Service Roads

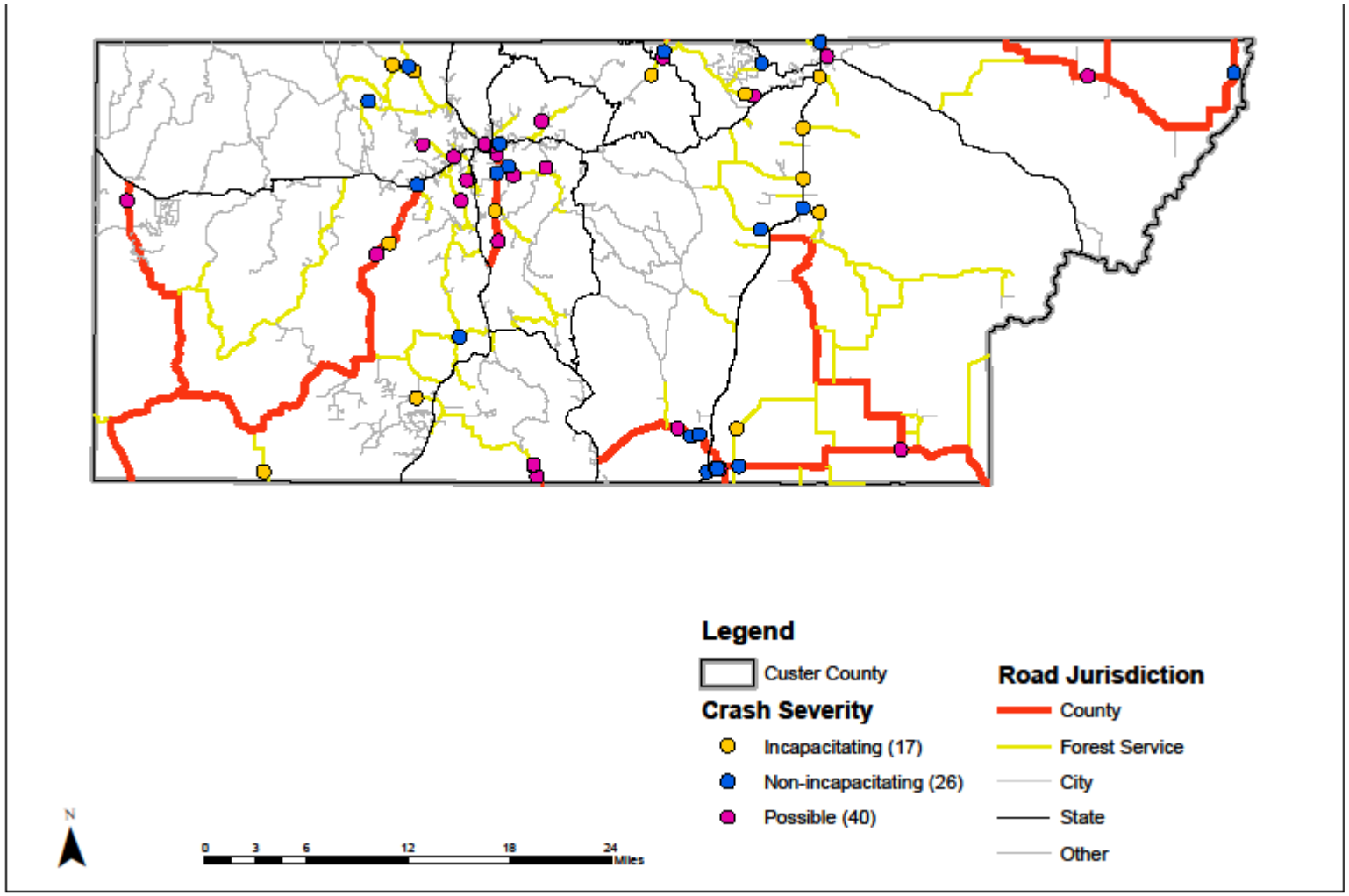


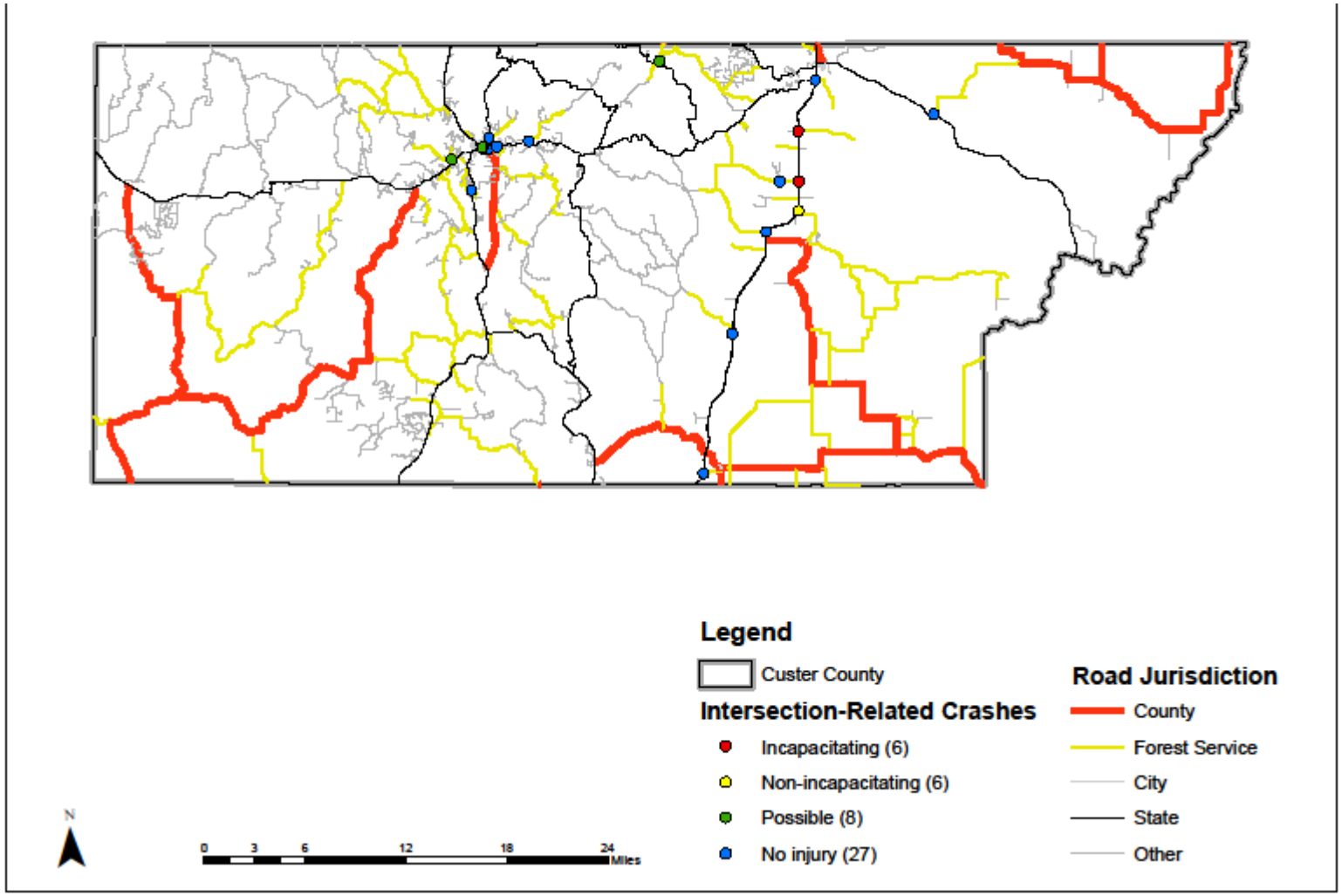
Table 2 shows the first harmful event recorded for crashes by severity. This gives an indication of what occurred during the crash. The two most common events for injury and non-injury crashes were crashing into another vehicle or experiencing a rollover.

Table 2. First Harmful Event

First Harmful Event	Incapacitating	Non-incapacitating	Possible	Wild animal hit	No injury	Total
Animal - wild		2		25	5	32
Animal - domestic			3		5	8
Bridge rail		2			2	4
Culvert	1				1	2
Delineator post			2		1	3
Ditch		2	1		2	5
Embankment	1		1		1	3
Fence			2		19	21
Fire/explosion					1	1
Guardrail face					1	1
Highway traffic sign post/sign					7	7
Jackknife					2	2
Mailbox					6	6
Motor vehicle in transport	6	5	9		27	47
Motor vehicle used as equipment (snowplow plowing)		1			1	2
Other post, pole, or support			1			1
Overturn/rollover	7	8	12		16	43
Parked motor vehicle			1		6	7
Pedalcycle			2			2
Pedestrian	1					1
Rock	1	2	2		4	9
Tree/shrubbery		3	4		7	14
Utility pole		1				1
(blank)						
Grand Total	17	26	40	25	114	222

Figure 3 shows the location of crashes at intersections (intersection related crashes and those at 4-way, Y and T intersections). For this map also there are a higher number of incidents than dots appearing in the map given some crashes overlap. Most intersection related crashes are in or near Custer City and a number are at locations where county and Forest Services roads intersect with Route 79.

Figure 3 Intersection Crashes



As shown in Table 3, most crashes did not occur during inclement weather. Snow was a factor in two non-incapacitating and one possible injury crash, as well as 11 non-injury crashes. Rain was a factor in three non-injury crashes.

Table 3 Weather Condition

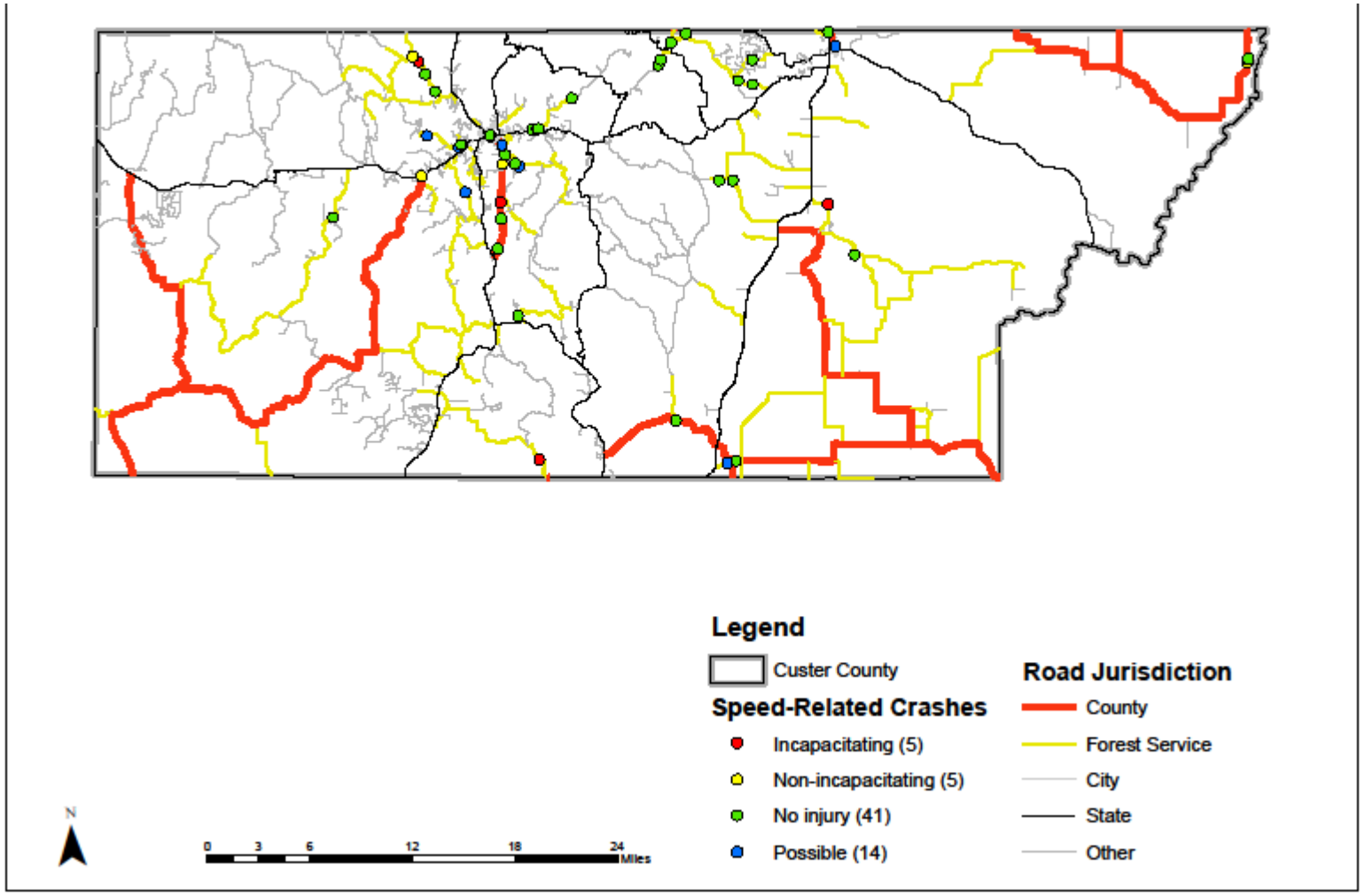
Injury Severity	Clear	Clear, Fog, smog, smoke	Cloudy	Cloudy, Rain	Cloudy, Snow	Rain	Snow	(blank)	Total
Incapacitating	15		2						17
Non-incapacitating	19		4	1	2				26
Possible	32		7				1		40
Wild animal hit – no injury	21	1	2			1			25
No injury	81		16	2	5	2	6	2	114
Grand Total	**168**	**1**	**31**	**3**	**7**	**3**	**7**	**2**	**222**

The county and forest service roadways are nearly all gravel and are intended for drivers to operate vehicles at lower speeds of 35 to 45 miles per hour. Table 4 shows speeding was recorded as a factor in 10 incapacitating and non-incapacitating crashes. Typically speeding is coded by law enforcement when the driver is driving too fast for conditions and may not always mean that the speed limit was exceeded.

Table 4 Speeding Involvement in Crashes

	Crash Injury Severity					
Speeding	Incapacitating	Non-incapacitating	Possible	Wild animal hit	No injury	Grand Total
N	12	21	26	25	73	157
Y	5	5	14		41	65
Grand Total	**17**	**26**	**40**	**25**	**114**	**222**

Figure 4 Speed Related Crashes



Proper use of a seatbelt has a major impact on the level of severity of a crash. While the crash might still have occurred, the injury might have been far less severe if all occupants were wearing safety belts properly. As shown in Table 5, for the majority of incapacitating injury crashes, seatbelts were not used or not worn properly. For nearly half of non-incapacitating injury crashes a safety belt was not used or not worn properly. A large number of records (47) did not have this data recorded, so the number of crashes involving unbelted occupants may be higher.

Table 5. Safety Equipment Used

Injury Severity	Helmet used	Helmet not used	Safety belt used properly	Safety belt used improperly	No safety belt used	blank	Total
Incapacitating			5	6	6		17
Non-incapacitating		3	11	2	10		26
Possible	1		22	5	8	4	40
Wild animal hit				0	0	25	25
No injury			79	8	9	18	114
Grand Total			117	21	33	47	222

As shown in Table 6, alcohol was recorded as a factor in one incapacitating injury crash and nearly one third (9 of 26) of non-incapacitating injury crashes.

Table 6. Alcohol Involvement in Crashes

Injury Severity	N	Y	Grand Total
Incapacitating	16	1	17
Non-incapacitating	17	9	26
Possible	37	3	40
Wild animal hit (blank)	25		25
No injury	107	7	114
Grand Total	**202**	**20**	**222**

The study team conducted a field review of all County roads and identified locations with apparent (based on visual review) geometric characteristics that could pose safety problems including.

- Steep sides
- Blind curves/visibility issues

- Flat curves/curves needing reshaping
- Poor approaches
- Steep curves and
- Excessive grades

While some of these issues are maintenance issues others may require significant investment. Low-cost solutions such as signing may be appropriate and able to be implemented quickly. The team conducted an analysis of crash locations within 100 feet of a segment with one of the above defined safety issues, shown in Figure 5. Of 22 locations where crashes occurred near one of the potential roadway issues, one involved an incapacitating injury, three involved a non-incapacitating injury and four involved a possible injury. Details on each of these crashes are shown in Table 7. Of the eight injury or possible injury crashes, two involved alcohol and four involved speed. At three of the eight locations a warning sign is in currently in place. Erosion was the most common issue at a location where a crash occurred, followed by a need for curve reshaping.

Figure 5 **Crashes Proximate to Identified Roadway Issues on/adjacent to County and Forest Service Roads**

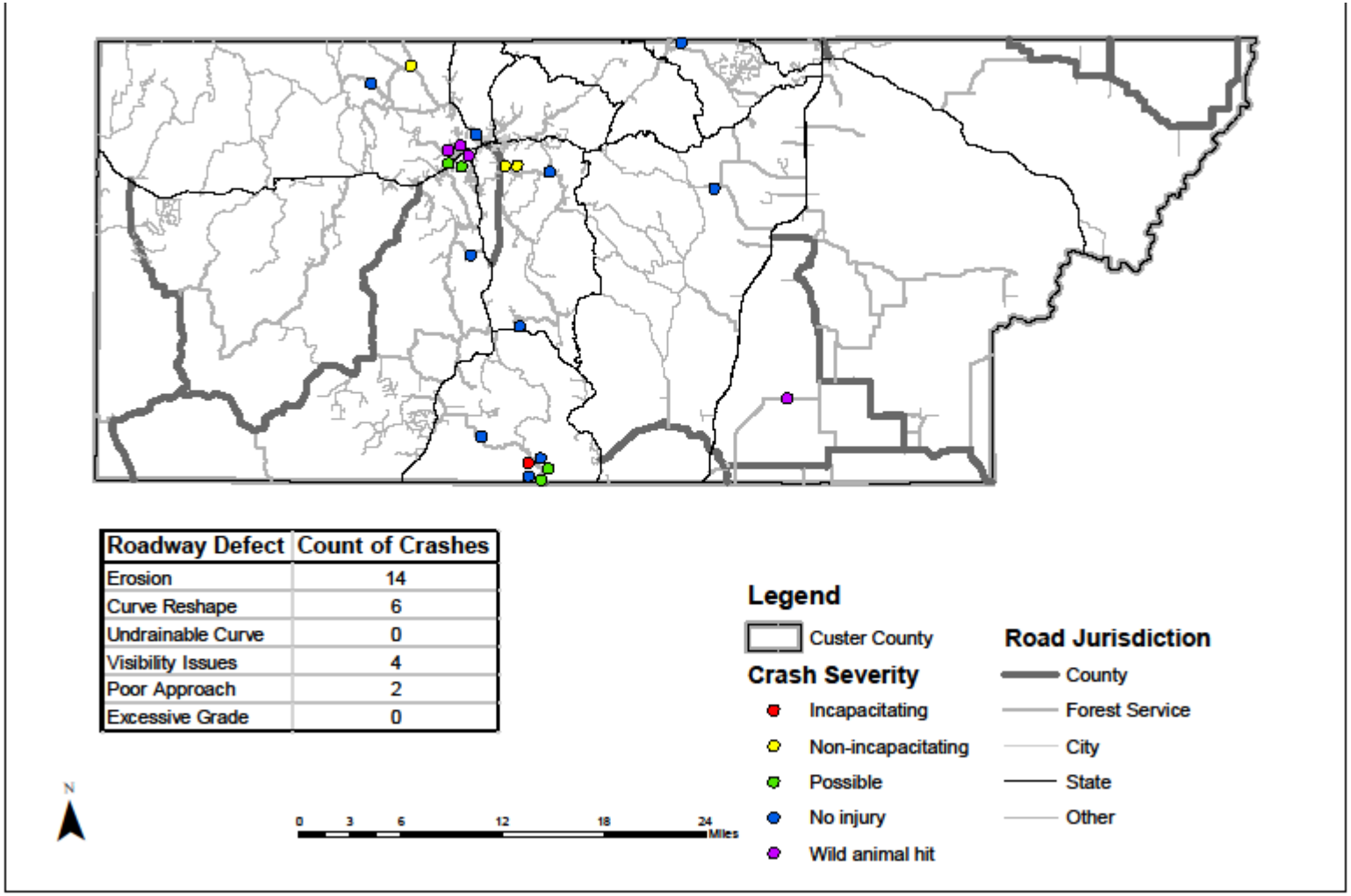


Table 7 Crashes Proximate to Identified Roadway Issues

ID	Road Conditio	First Harmful Event	Traffic Devi	Spee	Alcohol Use	InjurySeverity	Manner Of Collision	Speed Limit	Road Surfa	LightConditi	Junction	Hwy Classificatio	AlignmentD	ROADNAME	Erosior	Curve_ Reshap	Visibility Issue	Poor Approa
263	Dry	Overturn/rollover	Warning sign	Y	N	Incapacitating	Single Vehicle	40	Gravel	Dusk	Non-junction	County Road	Curve and hill crest	ARGYLE RD	0	1	1	0
687	Snow	Mailbox		N	Y	No injury	Single Vehicle	40	Gravel	Daylight	Non-junction	County Road	Curve and level	ARGYLE RD	0	1	0	0
776	Dry	Motor vehicle in transport		N	N	No injury	Sideswipe, opposite direction	40	Gravel	Daylight	Non-junction	County Road	Curve and hill crest	ARGYLE RD	0	1	1	0
250	Dry	Fence		N	N	No injury	Single Vehicle	40	Gravel	Dark - roadway	Non-junction	County Road	Curve and level	ARGYLE RD	1	1	0	0
683	Ice	Tree/shrubbery		N	N	No injury	Single Vehicle	0	Gravel	Daylight	Non-junction	County Road	Curve on grade	BEAVER CREEK RD	1	0	0	0
243	Ice	Embankment		N	N	No injury	Single Vehicle	0	Gravel	Daylight	Non-junction	County Road	Straight on grade	MAYO RD	1	0	0	0
760	Dry	Overturn/rollover	Warning sign	Y	N	No injury	Single Vehicle	35	Gravel	Daylight	Non-junction	County Road	Curve and level	LH RD	0	0	1	0
1199	Snow	Highway traffic sign post/sign		N	N	No injury	Single Vehicle	35	Gravel	Dusk	Non-junction	County Road	Curve on grade	HAZELRODT CUTOFF	1	0	0	0
534	Dry	Motor vehicle in transport		N	N	No injury	Rear-end (front to rear)	35	Asphalt	Daylight	Non-junction	State Road	Straight on grade	BAVARIAN HILLS RD	0	0	0	1
158	Dry	Animal - domestic		N	N	No injury	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	ELLIOT RD	1	0	0	0
245	Dry	Overturn/rollover		Y	N	No injury	Single Vehicle	0	Gravel	Dusk	Non-junction	County Road	Curve and hill crest	GHOST CANYON RD	1	0	0	0
473	Sand, mud,	Tree/shrubbery		N	N	Non-incapacitating	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	HAZELRODT CUTOFF	1	0	0	0
473	Sand, mud,	Tree/shrubbery		N	N	Non-incapacitating	Single Vehicle	35	Gravel	Dark - roadway	Non-junction	County Road	Straight on grade	HAZELRODT CUTOFF	1	0	0	0
143	Dry	Utility pole	Warning sign	Y	N	Non-incapacitating	Single Vehicle	35	Gravel	Daylight	Non-junction	County Road	Curve on grade	MEDICINE MOUNTAIN RD	1	0	0	0
246	Dry	Overturn/rollover	Warning sign	N	Y	Possible	Single Vehicle	40	Gravel	Dark - roadway	Non-junction	County Road	Curve on grade	ARGYLE RD	0	1	0	0
365	Dry	Overturn/rollover		N	N	Possible	Single Vehicle	40	Gravel	Daylight	Non-junction	County Road	Curve on grade	ARGYLE RD	0	1	1	0
487	Ice	Tree/shrubbery		Y	Y	Possible	Single Vehicle	0	Gravel	Dark - roadway	Y- intersection	County Road	Curve on grade	UPPER FRENCH CREEK RD	1	0	0	0
487	Ice	Tree/shrubbery		Y	Y	Possible	Single Vehicle	0	Gravel	Dark - roadway	Y- intersection	County Road	Curve on grade	UPPER FRENCH CREEK RD	1	0	0	0
93	Sand, mud,	Animal - wild		N	N	Wild animal hit	Wild animal hit - damage only	50	Wild ani	Daylight	Non-junction	County Road		OLD HWY 79	0	0	0	1
859	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0
931	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0
932	Dry	Animal - wild		N	N	Wild animal hit	Single Vehicle	55	Wild ani	Dark - roadway	Non-junction	State Road		UPPER FRENCH CREEK RD	1	0	0	0

To determine solutions to these safety issues will take both an understanding of challenges posed by the infrastructure as well as driver behavior in these locations. All crashes will be reduced if drivers do not operate a vehicle while impaired by alcohol or drugs, do not drive too fast for conditions, and always wear a safety belt. Improving safe driving behaviors will likely involve working with the State of South Dakota on its behavioral safety efforts, particularly those targeted to State Routes, as many of the trips on county roads also likely involve traveling on the State routes.

To determine infrastructure improvements needed in specific locations, county roadway staff will likely want to conduct some fieldwork in locations flagged with the data as having crash history or apparent infrastructure issues. In some locations County staff may wish to consider conducting a roadway safety audit to gain a comprehensive understanding of what types of countermeasures can be implemented.

Appendix V
SD LTAP EXCERPT

A Word About the Term "Paved"

What is meant by a "paved" road? For some, a light chip seal coat is considered paving. For others, paving is four or more inches of bituminous asphalt or "hot mix." The primary purpose of a pavement is to protect the subgrade. As the loads get heavier, the pavement thickness must be increased.

Generally speaking, bituminous concrete (hot mix asphalt) has little real load-bearing capacity of its own until it reaches a thickness of two inches. In fact, the Asphalt Institute has a firm policy of recommending a minimum pavement thickness of 4 inches full depth asphalt or 3 inches asphaltic concrete plus a suitable granular base even for low volume roads. Their research shows that 4 inches of hot mix will carry about 10 times as much traffic as 2 inches of hot mix when constructed over thin granular bases.

A pavement less than two inches thick primarily protects the base materials by shedding water and providing a smooth riding surface. Such a road is more properly called a surface-treated road. Roads with thin pavements must have excellent drainage designed into them and be diligently maintained throughout their service life.

In this paper we will consider even a light surface treatment as paving, however. The assumption is that, when a town first applies a chip seal treatment, for example, it has taken a first step toward eventually achieving a load-bearing pavement.

Introduction

Two-thirds of the highway systems in the United States and more than 90 percent of all the roads in the world are unsurfaced or lightly surfaced low volume roads. In Kentucky, more than 19,000 miles of local roads have gravel surfaces.

Most local roads were not designed with the same considerations used in the design of state and interstate highways. Most have evolved from primitive trails. Paths of least resistance first created by wild animals were later used by settlers. As needs and traffic increased, these traveled ways became roads which were gradually improved with gravel or crushed rock. Little engineering went into these improvements. Using available materials and "keeping them out of the mud" were the extent of efforts to maintain a road.

As paving occurred, the tendency was to make minor modifications to the foundations of the evolved road and to seal or pave the surface. As a result, many low volume roads in Kentucky now have continual maintenance problems because of inadequate base support in addition to alignment and drainage problems.

To add to the problem, roads throughout Kentucky are experiencing ever-increasing weights and volumes of traffic. Population growth and tourism make traffic demands. Coal trucks and other commercial vehicles are carrying heavier loads than ever before. These higher volumes and greater weights are putting a steadily increasing strain on local road maintenance and reconstruction budgets.

Gravel or Paved: A Matter of Trade-Offs

The decision to pave is a matter of trade-offs. Paving helps to seal the surface from rainfall, and thus protects the base and subgrade material. It eliminates dust problems, has high user acceptance because of increased smoothness, and can accommodate many types of vehicles such as tractor-trailers that do not operate as effectively on unsurfaced roads.

In spite of the benefits of paved roads, well-maintained gravel roads are an effective alternative. In fact, some local agencies are reverting to gravel roads. Gravel roads have the advantage of lower construction and sometimes lower maintenance costs. They may be easier to maintain, requiring less equipment and possibly lower operator skill levels. Potholes can be patched more effectively. Gravel roads generate lower speeds than paved surfaces. Another advantage of the unpaved road is its forgiveness of external forces. For example, today vehicles with gross weights of 100,000 pounds or more operate on Kentucky's local roads. Such vehicles would damage a lightly paved road so as to require resealing, or even reconstruction. The damage on a gravel road would be much easier and less expensive to correct.

There is nothing wrong with a good gravel road. Properly maintained, a gravel road can serve general traffic adequately for many years.

Should We Pave This Gravel Road? A Ten Part Answer

When a local government considers paving a road, it is usually with a view toward reducing road maintenance costs and providing a smooth riding surface. But is paving always the right answer? After all, paving is expensive. How does a county or city know it is making the most cost-effective decision?

We will consider ten answers to the question, "Should we pave this gravel road?" In fact they are ten parts of one answer. If one of the ten is not considered, the final decision may not be complete. The ten answers taken together provide a framework for careful decision making.

Answer 1: After Developing a Road Management Program

If the road being considered for paving does not fit into a countywide road improvement program, it is quite possible that funds will not be used to the fullest advantage. The goal of a road management system is to improve all roads or streets by using good management practices. A particular road is only one of many in the road system.

A road management system is a common sense, step-by-step approach to scheduling and budgeting for road maintenance work. It consists of surveying the mileage and condition of all roads in the system, establishing short-term and long-term maintenance goals and prioritizing road projects according to budget constraints.

A road management system helps the agency develop its road budget and allows the use of dollars wisely because its priorities and needs are clearly defined.

Through roadway management, local governments can determine the most cost-effective, long-term treatments for their roads, control their road maintenance costs, and spend tax dollars more wisely. Local governments that stick with the program will be rewarded with roads that are easier and less costly to maintain on a yearly basis. Pertinent information about all roads will be readily available for years to come instead of scattered among files or tucked away in an employee's head.

Steps in a Road Management Program:

1. **Inventory the roads.** The amount of time available and the miles of road in a county or city will determine how much detail to go into.
2. **Assess the condition of the roads.** Develop simple and easy techniques to use each year. Maintain a continuing record of the assessed condition of each road so that changes in condition can be noted easily and quickly.
3. **Select a road management plan.** Select the most appropriate treatment to repair each road, bridge, or problem area.
4. **Determine overall needs.** Estimate the cost of each repair job using generalized average costs and tally up the total. Establish long-range goals and objectives that in turn will help the agency justify its budget requests.
5. **Establish priorities.** Keep good roads in good shape (preventive maintenance) and establish a separate budget, or request a temporary increase, to reconstruct really bad roads.

Answer 2: When the Local Agency Is Committed to Effective Management

A commitment to effective management is an attitude. It is a matter of making sure that taxpayers' money is well spent—as if it were one's own money. It does not mean paving streets with gold but it does mean using the best materials available. It does not mean taking short cuts resulting in a shoddy project but it does mean using correct construction techniques and quality control. A commitment to effective management means planning for 5 or even 10 years instead of putting a band-aid on today's problem. It means taking the time to do things right the first time and constructing projects to last.

Consider a child's tree house compared to a typical three-bedroom house in a Kentucky town. Because each protects people from the wind and rain each comes under the definition of a shelter. However, the tree house was built with available materials and little craftsmanship. The other was planned, has a foundation, sound walls and roof and, with care, can last hundreds of years. One is a shack and the other is a family dwelling. Only one was built with a commitment to excellence.

Many roads are like the tree house. They qualify under the definition but they are not built to last.

The horse and buggy days are over. We are in an age of travelers' demands, increasing traffic, declining revenues and taxpayer revolts. We are expected to do more with less. Building roads to last requires an attitude of excellence. Such an attitude helps to make better decisions, saves money in the long run, and results in a better overall road system.

Answer 3: When Traffic Demands It

The life of a road is affected by the number of vehicles and the weight of the vehicles using it. Generally speaking, the more vehicles using a road, the faster it will deteriorate.

The average daily traffic volumes (ADT) used to justify paving generally range from a low of 50 vehicles per day to 400 or 500. When traffic volumes reach this range, serious consideration should be given to some kind of paving.

Traffic volumes alone are merely guides. Types of traffic should also be considered. Different types of traffic (and drivers) make different demands on roads. Will the road be used primarily by standard passenger cars or will it be a connecting road with considerable truck traffic? Overloaded trucks are most damaging to paved roads.

The functional importance of the highway should also be considered. Generally speaking, if the road is a major road, it probably should be paved before residential or side roads are paved. On the other hand, a residential street may be economically sealed or paved while a road with heavy truck usage may best be surfaced with gravel and left unpaved until sufficient funds are available to place a thick load-bearing pavement on the road.

Answer 4: After Standards Have Been Adopted

Written standards in the areas of design, construction and maintenance define the level of service we hope to achieve. They are goals to aim for. Without written standards there is no common understanding about what a local government is striving for in road design, construction and maintenance. In deciding to pave a gravel road, is the local government confident it would be achieving the desired standards?

Design and construction standards do not have to be complex. It takes only a few pages to outline such things as right-of-way width, traveled way width, depth of base, drainage considerations (such as specifying minimum 18"culvert pipe), types of surfacing and the like.

Maintenance standards address the need for planned periodic maintenance. A good maintenance plan protects local roads, which for most counties represents many millions of dollars of investment. It also is an excellent aid when it comes time to create a budget.

Considerations include: How often shall new gravel be applied to a gravel road? (Some roads require it more than others do.) How many times per year are roads to be graded? How often and in what locations should calcium chloride or other road stabilizers be applied? What is our plan for checking road signs? (Because of legal liability, a missing sign can be very costly if not replaced.) What is our plan for ditching and shouldering?

Answer 5: After Considering Safety and Design

Paving a road tempts drivers to drive faster. As speed increases, the road must be straighter, wider, and as free as possible from obstructions for it to be safe. Paving low volume roads before correcting safety and design inadequacies encourages speeds which are unsafe, especially when the inadequacies "surprise" the driver. Because of the vast mileage of low volume roads, it is difficult to reduce speeds by enforcement.

Roads must be designed to provide safe travel for the expected volume at the design speed. To do this a number of physical features must be considered:

- Sight Distance
- Alignment and Curves
- Lane Width
- Design Speed
- Surface Friction
- Superelevation

It may be necessary to remove trees or other obstructions such as boulders from the road's edge. Some engineers insist that no road should be paved that is less than 22 feet wide. If this standard is accepted, gravel roads must be widened before paving. Bridges may need widening. Considering these and other safety and design factors in the early stages of decision making can help to achieve the most economical road and one that will meet transportation needs. It makes no sense to pave a gravel road which is poorly designed and hazardous.

Answer 6: After the Base and Drainage Are Improved

"Build up the road base and improve drainage before paving." This cardinal rule cannot be stressed enough. If the foundation fails, the pavement fails. If water is not drained away from the road, the pavement fails. Paving a road with poor base or with inadequate drainage is a waste of money. It is far more important to ask, "Does this road need strengthening and drainage work?" than it is to ask, "Should we pave this gravel road?"

Soil is the foundation of the road and, as such, it is the most important part of the road structure. A basic knowledge of soil characteristics in the area is very helpful and can help avoid failures and unneeded expense. Soils vary throughout the country. For highway construction in general, the most important properties of a soil are its size grading, its plasticity, and its optimum moisture content.

There is a substantial difference in the type of crushed stone or gravel used for a gravel road-riding surface versus that used as a base under a pavement. The gravel road surface needs to have more fines plus some plasticity to bind it together, make it drain quicker and create a hard riding surface. Such material is an inferior base for pavement. If pavement is laid over such material, it traps water in the base. The high fines and the plasticity of the material make the wet base soft. The result is premature pavement failure.

Answer 7: After Determining the Costs of Road Preparation

The decision to pave a gravel road is ultimately an economic one. Policy makers want to know when it becomes economical to pave.

There are two categories of costs to consider: total road costs and maintenance costs.

Local government needs to determine what the costs are to prepare a road for paving. Road preparation costs are the costs of construction before paving actually takes place.

For example, if standards call for a traveling surface of 22 feet and shoulders of two feet for a paved road, the costs of new material must be calculated. Removing trees, brush or boulders, adding new culverts or other drainage improvements, straightening a dangerous curve, improving slopes and elevations, constructing new guardrails, upgrading signs and making other preparations – all must be estimated.

Costs will vary greatly from project to project depending on topography, types of soils, availability of good crushed stone or gravel, traffic demands and other factors. One important factor is the standards. That is one reason why we should carefully consider what is contained in the road policy (#4 above). For larger projects it may be desirable to hire an engineering consulting firm (another cost) to design the road and make cost estimations. For smaller projects construction costs can be fairly closely calculated by adding the estimated costs of materials, equipment and labor required to complete the job.

Answer 8: After Comparing Pavement Costs, Pavement Life and Maintenance Costs

A second financial consideration is to compare maintenance costs of a paved road to maintenance costs of a gravel road. To make a realistic comparison we must estimate the years of pavement life (how long the pavement will be of service before it requires treatment or overlay) and the actual cost of paving. It is at this point that we can begin to actually compare costs between the two types of roads.

Consider the following maintenance options:

A. For both paved and gravel roads, a local government must: maintain shoulders – keep ditches clean – clean culverts regularly – maintain roadsides (brush, grass, etc.) – replace signs and signposts.

B. **PAVED** roadways require: patching – resealing (chip, slurry, crack seal) and striping.

C. **GRAVEL** roadways require: regraveling – grading and stabilization of soils or dust control.

Since the maintenance options in "A" are common to both paved and gravel roads, they do not have to be considered when comparing maintenance costs. These costs for either type of road should be about the same. But the costs of the maintenance options in "B" and "C" are different and therefore should be compared.

Figure 16 shows costs for maintaining gravel roads over a six-year period in a hypothetical situation. If records of costs are not readily available, you may use a "best guess" allowing for annual inflation costs.

Three paving options are listed in Figure 17. Each includes estimated costs for paving and an estimated pavement life. You should obtain up-to-date cost estimates and expected pavement life figures for these and other paving options by talking to your state department of transportation, contractors, and neighboring towns and counties.

YEAR	1	2	3	4	5	6	TOTALS
GRADING							
Equipment	270	280	290	300	310	320	1,770
Labor	90	100	110	120	130	140	690
REGRAVEL							
Materials	–	–	4,000	–	–	–	4,000
Equipment	–	–	2,500	–	–	–	2,500
Labor	–	–	2,300	–	–	–	2,300
STABILIZATION/DUST CONTROL							
Materials	800	900	1,200	920	950	975	5,745
Equipment	30	35	70	40	50	60	285
Labor	100	110	150	125	140	150	775
Totals	1,290	1,425	10,620	1,505	1,580	1,645	$18,065

Figure 16: Gravel Road Maintenance Cost Per Mile

Let's consider the cost of a double surface treatment operation and the projected cost of maintaining it before anything major has to be done to the pavement (end of pavement life). We see in Figure 17 that the estimated cost to double surface treat one mile of road is $20,533. Estimated maintenance costs over a six-year period could be:

Patching	$1,800	Total maintenance	$4,300
Striping	$500	Construction	$20,533
Sealing	$2,000	Total cost over six years	$24,833
	$4,300		

When we compare this cost to the cost of maintaining an average mile of gravel road over the same period of six years ($18,065), we find a difference in dollar costs of $6,768. It is not cost beneficial to pave in this hypothetical example, even without considering the costs of road preparation (#7).

This is not a foolproof method, but it does give us a handle on relative maintenance costs in relation to paving costs and pavement life. The more accurate the information, the more accurate the comparisons will be. The same method can be used in helping to make the decision to turn paved roads back to gravel.

Option	Life	Cost Per Mile	Cost/Mile Per Year	Calculations	Maintenance Per Mile/Year
Chip Seal-Double Surface Treatment	6 yrs.	$20,533	$3,422	Based on price of $1.75 per sy; 20 ft. wide x 5,280 ft. = 105,600 sf 105,600 sf ÷ 9 = 11,733 sy s $1.75 = $20,533	?
Bituminous Concrete-Hot Mix	12 yrs.	$58,080	$4,840	Based on estimated price of $30 per ton; 1 sy of stone and hot mix/ cold mix 1" thick weighs about 110 lbs. Therefore 3" = 330 lbs. per sy. 11,733 sy (1 mile of pavement) s 330 lbs. = 3,871,890 lbs. 3,871,890 lbs. = 1936T × $30 = $58,080	?
Cold Mix	8 yrs.	$48,390	$6,048	At $30 per ton, using same formula as hot mix, 2 1/2" of cold mix equals 1,613T × $30 = $48,390	?

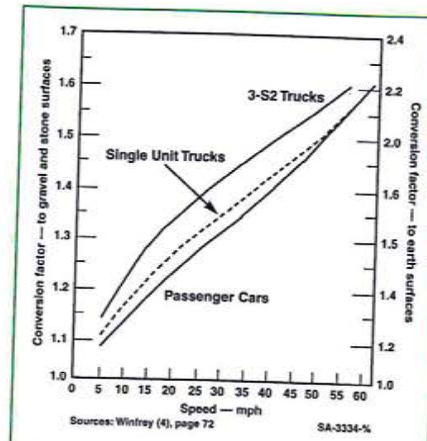
*These costs must be determined before any conclusions can be reached regarding the most cost-effective pavement method. The thinner the pavement, the greater the maintenance cost. Traffic, weather conditions, proper preparation before paving and many other factors can affect maintenance costs. No Kentucky data exists upon which to base estimates of maintenance costs on low volume roads of these paving options; and, therefore, we offer no conclusion as to the "best" way to pave.

Figure 17: Paving Options (Costs and road life are estimates and may vary)

Answer 9: After Comparing User Costs

Not all road costs are reflected in a highway budget. There is a significant difference in the cost to the user between driving on a gravel surface and on a paved surface. User costs, therefore, are appropriate to consider in the pave/not pave decision. By including vehicle-operating costs with construction and maintenance costs, a more comprehensive total cost can be derived.

Vehicles cost more to operate on gravel surfaces than on paved surfaces, often 2 or 3 times greater than for bituminous concrete roads in the same locations. There is greater rolling resistance and less traction which increase fuel consumption. The roughness of the surface contributes to additional tire wear and influences maintenance and repair expenses. Dust causes extra engine wear, oil consumption and maintenance costs. Figure 18 from AASHTO'S "A Manual on User Benefit Analysis of Highway and Bus-Transit Improvements" shows the impacts of gravel surfaces on user costs. For example, an average running speed of 40 MPH on a gravel surface will increase the user costs of passenger cars by 40% (1.4 conversion factor). The general public is not aware that their costs would actually be less if some of these roads were surface treated.



To use this chart, determine the type of vehicle, the speed and the type of road surface. Follow the speed line vertically to the vehicle type. Go horizontally to multiplier factor of road surface. Multiply the cost of travelling on a paved surface by this number to determine the cost of operating the same vehicle on gravel surface or dirt surface. Example: If it costs 28¢ per mile to operate a passenger car* at 40 mph on pavement, it will cost 39¢ per mile to operate it on a gravel road at the same speed and 50¢ per mile on a dirt road.

*1984 Federal Highway Administration Statistics quotes an operating cost of 28¢ per mile for an intermediate size passenger car traveling on average suburban pavement. You must determine your own vehicle operating costs on pavement in order to use these multiplicative factors to calculate operating that vehicle on gravel roads.

Figure 18: Impacts of Gravel Surfaces on User Costs

Add to the gravel road maintenance the user costs over a six-year period. Estimate an average daily traffic (ADT) of 100 cars and 50 single unit trucks, traveling at 40 mph. Estimate that it costs $.25 per mile to operate the vehicles on pavement. Using the chart in Figure 3, we see it costs 1.4 times as much (or $.35) to drive a car 40 mph one mile on gravel road and 1.43 times as much (or $.36) to drive a single unit (straight frame) truck 40 mph one mile on gravel road.

100 cars x 365 days x $.10 added cost x 1 mile = $3,650

50 trucks x 365 days x $.11 added cost x 1 mile = $2,008

User costs for the gravel road is $5,659 per year or $33,954 for a six-year period. Assuming we still do not consider road preparation costs, it now appears justified to pave the road. Such an approach can be used to establish a "rule of thumb" ADT. For example, some agencies give serious consideration to paving roads with an ADT above 125.

Answer 10: After Weighing Public Opinion

Public opinion as to whether to pave a road can be revealing, but it should not be relied upon to the exclusion of any one of points 1-9 already discussed. If a decision to pave is not based on facts, it can be very costly. Public opinion should not be ignored, of course, but there is an obligation by government leaders to inform the public about other important factors before making the decision to pave.

Stage Construction

Local government may consider using "stage construction design" as an approach to improving roads. This is how it works. A design is prepared for the completed road, from base and drainage to completed paving. Rather than accomplishing all the work in one season, the construction is spread out over three to five years. Paving occurs only after the base and drainage have been proven over approximately one year. Crushed gravel treated with calcium chloride serves as the wearing course for the interim period. Once all weak spots have been repaired, the road can be shaped for paving.

There are some advantages to keeping a road open to traffic for one or more seasons before paving:

1. Weak spots that show up in the sub-grade or base can be corrected before the hard surface is applied, eliminating later expensive repair;
2. Risky late season paving is eliminated;
3. More mileage is improved sooner;
4. The cost of construction is spread over several years.

Note: Advantages may disappear if timely maintenance is not performed. Surface may deteriorate more rapidly because it is thinner than a designed pavement.

Summary

Some local roads are not well engineered. Today, larger volumes of heavy trucks and other vehicles are weakening them at a fast rate. Paving roads as a sole means of improving them without considering other factors is almost always a costly mistake. Counties and cities should consider these ten points first. Carefully considering them will help to assure local government officials that they are making the right decision about paving a gravel road.

Appendix E: Walk-around Grader Inspection

A Good Operator Takes Care of the Machinery

For maintenance and operator personnel safety, and maximum service life of the machine, make a thorough walk-around inspection when performing lubrication and maintenance work. Inspect under and around the machine for such items as loose or missing bolts, trash build-up, cut or gouged tires; damaged hydraulic lines or hoses; oil, fuel, or coolant leaks; and condition of blade.

The grease gun is a very important maintenance tool.

In addition to routine machine maintenance, it is very important to keep all warning devices clean and visible.