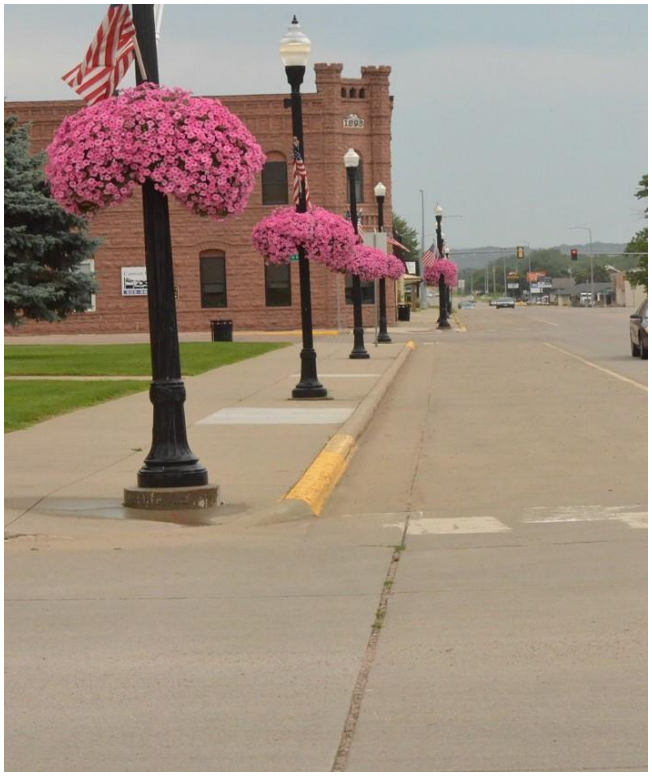

Lincoln County Master Transportation Plan

Final Report

November 18, 2019

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Lincoln County Master Transportation Plan

South Dakota Department of Transportation

Lincoln County

Sioux Falls Metropolitan Planning Organization

November 2019

Prepared by HDR Inc.

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Executive Summary

Lincoln County is the fastest growing County in South Dakota and one of the fastest growing Counties in the nation. The northern part of the County contains several rapidly growing municipal areas while the southern portion is characterized by agricultural land use. With the rapid population growth, traffic levels and traffic patterns are changing and anticipated to continue changing over time. As such, the South Dakota Department of Transportation (SDDOT) and Lincoln County have recognized a need to establish baseline conditions, to categorize and prioritize roadways, and determine future transportation improvements for the County.

In order to identify transportation needs and efficiently maintain County facilities, a study was conducted, beginning in September 2018 and resulting in this document, the Lincoln County Master Transportation Plan.

Lincoln County faces a number of challenges including rapid growth and development of Sioux Falls, Tea and Harrisburg placing stress on existing infrastructure in the northern part of the County, as well as challenges of maintaining existing infrastructure important to the agricultural economy and local communities to the south. The Lincoln County Master Transportation Plan provides a framework for managing County transportation facilities through the 2045 planning horizon.

A Major Road Plan has been developed providing a road classification system unique to the County's needs. The road plan provides guidance for design standards, access considerations, traffic analysis and traffic studies. This information will help the County plan for the future, proactively address development and growth around population centers, address infrastructure needs to maintain a connected network and prioritize network components important for the agricultural economy.

The Bicycle and Pedestrian Plan provides guidance on future projects and opportunities to provide a connected multi-modal network throughout the County.

The County's existing road network has been evaluated from an operational perspective under current and projected traffic levels. A crash history review provides insight into locations where safety issues may be occurring. A list of projects has been developed in order to address traffic capacity and safety needs. An investment of $149M is anticipated to address traffic and safety needs identified at the time of this study with $69M needed to address short-term, higher priority needs.

The condition of the existing road network and bridge structures has been evaluated and recommendations have been provided to assist the County in maintaining their investment in existing infrastructure. Although paved roads in Lincoln County are currently in adequate condition, $45M in bridge needs have been identified with $18M needed to address bridges currently in poor condition.

Heading into the future, it will be important to continue partnering with municipal and township governments to proactively plan for and address development and growth throughout the community, whether it is urban city expansion or new large-scale agricultural facilities. This Master Transportation Plan provides a framework for the County and partnering agencies to approach issues such as roadway jurisdiction, access, design, and funding while addressing growth and changing transportation needs.

1 Introduction

Lincoln County is located in the southeastern part of South Dakota sharing an eastern border with Iowa along the Big Sioux River. The County was incorporated December 30, 1867. It spans approximately 578 square miles and has a current population of 56,000 including 16 townships and 9 municipalities. Incorporated municipalities in Lincoln County include Canton, Fairview, Harrisburg, Hudson, Lennox, Tea, Worthing, and portions of Beresford and Sioux Falls. Townships within the County limits include Brooklyn, Canton, Dayton, Delaware, Delapre, Eden, Fairview, Grant, Highland, LaValley, Lincoln, Lynn, Norway, Perry, Pleasant and Springdale.

Some of the existing transportation facilities located within Lincoln County include the following:

- County Jurisdiction Roadways
    - Paved Roads – 286 miles
    - Gravel Roads – 44 miles
- County Bridges – 152
- Rail Facilities
    - Burlington Northern Santa Fe Railroad (BNSF)
    - D&I (L.G. Everist)
    - 110 Car Shuttle Facilities in Canton and Beresford
    - Ethanol facility in Hudson
    - CHS Facilities in Worthing and Canton
- Airports
    - Marv Skie Lincoln County Airport
    - Canton Municipal Airport
- Transit Providers
    - Sioux Area Metro (Sioux Falls)
    - Community Transit, Inc. (Lennox)
    - Rural Office of Community Services (Canton, Beresford)

The northern part of the County contains several rapidly growing municipal areas while the southern portion is characterized by agricultural land use. Lincoln County is part of the Sioux Falls Metropolitan Statistical Area (MSA), with the northern portion included within the Sioux Falls Area Metropolitan Planning Organization's (MPO) Transportation Planning Area.

With the rapid population growth, traffic levels and traffic patterns are changing and anticipated to continue changing over time. As such, the South Dakota Department of Transportation (SDDOT) and Lincoln County have recognized a need to establish baseline conditions, to categorize and prioritize roadways, and determine future transportation improvements for the County.

In order to identify transportation needs and efficiently maintain County facilities, a study was conducted, beginning in September 2018 resulting in this document, the Lincoln County Master Transportation Plan.

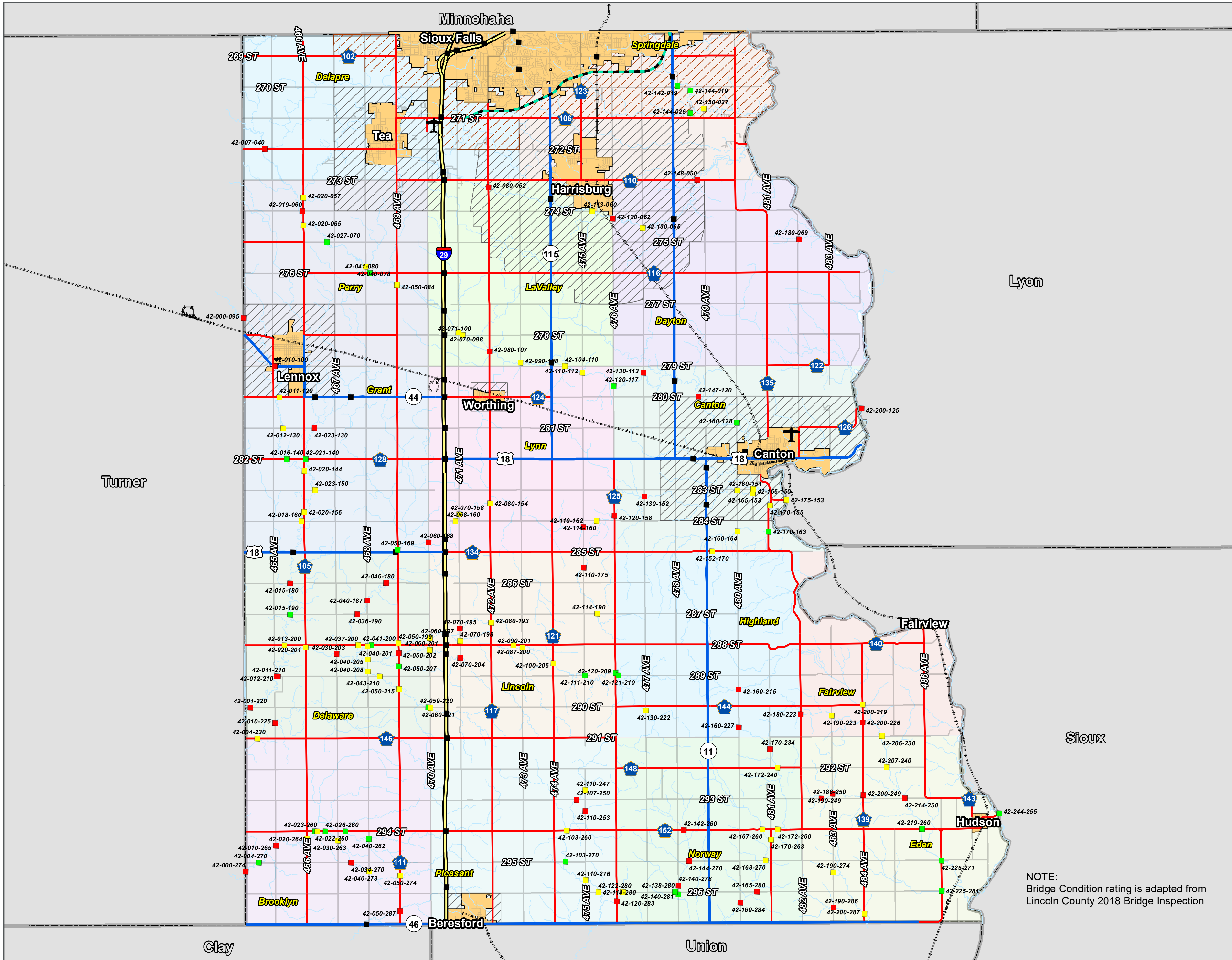
Goals identified for the Master Transportation Plan include the following:

- Complete a list of transportation issues and needs facing Lincoln County.
- Develop feasible solutions to address those issues and needs that meet current design standards and/or traffic level of service expectations under both the current and predicted future traffic conditions while promoting a livable community that will enhance the economic and social well-being of Lincoln County residents.
- Create final products for use by Lincoln County, SDDOT and the Sioux Falls MPO which will provide guidance to implement recommended improvements and proactively respond to future development plans within the area.

The study area encompasses all of Lincoln County and is shown in **Figure 1-1**. Areas where the County coordinates with local municipalities are also identified on the figure. These areas include the Sioux Falls Joint Jurisdiction boundary and various Municipal Growth Areas.

LINCOLN COUNTY
South Dakota

FIGURE 1-1 EXISTING TRANSPORTATION FACILITIES



LEGEND

- Interstate Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Highway 100 (Future)
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary

Bridge / Culvert

- Bridge / Culvert - Good Condition
- Bridge / Culvert - Fair Condition
- Bridge / Culvert - Poor Condition
- Bridge / Culvert (Other)
- Airport

N

0 1.5 3
MILES

SOURCE: SDDOT

NOTE:
Bridge Condition rating is adapted from Lincoln County 2018 Bridge Inspection

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG1-1_EXISTING_FACILITIES.MXD - USER: AFAGERNE - DATE: 11/18/2019

2 Baseline Conditions

The initial phase in development of the Master Transportation Plan was to establish baseline conditions. This primarily focused on identifying safety issues, traffic patterns and pavement condition for Lincoln County roadway facilities. An evaluation of safety and traffic conditions provided a means to identify issues with existing facilities and define needs related to increased traffic levels. The pavement condition evaluation was an important part of the overall plan since the County has a significant financial commitment for maintaining the existing roadway infrastructure.

Traffic scenarios developed for this study consider the effects of the future Highway 100 (or Veterans Parkway) extension between I-90 and I-29 spanning the east and south sides of Sioux Falls. Results are considered with and without the inclusion of Highway 100 to allow for its consideration in future planning. The County is not participating in development of Highway 100, but the corridor will have distinct impacts on adjacent County facilities once it has been completed.

2.1 Safety Evaluation

A Crash History Review was conducted to identify safety needs on the County roadway network. Crash data was obtained from the SDDOT for reportable crashes on public roadways throughout Lincoln County for the years 2013 through 2017. The focus of the review is on Lincoln County highways, with a cursory review of township, municipal, and state highways. Due to significantly higher traffic volumes, crashes along Interstate 29 (I-29) and within the City of Sioux Falls were removed from the assessment to help present safety needs related to roadways in the more rural areas.

A total of 4,039 crashes were reported throughout Lincoln County between 2013 and 2017. 1,674 of those occurred on Lincoln County, township, municipal roads, and state highways (excluding crashes within Sioux Falls city limits and along I-29). The location of these crashes, in terms of severity, is presented in **Figure 2-1**. Additional documentation including crash characteristics, driver contributing circumstances and information on vehicle-animal crashes can be found in Appendix A.

LINCOLN COUNTY
South Dakota

FIGURE 2-1
CRASH HISTORY
(2013-2017)

LEGEND

- Interstate Highway
- US Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- City

Crash Severity

- Fatal injury
- Incapacitating
- Non-incapacitating
- Possible
- No injury
- Wild animal hit

N

0 1.5 3
MILES

DATA SOURCE: SDDOT

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG2-1_CRASH_HISTORY_2013-2017.MXD - USER: AFAGERNE - DATE: 9/8/2019

LINCOLN COUNTY
South Dakota

FIGURE 2-2
SEVERE CRASHES
(2013-2017)

LEGEND

- Interstate Highway
- US Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- City

Crash Severity

- Fatal injury
- Incapacitating

N

0 1.5 3
MILES

DATA SOURCE: SDDOT

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG2-2_SEVERE_CRASHES_2013-2017.MXD - USER: AFAGERNE - DATE: 9/8/2019

2.1.1 Intersections

Crashes occurring within a 250-foot radius of an intersection in the GIS crash database were categorized as an intersection crash for this analysis. 627 of the 1,674 crashes occurred within the 250-foot radius of an intersection. The 22 intersections with the greatest crash frequency (7 or more crashes over the 5-year analysis period) are summarized in **Table 2-1** and shown spatially in **Figure 2-2**.

Intersections were ranked in terms of weighted crash rate (crashes per million entering vehicles (MEV)). Weighted crash rates were calculated using average daily traffic from the most recently collected daily traffic counts and by weighting each crash in accordance with its severity: fatal crash (12), injury crash (3), and property damage crash (1). This process differs from the calculation of an average crash rate in that the weighted crash rate accounts for injury and fatal crashes through the weighting process. An average crash rate calculation reflects total crash frequency, regardless of injury severity.

In terms of overall crash frequency, it was found that the 5 highest crash frequency intersections, and 7 of the top 9, occurred along the 271st Street corridor. I-29 Exit 73 interchange (271st Street) exhibited the greatest number of crashes with 67. The interchange is a single point configuration and includes five primary points of turning conflict (right-turns at each ramp terminal and the center single point). The 271st Street intersections of 475th Avenue and SD115 (474th Avenue) included the next highest crash frequency, with 29 and 27 crashes respectively.

Away from the 271st Street corridor, high crash frequency intersections tend to be located around the developing areas of Tea and Harrisburg and along the 272nd Street and 273rd Street corridors. There are a couple outlying intersections south of Tea and Harrisburg, two of which are on 276th Street and one on SD44 (280th Street).

State highway intersections included 8 of the top 22 crash frequency intersections. Four of those were on SD115, which is a primary north/south commuter route to/from Sioux Falls.

With regard to the weighted crash rate, three intersections stood out compared to the others:

- 272nd Street and 466th Avenue (5.7 crashes/MEV; weighted)
- 276th Street and SD115 (5.5 crashes/MEV; weighted)
- 271st Street and 475th Avenue (3.2 crashes/MEV; weighted)

Four additional intersections noted a weighted crash rate greater than 2.0 crashes/MEV. Overall, there were three intersections along 271st Street that exhibited a weighted crash rate greater than 2.0.

Table 2-1. Intersection Crash History (2013-2017)

No.	East/West Roadway	North/South Roadway	Total # Crashes	Weighted Crash Rate (Crashes/MEV)	Intersection Summary Included
1	**272nd Street (CH 106)**	**466th Avenue (CH 105)**	10	5.7	**
2	**276th Street (CH 116)**	SD115	13	5.5	
3	**271st Street (CH 106)**	**475th Avenue (CH 123)**	29	3.2	**
4	**271st Street (CH 106)**	SD115	27	2.5	
5	**272nd Street (CH 106)**	467th Avenue	7	2.5	**
6	SD44	468th Avenue	9	2.4	
7	**271st Street (CH 106)**	473rd Avenue	12	2.1	**
8	**269th Street (CH 102)**	**469th Avenue (CH 111)**	8	1.8	**
9	US18	**472nd Avenue (CH 117)**	7	1.8	
10	**276th Street (CH 116)**	SD11	8	1.7	
11	**269th Street (CH 102)**	**466th Avenue (CH 105)**	7	1.7	**
12	**271st Street (CH 106)**	**469th Avenue (CH 111)**	18	1.7	**
13	**273rd Street (CH 110)**	**472nd Avenue (CH 117)**	11	1.4	**
14	**276th Street (CH 116)**	**466th Avenue (CH 105)**	7	1.3	**
15	**271st Street (CH 106)**	**472nd Avenue (CH 117)**	15	1.2	**
16 [b]	270th Street	475th Avenue/Cliff Avenue	9	1.2	
17	US18	Cedar Street	7	0.7	
18	**271st Street (CH 106)**	470th Avenue	10	0.6	**
19	**273rd Street (CH 110)**	SD115	9	0.6	
20	272nd Street	SD115	8	0.6	
21	**273rd Street (CH 110)**	**475th Avenue (CH 123)**	7	0.5	**
22 [a]	**271st Street (CH 106)**	I-29 (Exit 73 single point interchange)	67	-	

Source: SDDOT Crash Database
Lincoln County-jurisdiction roadways indicated in **bold**
[a] I-29 Exit 73 single point interchange presented as a single intersection. Crash rate was not calculated.
[b] 270th Street and Cliff Avenue intersection annexed into City of Sioux Falls in 2017.

Detailed intersection crash summaries are included in Appendix A for those intersections identified in Table 2-1.

LINCOLN COUNTY
South Dakota

FIGURE 2-3
CRASH ANALYSIS INTERSECTIONS & CORRIDORS (2013-2017)

LEGEND

- Interstate Highway
- US Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Study Corridors
- Highest Ranked Weighted Crash Rate Intersections (minimum 7 intersection crashes)

* Weighted crash rate not calculated at I-29 and 271st Street interchange.

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford
Lyon
Sioux
Union
Clay
Turner

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2.1.2 Corridor Segments

Study corridors, highlighted in **Figure 2-3**, were identified for further analysis of existing conditions. Corridor crash rates were calculated in terms of crashes per million vehicle miles traveled (MVMT) using 2013-2017 reported crashes and traffic volumes from the most recently available daily traffic counts. A weighted crash rate was also calculated using the same weighting measures as the intersections: fatal crash (12), injury crash (3), and property damage crash (1). The corridor crash totals and rates include both segment and intersection crashes within the respective study corridor.

The weighted corridor crash rate was compared to the South Dakota statewide weighted crash rate for major collector state highways as the statewide reference group. Because the State of South Dakota does not calculate statewide or countywide crash rates for county roads, the lowest functional class for rural state highways with a calculated statewide weighted crash rate was used. Many of the county corridors are classified as rural major collectors and exhibit similar geometric features and traffic characteristics as a state highway rural major collector. A corridor where the calculated weighted crash rate exceeds the South Dakota rural collector weighted crash rate signifies that the corridor should be investigated further.

Table 2-2 presents the total number of crashes and the associated crash rate for the seven study corridors. Additional discussion specific to each these corridors can be found in Appendix A.

Table 2-2. Corridor Crash History (2013-2017)

Corridor No.	Roadway Corridor	Limits	Length (miles)	Total # Crashes	Crash Rate (Crashes/ MVMT)	Weighted Crash Rate (Crashes/ MVMT)
1	269th Street (CH 102)	466th Ave to 469th Ave	3	26	3.87	***5.95***
2	271st Street (CH 106)	469th Ave to SD11	9	244	2.94	***4.74***
3	273rd Street (CH 110)	469th Ave to SD11	9	96	1.51	***2.40***
4	276th Street (CH116)	466th Ave to I-29 SB Ramp Terminal	4.5	33	1.03	1.34
5	469th Avenue (CH 111)	268th St to 273rd St	5	74	1.86	***3.01***
6	472nd Avenue (CH 117)	93rd St to 273rd St	2.5	40	2.13	***3.30***
7	475th Avenue (CH 123)	270th St to 273rd St	3	73	2.04	***3.60***

Source: SDDOT Crash Database
Where study corridors overlap, intersection crashes may be counted in multiple corridors.
Crash rate that exceeds statewide state highway rural major collector weighted crash rate noted in ***red***.
2017 South Dakota statewide weighted crash rate for state highway rural major collectors: 2.37 crashes/MVMT.

As part of the identification of issues and needs for this study, stakeholders and the public frequently noted safety concerns with the 466th Avenue/CH 105/Old SD17 corridor intersections.

Many of these concerns stemmed from the disregard of intersection traffic control. Other than the 466th Avenue intersection with US18, intersections are stop-controlled on the eastbound/westbound approach. Site distance at some approaches and high approach speeds may also be contributing factors to these crashes.

Based on this feedback, a high-level review of crashes was conducted at each 466th Avenue intersection between the Minnehaha County and Clay County boundaries.

Across the 28 intersections, there were two fatalities and 22 injury crashes. These 24 fatal or injury crashes represent 38 percent of the 63 total intersection crashes along the 466th Avenue corridor. Most of those crashes occurred north of SD44.

There were 44 intersection crashes that did not involve a vehicle-animal collision. Of those 44 crashes, it was apparent that disregarding traffic signs and/or failure to yield was a common factor across the corridor.

- 27 of the 44 crashes (61%) noted failure to yield and/or disregarded traffic signs or signals as a contributing circumstance
- Failure to stop for stop sign citation was issued in 20 of the 44 crashes (45%)

The reported crashes support feedback received from the public and stakeholder meetings with regard to angle crashes and motorists disregarding traffic signs and/or failing to yield at the intersections.

2.1.3 Railroad Crossings

Rail lines cross Lincoln County in both east/west and north/south directions, originating in Canton. The east/west line is owned and operated by BNSF and is part of the 100-mile connection between Canton and Mitchell. The north/south line is split between two owners. Between Canton and Sioux Falls, BNSF owns the line and D&I Railroad has rights to operating on the tracks. South of Canton, the State of South Dakota owns a line that connects Elk Point and Canton. The line is operated by D&I Railroad. There is one 110-car loading facility in Canton. An ethanol plant is located just west of Lennox along SD44. Other smaller connections to these lines are present within the county.

The Federal Railroad Administration maintains an inventory of crossings throughout the United States. Their inventory indicates that there are 128 public and private highway/rail crossings within Lincoln County.

The crash history at highway/rail crossings was reviewed between 2013 and 2017. There were 11 reported crashes that occurred at a railway crossing or were railway crossing related, which are summarized in **Table 2-3**.

Table 2-3. Rail Crossing Crashes (2013-2017)

Roadway Corridor	Crossing Location	Crossing Number	Railroad	Total # Crashes	Trains/ Day	Crossing Control
SD11	South of 277th Street	381627L	BNSF	4#	4	Active – flashing lights and gates
270th Street	East of 475th Avenue	381644C	BNSF	1#	4	Passive – crossbuck assembly
271st Street	East of 475th Avenue	381643V	BNSF	1	4	Active – flashing lights
272nd Street	East of 475th Avenue	381642N	BNSF	1	4	Passive – crossbuck assembly
280th Street	East of 472nd Avenue	385885E	BNSF	1	2	Active – flashing lights and gates
467th Avenue	South of 278th Street	385900E	BNSF	1	2	Passive – crossbuck assembly
SD18	In Canton	381612W	BNSF	1	4	Active – flashing lights (post and cantilevered mounted)
SD115	South of 280th Street	385882J	BNSF	1	2	Active – flashing lights

Source: SDDOT Crash Database and Federal Railroad Administration (https://fragis.fra.dot.gov/GISFRASafety/)
Includes a vehicle-train crash

While a majority of the crashes were dispersed across the eight crossing locations, there were four reported crashes at the SD11 crossing of the BNSF line just south of 277th Street. There did not appear to be any discernable trends across these four crashes as they involved varying crash types, directions of travel, and most harmful events.

There were two vehicle-train collisions reported in the 5-year analysis period. One occurred at the SD11 crossing just south of 277th Street. The other occurred at 270th Street, east of 475th Avenue. Both of these crashes resulted in no injury.

Overall, the dispersion of crashes across eight crossing locations illustrate the random nature of crossing crashes in rural areas. Even with the low vehicular and train volumes at many of these locations, two vehicle-train collisions were reported over the 5-year analysis period. It is important to continually improve crossings through a systematic process of identifying and addressing potential issues of vehicle-train, vehicle-pedestrian, and vehicle-vehicle conflicts as well as single-vehicle roadway departure risks.

2.2 Existing and Future Traffic Volumes

As previously noted, significant development and growth continues to occur in the northern part of Lincoln County. Several road corridors in this area were identified for analysis of existing and future traffic operations.

Two scenarios were considered including 2018 Existing Conditions and 2045 No-Build Conditions in order to identify intersection-related traffic capacity and operational needs through the 2045 Planning Horizon. The 2045 Planning Horizon No-Build scenario was also considered with and without inclusion of Highway 100. Traffic volume forecasts were based on the 2045 Sioux Falls MPO Travel Demand Model.

2.2.1 Traffic Volume Scenarios

The following existing traffic volume and forecast scenarios were developed as part of the evaluation:

- 2018 Existing Conditions
    - Daily (24-hour) traffic volumes
    - Morning and afternoon/evening (AM and PM) peak hour intersection volumes at select intersections
- Daily (24-hour) traffic forecasts for the 2045 Planning Horizon
    - Daily (24-hour) traffic volumes
    - Morning and afternoon/evening (AM and PM) peak hour intersection volumes at select intersections

AM and PM peak hour intersection turning movement volumes and forecasts were developed for primary intersections along the following corridors (locations shown in **Figure 2-4**):

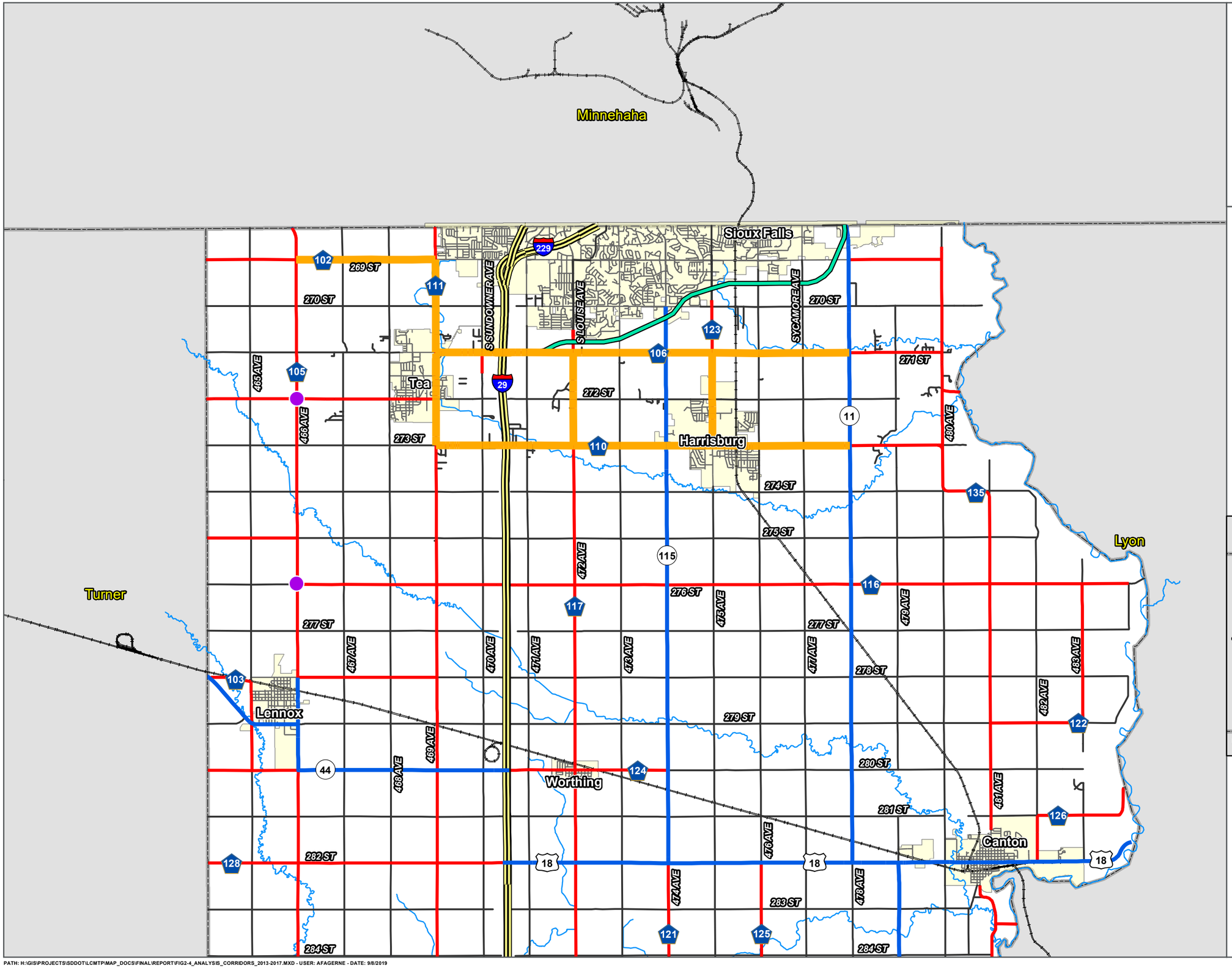
- 269th Street – from 466th Avenue to 469th Avenue
- 271st Street – from 469th Avenue to SD11
- 273rd Street – from 469th Avenue to SD11
- 469th Avenue – from 269th Street to 273rd Street
- 472nd Avenue – from 271st Street to 273rd Street
- 475th Avenue – from 271st Street to 273rd Street

Similar peak hour turning movement volumes and forecasts were developed for the following isolated intersections (locations shown in **Figure 2-4**):

- 466th Avenue and 272nd Street
- 466th Avenue and 276th Street

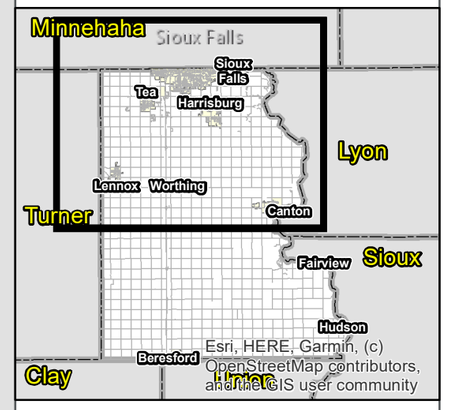
LINCOLN COUNTY
South Dakota

FIGURE 2-4
ANALYSIS CORRIDORS



LEGEND

- Traffic Study Isolated Intersections
- Traffic Study Corridors
- Interstate Highway
- US Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- Highway 100 (Future)
- City



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MILES

SOURCE: SDDOT

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The 2018 Existing Conditions traffic volumes were developed from several sources including the following:

- Daily (24-hour) roadway segment counts
    - SDDOT collected in years 2016 and 2017
    - City of Sioux Falls collected in 2018
    - Sioux Falls MPO collected in 2018

- Peak hour (morning and afternoon/evening) intersection turning movements counts collected November 28, 2018 as part of the study

The forecast year identified for the analysis was 2045 and represents the study's planning horizon. Traffic forecasts help assess future-year capacity and operational needs on Lincoln County highways due growth in traffic demand and/or changes in traffic patterns.

2.2.2 Forecast Notes

The following provides discussion on various findings from the traffic forecasting process.

Intersection Balancing

Traffic volumes presented in this study include locations where peak hour intersection turning movement volumes were not balanced across intersections. This was typically due to the highly directional peak hour commuter traffic to/from Sioux Falls and propensity for high-volume intersections between the primary section-line intersections. Essentially, there would be a large number of vehicles which either enter or exit the study corridor roadway between the analysis intersections. In these instances, mid-segment turning movements were significant and any balancing would have notably altered traffic volumes at an upstream or downstream intersection. Examples of these high-volume mid-segment intersections include:

- 475th Avenue between 272nd Street and 273rd Street
- 273rd Street between SD115 (Minnesota Avenue) and 476th Avenue
- 469th Avenue between 271st Street and 273rd Street

These intersections were smoothed for reasonableness and the impact of mid-segment turning movements will be noted and accounted for in the operations analysis.

Volume Comparison to Previous Studies

Traffic volumes and forecasts developed as part of this study were compared to historical counts and previously-developed forecasts in order to assess consistency in disseminating traffic-related information within Lincoln County.

One of the reviewed studies was the I-29 – Exit 62 to Exit 73 Corridor Study (referred to as 2018 I-29 study), completed in July 2018. While this study focused on the I-29 corridor, it did conduct intersection counts and develop intersection forecasts along each study interchange crossroad to the next adjacent major intersection. The following are conclusions from this review:

- Traffic count volumes collected for this study were generally lower than those presented in the 2018 I-29 study. However, that study also acknowledged that those counts were higher than historical counts at similar intersections.
- The traffic forecast scenarios were different between this study and the 2018 I-29 study, and thus forecasts are not directly comparable.
    - The 2018 I-29 study forecast scenarios include:
        - 2045 Current Network
        - 2045 with Highway 100 to Minnesota Avenue
        - 2045 with 85th Street Interchange and Highway 100 to Minnesota Avenue
    - In comparison, this study evaluated the following scenarios:
        - 2045 Current Network with 85th Street Interchange
        - 2045 with 85th Street Interchange and Highway 100 between SD11 and I-29

Because I-29 interchange counts were not collected as part of this study, interchange volumes are not presented as part of this study.

Highway 100 Conclusions

It was found that the impact of constructing the southern segment of Highway 100, between SD11 and I-29, on traffic patterns south of Sioux Falls is notable. Whether the segment is constructed has a significant impact on future-year demand along several Lincoln County highway corridors.

Noteworthy findings in the scenario with Highway 100 constructed between SD11 and I-29 include:

- Highway 100 serves as the primary east/west corridor to distribute traffic across the southern Sioux Falls metropolitan area.
    - 271st Street corridor demand is significantly reduced
    - 273rd Street corridor demand is reduced, but not to the level of 271st Street.
- Segments within Harrisburg are minimally impacted.
- North/south corridor demand increases east of I-29
    - 475th Avenue (Cliff Avenue) demand is significantly increased
    - 472nd Avenue (Louise Avenue) demand is increased, but not at the same level as 475th Avenue
    - Minimal difference along 470th Avenue (Tallgrass Avenue) or 469th Avenue (Tea-Ellis Road) corridors

Future Growth Considerations

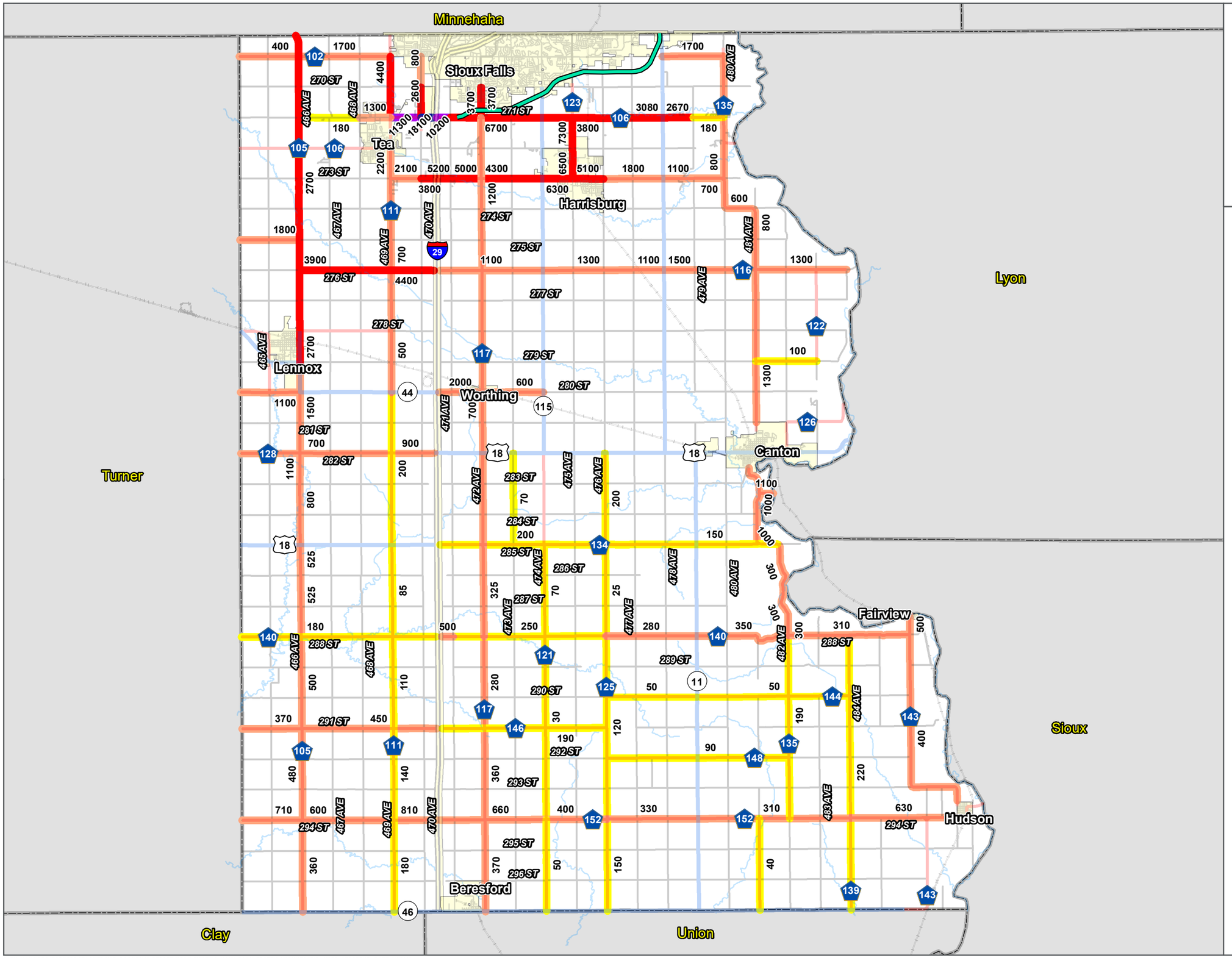
It will be important for Lincoln County, the City of Harrisburg, and the City of Tea to require traffic impact studies for new development south of Sioux Falls. As these forecasts were developed with Travel Demand Model (TDM) output, the forecasts only represent existing and future development that has been identified by members of the MPO through year 2045. A 25-year window for development requires some assumption to be built into the model. Understanding that growth areas, development intensity, and access planning are all subject to change, these traffic impact studies provide greater detail to traffic patterns and generated traffic volumes used for roadway design. Information from traffic studies should be provided to the Sioux Falls MPO for a cross-check of what is currently included in the respective transportation analysis zone and possible inclusion into their model.

2.2.3 Traffic Volumes

County-wide 2018 Existing Conditions traffic volumes and 2045 Planning Horizon traffic forecasts are presented in **Figure 2-5** and **Figure 2-6**.

Additional information including 2018 and 2045 Peak Hour Traffic Volumes for intersections within the following corridor segments can be found in Appendix B.

- 269th Street Corridor – 466th Avenue to 469th Avenue
- 466th Avenue intersections with 272nd Street and 276th Street Intersections
- 271st Street (CH 106) Corridor – 469th Avenue to SD11
- 273rd Street (CH 110) Corridor – 469th Avenue to SD11
- 469th Avenue (CH 111) Corridor – 269th Street to 273rd Street
- 472nd Avenue (CH 117) and 475th Avenue (CH 123) Corridors – 469th Avenue to SD 11



PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG2-5_EXISTING_(2018)_DAILY_TRAFFIC_VOLUMES.MXD - USER: AFAGERNE - DATE: 9/8/2019

LINCOLN COUNTY
South Dakota

FIGURE 2-6
DAILY TRAFFIC VOLUMES
(2045 PLANNING HORIZON)

LEGEND

- Interstate Highway
- US Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- Highway 100 (Future)
- City

2045 Planning Horizon Daily Traffic

- 25 - 250
- 251 - 2500
- 2501 - 8000
- 8001 - 16000
- 16001 - 20000
- 20001 - 42700

X,XXX With Hwy 100 Connection to I-29

X,XXX No Hwy 100 Connection to I-29

Traffic forecasts were developed for scenarios with and without a Hwy 100 connection to I-29. Volumes in black text represent forecasts where Hwy 100 is extended to I-29. Volumes in red represent forecasts where Hwy 100 is not extended to I-29.

Parallel lines symbolizing these forecasts are based on the above thresholds.

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha Lyon Turner Clay Union Sioux

Sioux Falls Tea Harrisburg Lennox Worthing Canton Fairview Hudson Beresford

269 ST 270 ST 271 ST 272 ST 273 ST 274 ST 275 ST 276 ST 277 ST 278 ST 279 ST 280 ST 281 ST 282 ST 283 ST 284 ST 285 ST 286 ST 287 ST 288 ST 289 ST 290 ST 291 ST 292 ST 293 ST 294 ST 295 ST 296 ST

465 AVE 466 AVE 467 AVE 468 AVE 469 AVE 470 AVE 471 AVE 472 AVE 473 AVE 474 AVE 475 AVE 476 AVE 477 AVE 478 AVE 479 AVE 480 AVE 481 AVE 482 AVE 483 AVE 484 AVE 486 AVE

29 115 44 18 11 46 SD HWY 46

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2.3 Existing and Future Traffic Operations

The study intersections were further evaluated based on Level of Service (LOS) criteria under 2018 Existing Conditions and 2014 Planning Horizon No-Build Conditions traffic volumes. The Level of Service provides a measure of the delay that is experienced by the traveling motorists as they progress through an intersection. The 2045 Planning Horizon No-Build scenario was considered with and without inclusion of Highway 100.

The 2018 Existing Conditions scenario reflects existing conditions, as they were during the collection of peak hour traffic counts in November 2018. Number of travel lanes, traffic control, speed limits, signal timings, etc., all reflect existing field conditions. The lone exception is along the SD115/Minnesota Avenue corridor where the improvements being constructed in 2019 have been incorporated at the 271st Street and 273rd Street intersections.

The 2045 No-Build Conditions scenario reflects similar roadway features as the Existing Conditions scenario, but applies future-year traffic to the existing roadway network. This helps identify future needs along study corridors and at specific intersections. Similar to the 2018 Existing Conditions Scenario, the intersections with SD115/Minnesota Avenue have been built-out to reflect the 2019 improvements. For this scenario, it is assumed that signal timings would be updated as traffic increases and patterns change.

Thresholds for applicable LOS measures are provided in **Table 2-4**.

Table 2-4. Level of Service Thresholds

LOS	Intersection Delay per Vehicle (sec/veh)	
	Signalized Intersections	Two-Way Stop-Control*, All-Way Stop-Control, and Roundabouts
A	≤ 10	≤ 10
B	> 10 – 20	> 10 – 15
C	> 20 - 35	> 15 - 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	Demand exceeds capacity; > 80	Demand exceeds capacity; > 50

Source: Transportation Research Board, HCM6

LOS goals for this study are as follows:

- Signalized intersections:
  - Rural area minimum allowable LOS – LOS B
  - Urban area minimum allowable LOS – LOS C
    - Individual movements allowed to operate at LOS E or better
- Roundabouts:
  - Minimum allowable LOS – LOS C
- All-way stop-control (AWSC)
  - Rural area minimum allowable LOS – LOS B
  - Urban area minimum allowable LOS – LOS C
- Two-way stop-controlled (TWSC) intersections:
  - Rural area minimum allowable LOS – LOS B (worst-case stop-controlled approach)
  - Urban area minimum allowable LOS – LOS C (weighted average intersection approach)

Locations where the LOS exceeds (worse) these study goals demonstrates an operational or capacity-related need to be addressed later in this study.

The 466th Avenue and 272nd Street intersection is located within the Sioux Falls Metropolitan Planning Organization (MPO) planning area and is thus analyzed as urban intersections for LOS-comparison purposes. The 466th Avenue and 276th Street is analyzed as an urban intersection. I-29 interchanges were not analyzed as part of this study.

2018 Existing Conditions and 2045 Planning Horizon No-Build Conditions scenario operational measures are presented in **Table 2-5** through **Table 2-11**. Additional information regarding this analysis can be found in Appendix C.

Table 2-5. 269th Street (CH 102) Corridor – 466th Avenue to 469th Avenue

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon *
			AM / PM LOS	AM / PM LOS
269th Street	466th Avenue (Old SD17)	TWSC	A / A	A / A
269th Street	469th Avenue (Tea-Ellis Road)	TWSC	A / A	**F / F**

* No significant difference in traffic forecasts between 2045 Planning Horizon scenarios with or without Hwy 100.
LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-6. 271st Street (CH 106) Corridor – 469th Avenue to SD11

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon – w/out Hwy 100	2045 Planning Horizon – with Hwy 100
			AM / PM LOS	AM / PM LOS	AM / PM LOS
271st Street	469th Avenue (Tea-Ellis Road)	Signal	**D** / C	**F / D**	**F / D**
271st Street	470th Avenue (Sundowner Ave)	TWSC	A / A	**F / F**	**F / F**
271st Street	471st Avenue (Tallgrass Ave)	TWSC	A / A	**F / F**	**F / F**
271st Street	472nd Avenue (Louise Ave)	Roundabout	A / A	B / A	A / A
271st Street	473rd Avenue (Western Ave)	AWSC	B / A	C / C	B / A
271st Street	SD115 (Minnesota Ave)	Signal	B / B	C / C	C / C
271st Street	475th Avenue (Cliff Ave)	Signal	**D / D**	C / **E**	**E / F**
271st Street	476th Avenue (Southeastern Ave)	TWSC	A / A	**F / F**	**F / F**
271st Street	SD11	AWSC	B / A	**F / F**	**D / F**

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-7. 273rd Street (CH 110) Corridor – 469th Avenue to SD11

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon – w/out Hwy 100	2045 Planning Horizon – with Hwy 100
			AM / PM LOS	AM / PM LOS	AM / PM LOS
273rd Street	469th Avenue	AWSC	A / A	A / A	A / A
273rd Street	470th Avenue (Sundowner Ave)	TWSC	A / A	A / A	A / A
273rd Street	471st Avenue (Tallgrass Ave)	TWSC	A / A	A / A	A / A
273rd Street	472nd Avenue (Louise Ave)	AWSC	B / A	C / C	C / B
273rd Street	473rd Avenue (Western Ave)	TWSC	A / A	A / A	A / A
273rd Street	SD115 (Minnesota Ave)	Signal	B / B	C / C	C / C
273rd Street	475th Avenue (Cliff Ave)	AWSC	**D** / C	**F / F**	**F / F**
273rd Street	476th Avenue (Southeastern Ave)	TWSC	A / A	B / **F**	B / B
273rd Street	SD11	TWSC	A / A	**F / F**	A / A

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-8. 469th Avenue (CH 111) Corridor – 269th Street to 273rd Street

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon – w/out Hwy 100	2045 Planning Horizon – with Hwy 100
			AM / PM LOS	AM / PM LOS	AM / PM LOS
469th Avenue (Tea-Ellis Rd)	269th Street	TWSC	A / A	**F / F**	**F / F**
469th Avenue (Tea-Ellis Rd)	271st Street	Signal	**D** / C	**F / D**	**F / D**
469th Avenue	272nd Street	TWSC	A / A	**F** / B	**F** / B
469th Avenue	273rd Street	AWSC	A / A	A / A	A / A

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-9. 472nd Avenue (CH 117) Corridor – 271st Street to 273rd Street

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon – w/out Hwy 100	2045 Planning Horizon – with Hwy 100
			AM / PM LOS	AM / PM LOS	AM / PM LOS
472nd Avenue (Louise Ave)	271st Street	Roundabout	A / A	B / A	A / A
472nd Avenue (Louise Ave)	272nd Street	TWSC	A / A	A / A	A / A
472nd Avenue (Louise Ave)	273rd Street	AWSC	B / A	C / C	C / B

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-10. 475th Avenue (CH 117) Corridor – 271st Street to 273rd Street

Corridor Route	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon – w/out Hwy 100	2045 Planning Horizon – with Hwy 100
			AM / PM LOS	AM / PM LOS	AM / PM LOS
475th Avenue (Cliff Ave)	271st Street	Signal	**D / D**	C / **E**	**E / F**
475th Avenue (Cliff Ave)	272nd Street	TWSC	A / A	**F / F**	**F / F**
475th Avenue (Cliff Ave)	273rd Street	AWSC	**D** / C	**F / F**	**F / F**

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

Table 2-11. Isolated Intersections

Crossroad	Crossroad	Existing Intersection Traffic Control	2018 Existing Conditions	2045 Planning Horizon *
			AM / PM LOS	AM / PM LOS
466th Avenue (old SD17)	272nd Street (CH 106)	TWSC	A / A	A / A
466th Avenue (old SD17)	276th Street (CH116)	TWSC	A / A	A / A

* No significant difference in traffic forecasts between 2045 Planning Horizon scenarios with or without Hwy 100.

LOS reported in **red/bold** denotes value does not meet operational goals for this study.

2.4 Countywide Segment Traffic Volumes

It addition to the corridor / intersection evaluation described above, Lincoln County roadways were reviewed on a countywide basis for capacity needs. The review compares 2045 Planning Horizon daily traffic volumes to generalized Level of Service (LOS)-based capacity thresholds for roadway cross-sections ranging between 2 and 6 lanes.

This review is a planning-level guide for future corridor needs and is not intended to be a design determination. Prior to any design, a traffic analysis shall be conducted to determine the number of lanes and intersection modifications.

Average daily traffic (ADT) volumes were developed for the following two scenarios:

- 2045 Planning Horizon – with Hwy 100 connection to I-29
- 2045 Planning Horizon – with no Hwy 100 connection to I-29

This review looks at Lincoln County-jurisdiction highways where existing and/or future-year traffic volumes are available. In several instances, assumptions were made on future-year traffic volumes between major intersections.

The LOS-based thresholds are presented in the South Dakota Department of Transportation Road Design Manual Chapter 15 Traffic, Table 15-10[1], replicated in **Table 2-12**.

Table 2-12. Estimated Number of Lanes

Total Number of Lanes	Description	Total Design Year ADT [1]	
		Rural Level	Urban
2	1 lane in each direction	< 8,000	< 2,500
3	1 lane in each direction plus center turn lane	[2]	2,500 to 16,000
4	2 lanes in each direction	8,000 to 20,000 [3]	[3]
5	2 lanes in each direction plus center turn lane	[2]	16,000 to 30,000
6	3 lanes in each direction	> 20,000 [4]	> 30,000 [4]

Source: South Dakota Department of Transportation Road Design Manual, Table 15-10 (as of 2/13/19)

1 Construction/Reconstruction projects are designed based on a typical 20 year ADT projection beyond the anticipated year of project construction.

2 Continuous left turn lanes may be considered based on left turn volumes and/or when intersections and/or approaches are closely spaced together.

3 Undivided sections may be used if left turn movements are low and there is no crash history, otherwise consider installing a median or 5 lane section.

4 Medians should be used.

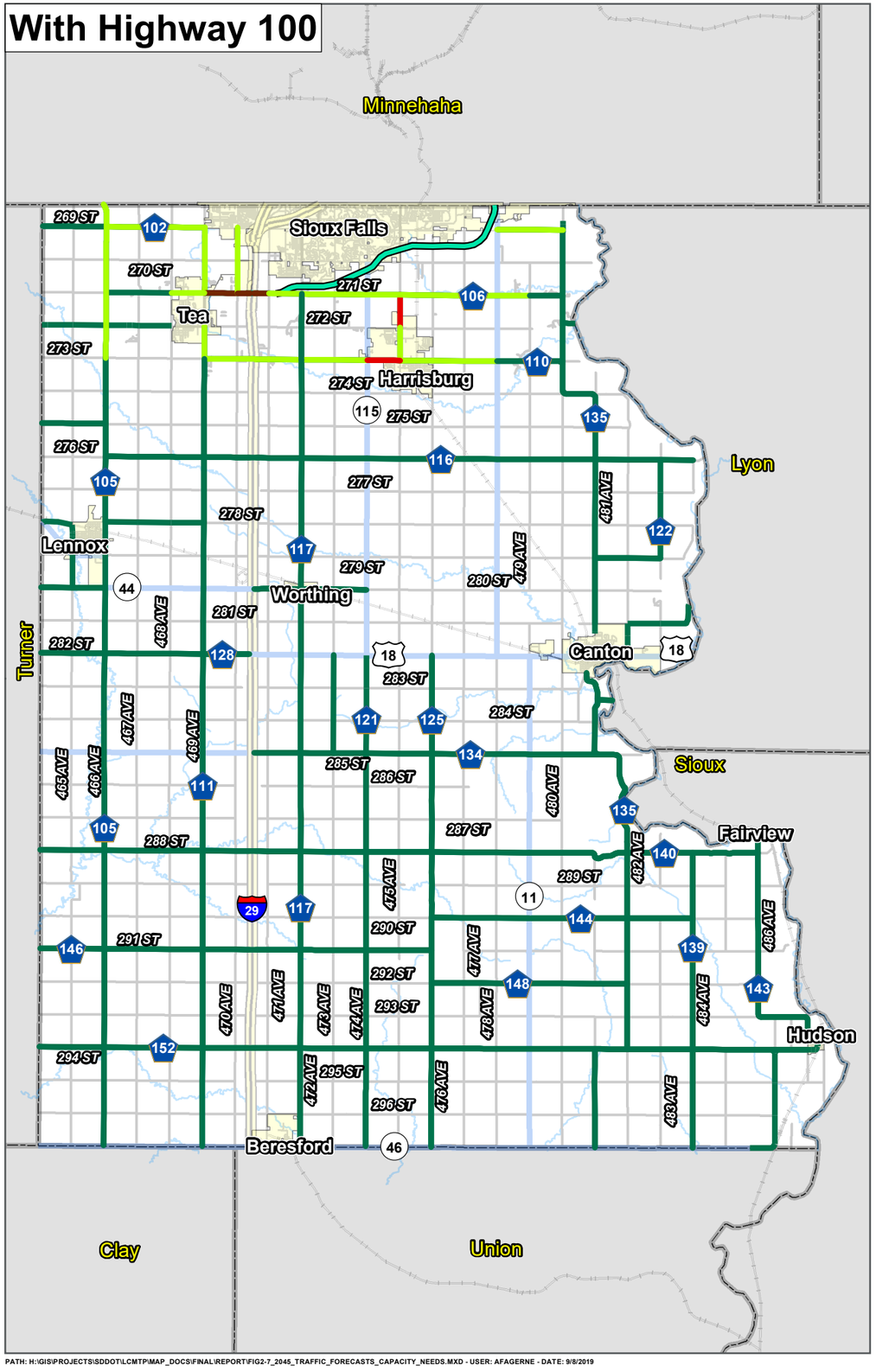
[1] South Dakota Department of Transportation Road Design Manual. http://www.sddot.com/business/design/forms/roaddesign/Default.aspx (accessed 2/13/19)

Figure 2-7 presents the segment capacity reviews based on generalized LOS thresholds and urban/rural designation.

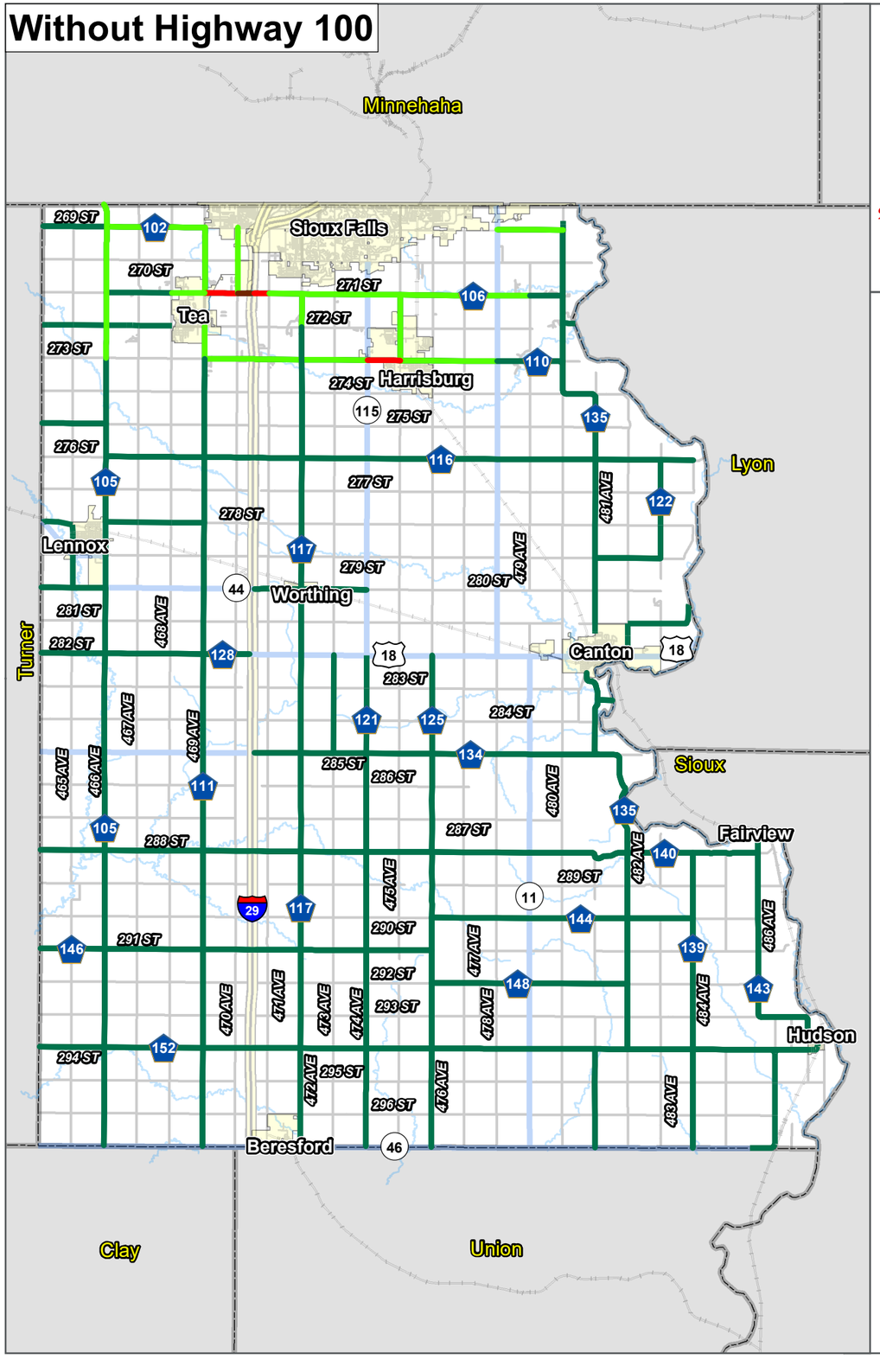
- 2045 Planning Horizon – with Hwy 100 connection to I-29
- 2045 Planning Horizon – with no Hwy 100 connection to I-29

The color-coding is based on where the volume falls within the **Table 2-12** thresholds. However, it is recommended that planning-level number of lanes on either side of the threshold be considered for segments where volumes are near the cut-off point. Ultimately, traffic patterns, traffic signals or other intersection control, number of access points, and number of major intersecting roadways are considerations that will often dictate design needs. Additional information regarding the segment capacity analysis can be found in Appendix D.

With Highway 100



Without Highway 100



LINCOLN COUNTY
South Dakota

FIGURE 2-7
2045 TRAFFIC FORECASTS CAPACITY NEEDS

LEGEND

- Interstate Highway
- US Highway
- State Highway
- Township Road
- Urban Road
- Rivers/Streams
- Railroad
- Highway 100 (Future)
- City

Lincoln County Highway Estimated No. Lanes (2045)

- 2
- 3
- 4
- 5
- 6

Urban capacity consideration area generally bounded by 269th Street to 273rd Street and 469th Avenue to 476th Avenue.

N

0 2 4
MILES

SOURCE: SDDOT

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2.5 Pavement Condition Evaluation

A pavement condition survey was completed in April 2019 for paved Lincoln County Roads. This provided a "snapshot" of the current pavement condition and was also used for determining a maintenance plan for county facilities. Each 0.1-mile road segment has been rated using the Pavement Condition Index (PCI).

The County's paved roadways are generally in good condition. However, the system has a low number of road segments with "Excellent" scores which may indicate a trend of insufficient investment. There are 3 metrics typically used to assess the health of an agency's road network and those metrics are as follows:

- Network Average PCI – the County's average network PCI is 69 and is considered "Very Good". The nationwide average PCI is typically between a 60 and a 65. Less than 1 in 10 agencies will have an average PCI above 75 and less than 1 in 20 agencies have an average PCI above 80.
- Percent of Excellent – the portion of roads that score above a PCI of 85. The goal for this metric is to maintain a minimum of 15% of the network falling into this category. The Percent of Excellent metric indicates if an agency has been reinvesting in the network at a rate that would maintain the current overall PCI. The County is currently at 2% which is well below the recommended minimum level. This may indicate a trend of insufficient investment.
- Backlog –the portion of roads that are rated "Very Poor" and "Poor" and fall below a PCI of 40. This represents the major surfacing work in Lincoln County (full reconstruction, partial reconstruction, surface removals, etc). Generally a very healthy agency will have less than 10% of their network in the backlog category with 12 - 15% representing a realistic target for most agencies. A Backlog of 15% is the maximum recommended target for agencies. As soon as an agency approaches and/or exceeds 20% backlog the major surfacing work can spiral out of control as it accumulates faster than funding can be invested into the system. Lincoln County is currently at 2% Backlog, which is exceptional.

Figure 2-8 and **Figure 2-9** show the distribution of pavement condition scores across Lincoln County facilities. **Figure 2-10** includes a map of the Overall Condition Index (or Pavement Condition Index).

The full pavement condition evaluation and analysis can be found in Appendix E.

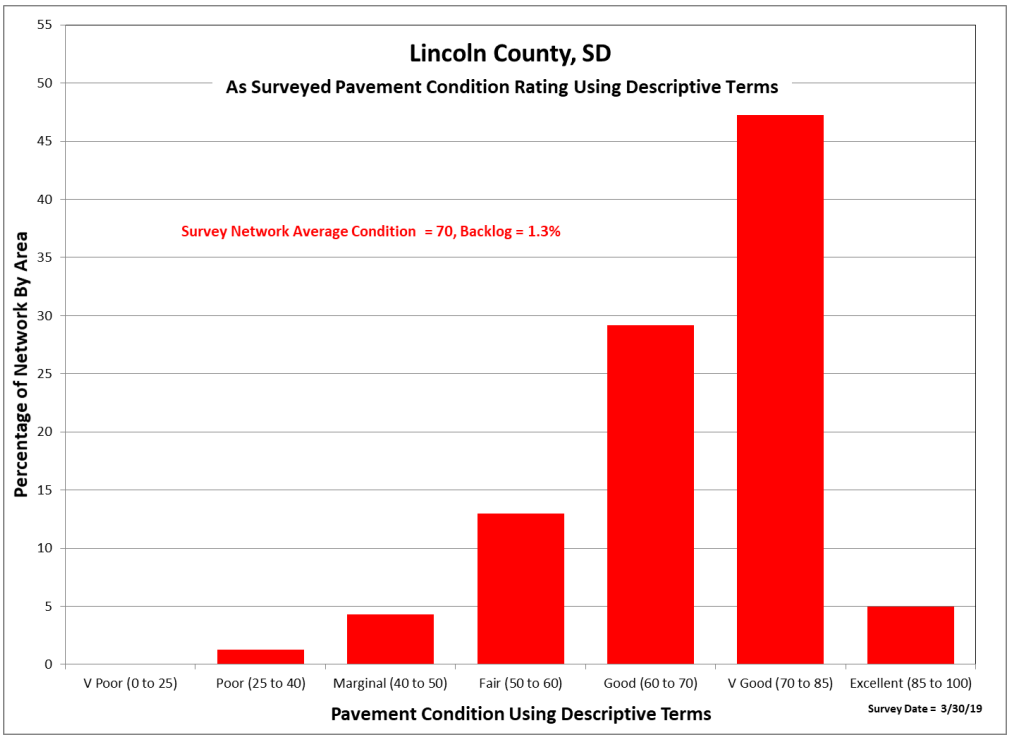

Figure 2-8. Pavement Condition Using Descriptive Terms

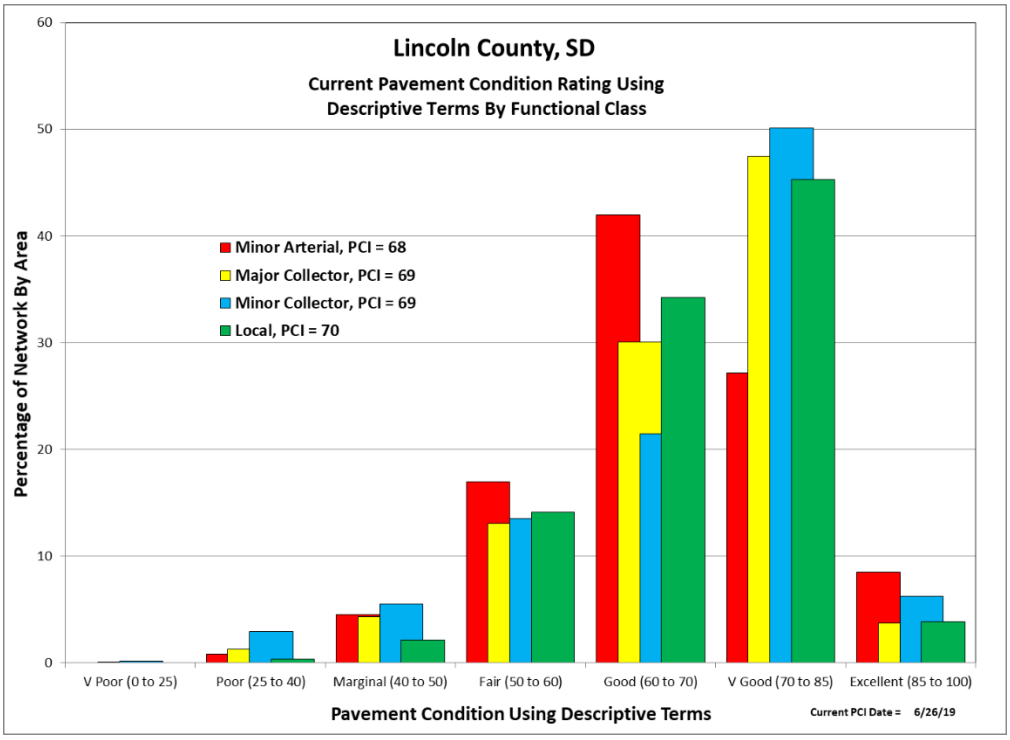

Figure 2-9. Pavement Condition Using Descriptive Terms by Functional Class

LINCOLN COUNTY
South Dakota

FIGURE 2-10
LINCOLN COUNTY PAVEMENT CONDITION INDEX (2019)

LEGEND

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Highway 100 (Future)
- County Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Airport

Pavement Condition Index

- 0 - 30 (RED)
- 31 - 40
- 41 - 50
- 51 - 60 (YELLOW)
- 61 - 70
- 71 - 80
- 81 - 90
- 91 - 100 (GREEN)

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Lyon
Turner
Sioux
Clay
Union
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford

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3 Planning and Guidance

One of the goals identified for the Master Transportation Plan includes development of guidance for how recommended improvements can be implemented and how to address future development.

3.1 Major Road Plan

A Major Road Plan was developed to assist the County in planning and prioritizing facilities as well as provide guidance for development.

3.1.1 Road Classification

A road classification system was developed specific to Lincoln County needs with the following considerations:

- Location and type of State roadway facilities
- Municipal connectivity
- Surfacing type – paved or gravel
- Functional classification – arterial, collector, local
- Traffic volumes – current and future
- Spring Load Limits – year round accessibility

The US / State highways within Lincoln County provide the greatest connectivity and highest level of mobility for a variety of users. These roadways include I-29, US 18, SD 44, SD 115, SD 11 and SD 46 (along the southern county border). While these roadways provide a high level of mobility, township and urban roadways are important for local access. County roadways generally fall in the middle of the spectrum, providing a moderate level of mobility and access. The County roads are also important for providing access between smaller municipalities and higher mobility road systems.

The majority of roadways in the northern part of the County are surfaced with bituminous pavement. The locations of existing paved and gravel surfaced roadways are shown in **Figure 3-1**. Several gravel roads are located near Canton and in the southern part of the County. Although it is not indicated in the figure, Township roads are predominately gravel and urban roads are typically surfaced with bituminous or concrete pavement.

Figure 3-2 shows the current functional classification of roadways under County jurisdiction. The functional classification describes the type of service a road segment provides and is also used to determine federal funding eligibility. The owner of the roadway coordinates with the State to define the functional classification. The State then recommends the designation to FHWA for approval. Lincoln County currently has roadways with Urban and Rural functional classifications.

Traffic volumes were also used as a guide for developing the road classification. Traffic volumes are generally higher in the northern, urbanized part of the County where rapid development is occurring. Refer to Section 2 for additional discussion of existing and future traffic volumes.

A number of County roadways and bridges currently have load restrictions. The County employs spring weight load limits on some routes in order to protect the infrastructure from heavy use. Several routes have been identified with a 6 or 7 ton per axle weight restriction. The current routes with weight limits are shown in **Figure 3-3**. Bridges that have been posted with weight limits are shown in **Figure 3-4**.

Goals and Objectives

Along with the considerations discussed above, the following goals and objectives have been identified for the Major Road Plan:

1. Utilize the existing state highway network for highest level of mobility.
2. Utilize the existing Township and Urban network for highest level of local access.
3. Identify routes through rapidly growing areas with higher traffic levels and increased need for urban facilities.
4. Identify routes that provide connectivity between municipalities and State highway system.
5. Identify routes that provide all-season access (without weight restrictions)
6. Provide appropriate roadway surfacing based on traffic demand.
7. Provide appropriate roadway jurisdiction based on traffic demand and development.

LINCOLN COUNTY
South Dakota

FIGURE 3-1
EXISTING
SURFACING TYPE

LEGEND

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Highway 100 (Future)
- County Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other)
- Airport

Existing Surfacing Type

- Paved
- Gravel

Note:
"Paved" roadways are generally bituminous (ACC) with approximately 1.5 miles of concrete (PCC) surfacing at interchange locations

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford
Lyon
Sioux
Turner
Clay
Union

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LINCOLN COUNTY
South Dakota

FIGURE 3-2
FUNCTIONAL CLASSIFICATION

LEGEND

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Highway 100 (Future)
- County Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other)
- Airport

Functional Classification

- Urban Minor Arterial
- Urban Major Collector
- Rural Major Collector
- Rural Minor Collector
- Rural Local Roads

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford
Lyon
Turner
Sioux
Clay
Union

269 ST
270 ST
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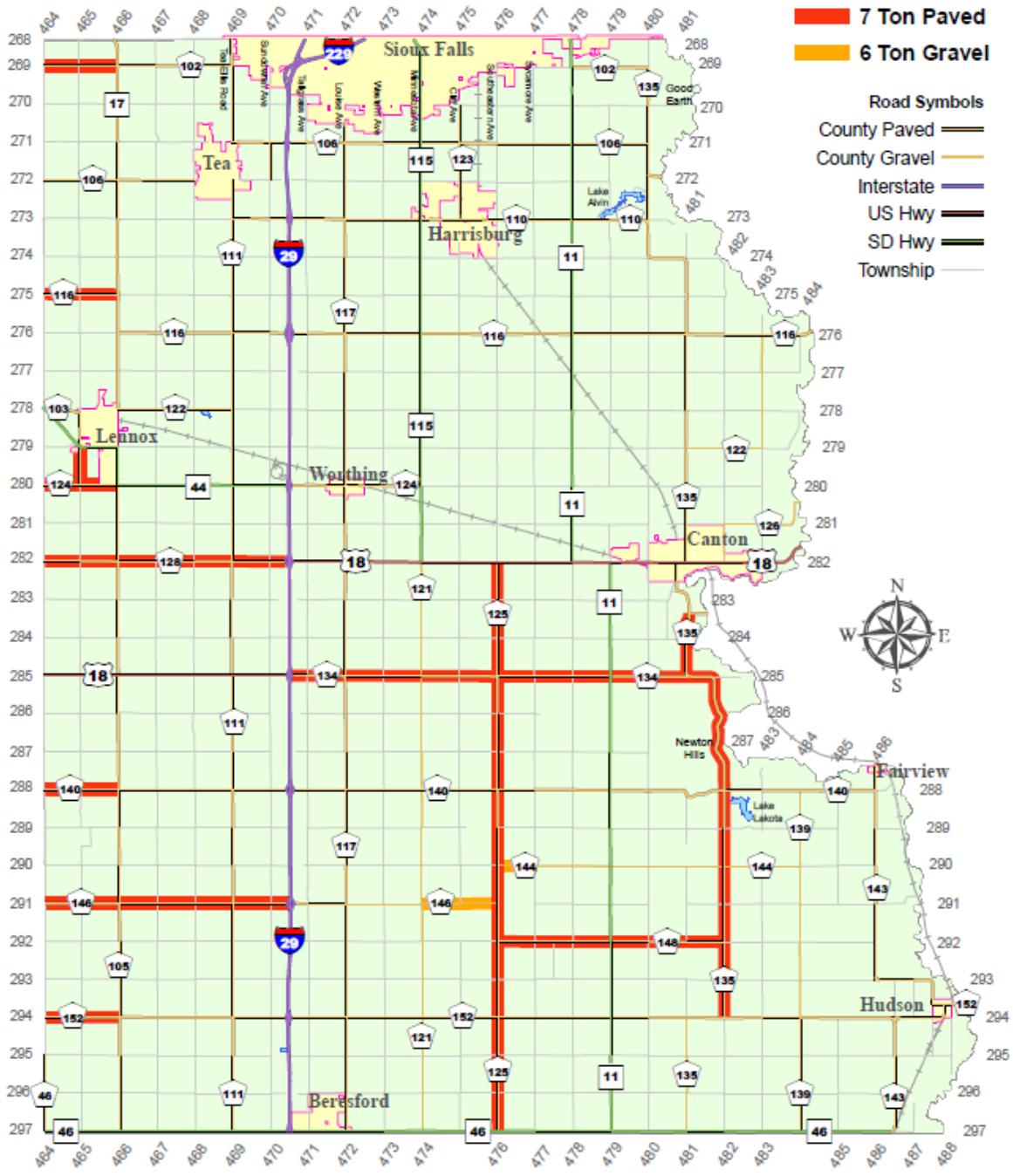


Figure 3-3. Lincoln County Spring Weight Load Limits on Roads (2019)

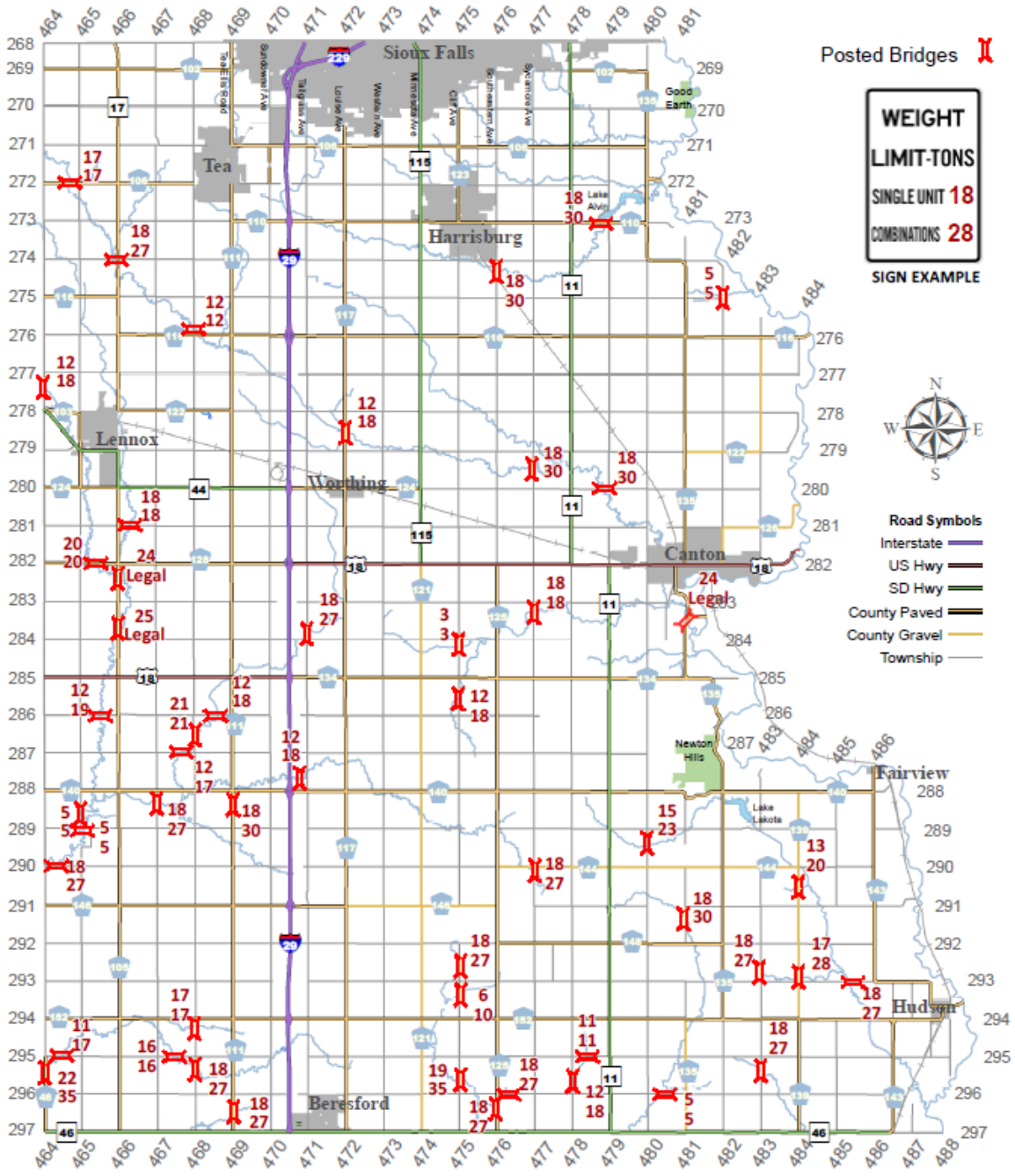


Figure 3-4. Lincoln County Posted Weight Load Limits on Bridges (2019)

The Major Roads Plan is shown in **Figure 3-5** and establishes County roadway classifications in terms of roadway surfacing as follows:

Paved - Urban

High volume, variable-speed facility. The roadway is located in a rapidly developing area adjacent to a municipality or within an identified growth boundary. When improvements are needed, these roadways should be considered for urban needs (urban typical section, pedestrian and bicycle use, utilities, etc.) in coordination with the adjacent municipality. Design standards are based on the requirements of the local authority. The road segments are also candidates for jurisdictional transfer to the municipality. Speed reductions may be warranted as urbanization occurs. These segments often experience competing needs for access and mobility. Access locations within Municipal Growth Boundaries or Sioux Falls Joint Jurisdiction Area should be coordinated with the County and local authority.

Paved - Truck Route

Low volume, high-speed facility. Generally higher traffic volumes than the “Paved” category and lower traffic volumes than the “Paved – Urban” category. The facility provides all-season use and is not limited by spring weight restrictions. Design standards for the roadway are based on the Rural Collector category within the SDDOT Local Roads Plan. When improvements are needed, additional shoulder width should be considered for bicycle accommodation and as needed for traffic volumes. Access points are spaced for safety and operations efficiency.

Paved

Low volume, high-speed facility. Lower traffic volumes than the “Paved – Truck Route” category. Road segments may have spring load limits or posted bridges. Design standards for the roadway are based on the Rural Collector category within the SDDOT Local Roads Plan. Access points are spaced for safety and operations efficiency.

Gravel

Low volume, high-speed facility. Design standards for Gravel roads are based on the Local Rural Road category within the SDDOT Local Roads Plan. Access points are spaced for safety and operations efficiency.

LINCOLN COUNTY
South Dakota

FIGURE 3-5
LINCOLN COUNTY
MAJOR ROADS PLAN

Minnehaha
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford
Turner
Lyon
Sioux
Clay
Union

269 ST
270 ST
271 ST
272 ST
273 ST
274 ST
275 ST
276 ST
277 ST
278 ST
279 ST
280 ST
281 ST
282 ST
283 ST
284 ST
285 ST
286 ST
287 ST
288 ST
289 ST
290 ST
291 ST
292 ST
293 ST
294 ST
295 ST
296 ST

465 AVE
466 AVE
467 AVE
468 AVE
469 AVE
470 AVE
471 AVE
472 AVE
473 AVE
474 AVE
475 AVE
476 AVE
477 AVE
478 AVE
479 AVE
480 AVE
481 AVE
482 AVE
483 AVE
484 AVE
485 AVE
486 AVE
487 AVE
488 AVE
489 AVE

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Highway 100 (Future)
- County Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other Jurisdiction)
- Airport

Road Classification

- Paved - Urban
- Paved - Truck Route
- Paved
- Gravel

N

0 1.5 3
MILES

SOURCE: SDDOT

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG3-5_MAJOR_ROADS_CLASS_LINCOLN.MXD - USER: AFAGERNE - DATE: 11/18/2019

3.1.2 Roadway Design Guidelines

This section provides design guidance for Lincoln County roadway facilities. Design guidance is based on the following resources:

- SDDOT Local Roads Plan
- SDDOT Road Design Manual
- American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets
- Municipal Engineering Design Standards (Sioux Falls, Harrisburg, etc.)

The referenced design guidance documents are updated periodically and County standards should be based on the current version of the document or current standard of practice.

The SDDOT and City design guidance documents typically include requirements adapted from the AASHTO publication, "A Policy on Geometric Design of Highways and Streets". At the time of this study, the current AASHTO publication is the 2018 version (7th Edition). However, current SDDOT and City design documents reference the 2004 and 2011 versions of the AASHTO publication. In order to maintain consistency with State practices, it is recommended that the current SDDOT standard takes priority over the current AASHTO publication if a discrepancy is identified.

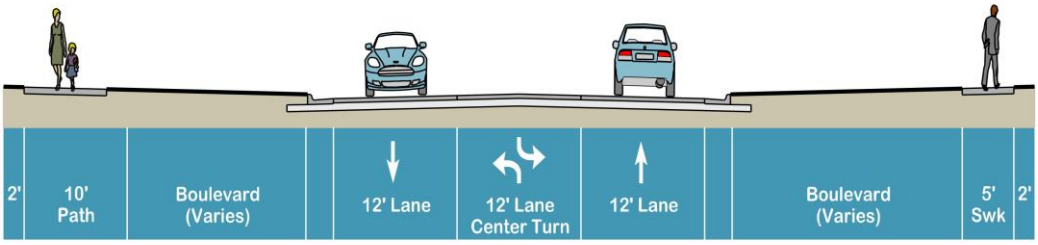
Typical Roadway Cross-Sections

The Typical Roadway Cross-Sections are shown in **Figure 3-6** and based on the Lincoln County Roadway Classifications. These include the following:

- Paved - Urban
- Paved - Truck Route
- Paved
- Gravel

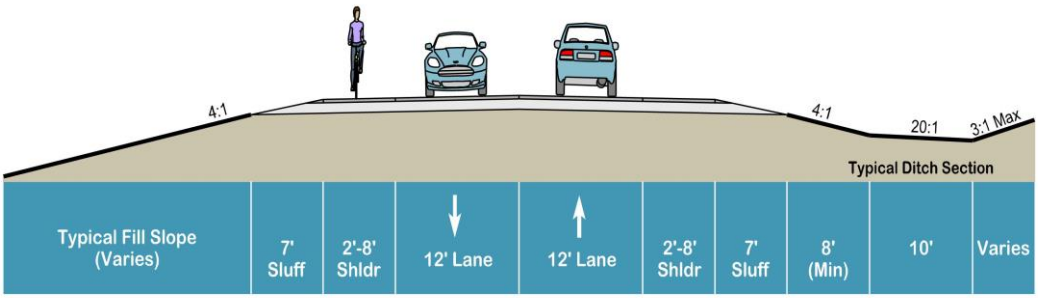
The typical section for “Paved - Urban” is included for informational purposes. These facilities should be designed in accordance with design standards for the adjacent municipality. The cities in northern Lincoln County generally use design standards developed by the City of Sioux Falls. Improvements to these facilities will likely be based on an agreement with the adjacent municipality and should consider a transfer of jurisdiction from the County to the municipality. Right-of-way requirements, setbacks, access and associated items should be coordinated with the adjacent municipality.

The typical travel lane width is 12-feet which would accommodate most agricultural equipment use. Center and left turn lanes are also 12-feet wide. The length of the turn lane is generally dependent on traffic analysis and should be designed in accordance with the SDDOT Road Design Manual. The shoulder width is based on projected traffic volumes. Refer to the SDDOT Local Roads Plan for additional guidance on shoulders. When bicyclists need to be accommodated on the shoulders, a minimum usable paved shoulder width of 4-feet should be provided (clear of rumble strips).



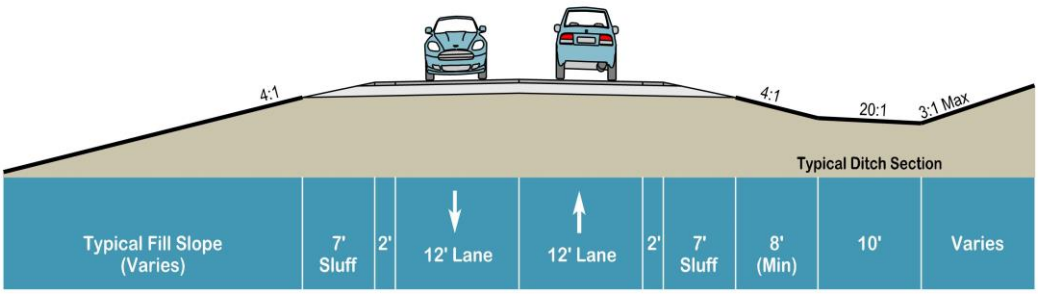
Right-Of-Way 100'

TYPICAL SECTION: PAVED - URBAN
Urban 3-Lane



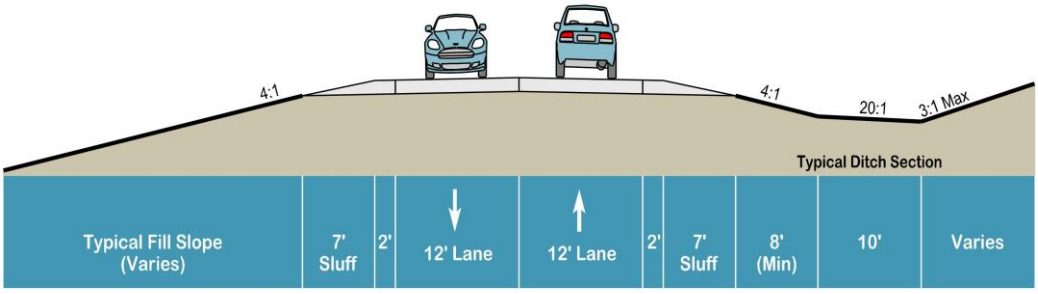
Right-Of-Way 100'

TYPICAL SECTION: PAVED - TRUCK ROUTE
Rural 2-Lane



Right-Of-Way 100'

TYPICAL SECTION: PAVED
Rural 2-Lane



Right-Of-Way 100'

TYPICAL SECTION: GRAVEL
Rural 2-Lane

Figure 3-6. Typical Roadway Sections

3.1.3 Traffic Analysis Guidelines

Level of Service

A traffic analysis should be conducted when determining facility needs (lane requirements) in order to achieve a minimum Level of Service (LOS). The LOS describes how well traffic flows through a facility and is scored A to F (with A providing the best traffic flow and F providing the worst). The LOS can be a measurement of vehicle density, percent of time spent following or intersection delay, depending on what type of facility is being analyzed.

The traffic analysis should be conducted in accordance with the current edition of following resources:

- SDDOT Road Design Manual
- Highway Capacity Manual (Transportation Research Board)

The LOS is dependent on facility type, and the recommended minimum operating conditions for existing or future projected traffic is shown in **Table 3-1**.

Table 3-1. Minimum Level of Service for Lincoln County Facilities

Facility Type	LOS
Rural Highway Segment	B
Intersection	B

Traffic Control Warrants

The Manual on Uniform Traffic Control Devices (MUTCD) provides extensive guidance on the use of traffic control devices including signs, pavement markings and traffic signals under a wide variety of conditions / situations.

The MUTCD identifies the following purpose of Traffic Control Devices:

- The purpose of traffic control devices, as well as the principles for their use, is to promote highway safety and efficiency by providing for the orderly movement of all road users on streets, highways, bikeways, and private roads open to public travel throughout the Nation.
- Traffic control devices notify road users of regulations and provide warning and guidance needed for the uniform and efficient operation of all elements of the traffic stream in a manner intended to minimize the occurrences of crashes.

The MUTCD provides warrants and guidance on the use of STOP and YIELD signs, pavement markings (center line, no passing zones, edge markings, etc.) and traffic signals. In locations where a traffic signal is being considered, an engineering traffic study should be performed that considers the nine traffic signal warrants described in the MUTCD. As stated in the MUTCD, “The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.” Installation of traffic

control devices should be based on engineering judgment after a thorough evaluation of the specific installation, considering site conditions and the overall context.

Turn Lane Warrants

Under certain circumstances, the installation of turn lanes can provide benefits such as operational improvements and reduction of crashes. Guidance and warrants for turn lanes can be found in the SDDOT Road Design Manual, Chapter 15 Traffic. A turn lane analysis should include the following:

- A thorough evaluation of each of the warrant criteria.
- Discussion of access management considerations.
- Recommendations as to whether or not turn lanes are appropriate. Even though conditions may or may not meet certain criterion, the ultimate deciding factor is the engineer's judgment. Factors that could influence the decision include conflict analysis results, benefit/cost analysis results, right-of-way cost considerations, constructability, etc.
- The recommended storage length if a turn lane is appropriate. The estimated 95th percentile queue value should be used for the recommended length. Queue values should be determined using an acceptable analysis software method.

The SDDOT Road Design Manual provides evaluation criteria for unsignalized left-turn and right-turn lanes. Turn lane criteria at signalized intersections is based on intersection delay or a benefit/cost evaluation.

Local Municipalities (Sioux Falls, etc) may also have turn lane warrant guidance which may be more applicable in urban areas.

3.1.4 Traffic Impact Guidance

A Traffic Impact Study (TIS) is an objective analysis of safety and operational impacts to the surrounding Lincoln County highway system due to the generation of traffic or shifts in travel patterns from planned development or modified land use. Information provided in the TIS will aid Lincoln County in their decision on any access permit, roadway improvement needs, and changes to traffic control within the study area. Roadway or traffic control improvements recommended by the TIS to maintain roadway safety and efficiency as a result of impacts from the proposed development will be funded by the developer.

The preparation of a TIS report shall be the responsibility of the developer and prepared by a licensed design professional with experience in transportation planning or traffic engineering.

Lincoln County may also engage in transportation planning studies, either alone or in conjunction with the SDDOT, the Sioux Falls MPO and/or the municipalities which will determine future access locations.

For proposed modifications to the State highway system, Lincoln County or the developer, shall coordinate the development of a TIS with the SDDOT Sioux Falls Area office.

Thresholds for a Traffic Impact Study

A TIS will be required for any proposed development or change in land use that is expected to generate trips that meet one or more of the following thresholds:

- Generate 100 or more trips during the adjacent highway's peak hour
- Generate 100 or more trips during the proposed development's peak hour
- Generate 750 or more trips per day

Trip generation shall be developed using trip generation rates from the latest version of the Institute of Transportation Engineers (ITE) Trip Generation Manual. If trip generation rates are not available for the proposed development, rates may be developed based on previous studies of similar facilities, anticipated traffic generated by the development, or traffic count of similar facilities as approved by Lincoln County.

Common land use types and sizes that would generate 100 peak hour trips or 750 daily trips are provided in **Table 3-2**. For proposed development that has seasonal peaks, such as a grain handling facility or retail locations with busy holiday seasons, the traffic generated during the seasonal peak shall be evaluated.

Table 3-2: Approximate Development Size for Common Land Use Thresholds

Land Use (ITE Trip Generation Code)	Development Size >100 Peak Hour Trips	Development Size >750 Daily Trips
Single Family Homes (210)	100 units	80 units
Apartments (220)	160 units	115 units
Condominiums/Townhomes (230)	190 units	130 units
Hotel (310)	145 occupied rooms 170 total rooms	85 occupied rooms 95 total rooms
Discount Store (815)	20,000 sf gross floor area	13,100 sf gross floor area
Retail Shopping Center (820)	27,000 sf gross floor area	17,500 sf gross floor area
General Office (710)	67,000 sf gross floor area	68,000 sf gross floor area
Clinic (630)	19,300 sf gross floor area	23,900 sf gross floor area
Daycare Center (565)	8,100 sf gross floor area 125 students	10,200 sf gross floor area 172 students
Light Industrial (110)	103,000 sf gross floor area 13.8 acres	107,600 sf gross floor area 14.5 acres
Industrial Park (130)	118,000 sf gross floor area 11.7 acres	109,800 sf gross floor area 12.3 acres
Warehousing (150)	311,000 sf gross floor area 11.5 acres	210,700 sf gross floor area 13.1 acres
Fast Food w/Drive Thru (934)	3,100 sf gross floor area 105 seats	1,500 sf gross floor area 39 seats
Gas Station w/ Convenience Store (945)	8 fuel pumps	5 fuel pumps

Based on ITE Trip Generation Manual 9th Edition
Reflects greatest generated volume of AM or PM peak hours
Square footage (sf) based on gross floor area (gfa)

Little information is currently available for agricultural-based development and associated trip generation rates. In instances where trip generation rates have not been established in the ITE Trip Generation Manual, the developer shall provide the following information for the County to determine whether a traffic impact study is warranted:

- Total daily trips into and out of the proposed development
- Total daily truck trips into and out of the proposed development
- Approximate peak hour of trips into and out of the proposed development and when that peak is expected to occur

Methods to estimate this data include:

- Observation and counts of a comparable facility
- Developer-estimated trip generation

Lincoln County may require a TIS even if the traffic generated by the proposed development does not reach the aforementioned trip generation thresholds. There may be instances where the County has questions or concerns regarding the potential impacts of a development. In these cases, a TIS will help the County better understand potential impacts on the road network and determine appropriate mitigation measures. Examples where additional investigation of potential impacts may be warranted, at the discretion of Lincoln County, include one or more of the following conditions:

- When an expected increase in traffic volumes or shift in traffic patterns may have an adverse effect on traffic operations and safety.
- When proposed changes in access may have an adverse effect on traffic operations and safety.
- When construction traffic or post-construction traffic is expected to increase the number of large vehicles, which may have an adverse effect on traffic operations and safety.

Traffic Impact Study Format and Contents

The TIS report format and contents shall follow guidance outlined in the SDDOT Road Design Manual, Chapter 15 Traffic, unless agreed upon by Lincoln County at the pre-study conference.

The TIS shall fully describe and account for the proposed development. Phased construction shall be accounted for in the evaluation.

For land uses not in the current ITE Trip Generation Manual, the developer may propose trip generation rates to the County for approval. The County shall approve the method of developing trip generation rates and the generated trip volumes used in the analysis.

A TIS shall also evaluate construction haul routes and post-construction truck routes for adequacy of existing route geometrics, roadway structure, and bridge weight limits. Mitigation measures shall be proposed to address truck route needs based on anticipated during and post-construction truck volumes.

Order of Operation

Prior to beginning the study, the developer or the developer's licensed design professional shall organize a pre-study conference with Lincoln County and any other jurisdictional authority within the study area. The purpose of this meeting is to discuss the development, study area, study scope, data collection needs, traffic variables and design standards, and other requirements for the study commensurate with SDDOT TIS guidance.

A Methods and Assumptions document shall be drafted to document analysis assumptions, variables, and parameters as discussed at the pre-study conference. This document must be agreed upon by the agencies, design professional, and developer prior to beginning the analysis.

The developer and licensed design professional shall collect all needed data, conduct the study, develop a draft TIS report and submit the draft TIS report to Lincoln County for review. All study reports must be reviewed by Lincoln County before acceptance.

Lincoln County, and other review agencies as identified at the pre-study conference, will review the submitted draft TIS reports and provide comments in written form.

The developer and licensed design professional will have the opportunity to revise the report prior to final submittal.

All comments from Lincoln County and other review agencies must be completely addressed prior to the TIS being approved.

Methods and Assumptions Template

A template in included in Appendix G for development of the methods and assumptions document to be included with a proposed TIS. This document is intended to serve as a historical record of the TIS process, dates, and decisions made by the study team representatives.

3.1.5 Access Management Guidelines

Access management is an important consideration for providing safe, efficient ways of getting on and off streets and highways. Access to adjacent land development needs to be managed in order to promote safety and protect the operational function of the roadway. **Figure 3-7** demonstrates the balance between access and mobility. Lincoln County has a limited number of urban arterial and collector facilities in the northern part of the County, while the majority of roadways are classified as rural collectors.

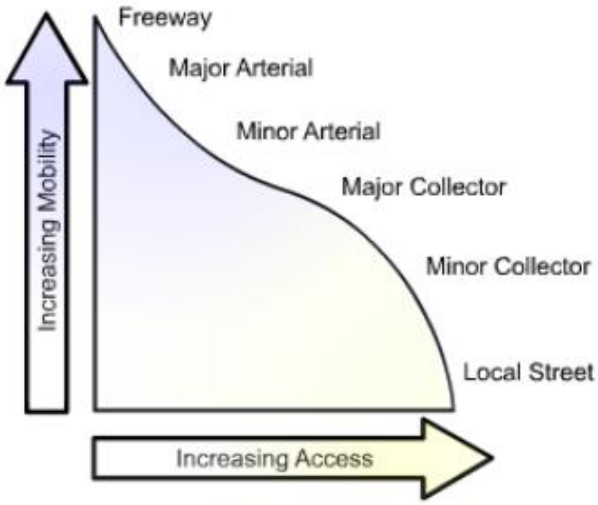


Figure 3-7. Conceptual Roadway Functional Hierarchy (Courtesy of FHWA).

There are special considerations with urbanizing / urban fringe areas because they must serve the needs of through-trip and local-trip drivers. There is increasingly competitive demand for mobility and access on these facilities. The areas should be developed in close coordination with local jurisdictions as they present a great opportunity for managing growth in a proactive manner. As the area develops, it is expected that there will be reduction in travel speeds, demand for higher density access spacing, roadway segment and intersection capacity needs and additional traffic controls. Ultimately, the area is expected to transfer from County jurisdiction to the local authority as urbanization occurs.

A key component of access management is understanding the impact of a proposed access. For example, an access could be related to a major commercial development that will generate significant traffic or it could be an agricultural field approach with limited use. A residential driveway or field approach should be evaluated differently than a commercial business or apartment complex. A development that generates significant traffic should receive a higher level of evaluation than those with minimal trip generation. As previously noted, requirements and guidance for conducting a traffic impact study for Lincoln County facilities can be found in Section 3.1.4. The traffic impact study guidance provides thresholds and criteria that can be used for requiring a developer to complete a traffic impact study. When a traffic impact study is required, the access is reviewed in greater detail for operational needs including lane capacity, turn lanes and traffic control.

Access Management Goals

The following goals for access management in Lincoln County have been adapted from the National Cooperative Highway Research Program (NCHRP) Report 548, A Guidebook for Including Access Management in Transportation Planning:

- Promote safety for vehicular and pedestrian traffic.
- Allow motorists to operate vehicles with fewer delays, less fuel consumption, and fewer emissions.
- Provide reasonable access to properties.
- Maintain the functional integrity and efficiency of roadways, helping to protect the investment of taxpayer dollars.
- Promote coordination between land use and transportation decisions.
- Utilize the roadway for the purposes (functions) for which they are designed.

The NCHRP Report 548 also identifies key components of an effective access management program. These components are summarized as follows:

- Develop and apply an access management classification system that assigns access management standards to roadways with their level of importance to mobility.
- Plan, design and maintain road systems based on this access management system.
- Define the level of access permitted to each classification.
- Establish the criteria for the spacing of signalized and non-signalized access, access setback distance from intersections (corner clearance) and interchanges.
- Apply engineering standards that include the appropriate geometric design criteria and traffic engineering measures to each allowable access point.
- Establish policies, regulations and permitting procedures to implement the listed components.
- Ensure coordination with and supportive actions by local jurisdictions exercising their land use planning authority as well as their development permitting and review authority.

Jurisdictional Considerations

Lincoln County roadways interface with State and Local (City, Township) facilities and are sometimes located within municipal growth areas and municipal limits. When a development occurs within the municipal growth area or Sioux Falls Joint Jurisdiction boundary, the County coordinates with the municipality for review and approval of the access. Similarly, any development occurring near an SDDOT facility should be coordinated with the State. The SDDOT restricts access adjacent to interstate interchange terminals and grade separated crossings. Often the SDDOT will implement a Control of Access property right on crossing roads adjacent to interstate interchange terminals. Proposed access locations within ½-mile of the interstate (I-29) should be coordinated with the SDDOT.

Access to South Dakota highways is governed by administrative rule, found in Article 70:09 of state code.

Access Location Criteria

Access spacing guidelines are shown in **Table 3-3** and reflect the Roadway Classification identified in the Major Roads Plan. Additional access management guidance and information is provided in the SDDOT Road Design Manual.

Table 3-3. Lincoln County Access Location Criteria

Lincoln County Highway Major Roads Plan Designation	Signal Spacing (miles)	Minimum Unsignalized Access Spacing (feet)	Access Density (accesses / side / mile)
Paved - Urban	1/4	1,000	5
Paved - Truck Route	1/4	1,000	5
Paved	1/4	1,000	5
Gravel	N/A	1,000	5

Notes:

1. Access locations within Municipal Growth Boundary or Sioux Falls Joint Jurisdiction area shall be coordinated with the County and local authority.
2. Access locations within ½-mile of SDDOT facility shall be coordinated with the County and SDDOT.
3. Lincoln County may defer to stricter local or State standards.
4. Minimum unsignalized access spacing applies to full-movement and partial-movement access.

Proposed access locations near an existing street intersection should be evaluated for corner clearance. This is the distance between a new unsignalized access and the nearest crossroad intersection. It should provide drivers with adequate perception-reaction time to assess potential downstream conflicts and is aimed at preventing the location of driveways within the functional area of an intersection (intersection storage and maneuvering area).

The recommended minimum upstream corner clearance guidelines are provided in **Table 3-4**. The SDDOT Road Design Manual, Chapter 17 Access Management contains additional information and techniques used for evaluating and addressing access issues.

Table 3-4. Minimum Upstream Corner Clearance Guidelines

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

3.1.6 Roadway Jurisdiction and Jurisdictional Transfer

Roadway jurisdiction determines whether a road falls under the state, county, city or township level of responsibility. This section considers why jurisdictional road assignments are needed, how system continuity is achieved, and recommends criteria to be considered in evaluating whether a roadway jurisdictional transfer should be considered.

The jurisdiction of a roadway is important and addresses how a road is operated, maintained and administered for the following areas.

Administration

The roadway's jurisdiction identifies the agency or entity having the responsibility for planning, design, construction, maintenance, and operations. Each agency or entity has staff or responsible persons with expertise pertaining to a distinct philosophy which matches to the level of roadways they are responsible for maintaining.

Functional and County Roadway Classification

The hierarchy of roadway functional classification is supported by having the proper agencies assigned to monitor a roads mobility and access priorities.

In general, the majority of roads that will be considered for jurisdictional transfer will be functionally classified as collector and local roads, and may be further categorized using County Roadway Classifications: Paved - Urban, Paved – Truck Route, Paved, and Gravel.

System Continuity/Roadway Characteristics

Appropriate jurisdictional classification is necessary to provide roadway system consistency, connectivity, and aid in defining roadway user expectations.

Jurisdictional responsibility generally refers to the state, county, city or township who is responsible for the roadway. In South Dakota, the state is responsible for the Interstate highway system and other state designated highway routes. Lincoln County is responsible for County designated highways/roadways, and individual Cities, Townships, Road Districts and private developments are responsible for roadways within their jurisdictions.

System continuity is important as each identified agency has jurisdiction over facilities that align with their goals and responsibilities. For instance, the state (South Dakota Department of Transportation – SDDOT) is interested in maintaining a system of highways serving inter/intra state travel, with a high focus on mobility. The county's roadway system is intended to serve regional/sub-regional travel. Finally, city/township roads are to provide direct local access to neighborhoods and individual properties.

For Lincoln County, continuity is achieved through:

- System connections and differing levels of mobility
- Linkages between cities/towns and rural areas
- Integration between the state highways and local street networks

Consistency for each of the jurisdictional entities is maintained through:

- Design and safety standards
    - Roadway geometrics
    - Road surface characteristics (gravel, bituminous, concrete)
    - Operating and design speeds
    - Traffic operations
    - Access guidelines
    - Signage
- Funding
- Maintenance
    - Capital (physical roadway improvements)
    - Operational (plowing/striping/etc.)

Jurisdictional Transfer Guidance

Jurisdictional transfer is when ownership of a roadway is transferred from one roadway agency to another. For each agency having roadway jurisdiction/ownership, there may be a significant amount of cost associated with a transfer as it is typical for a roadway to be brought “up to standards” or to an acceptable condition as a result of the transfer of jurisdiction by one of the parties involved in the transfer.

The overall objective of jurisdictional transfer is to provide for roadway ownership, operations, and maintenance at the proper jurisdictional level/by the correct agency. Jurisdictional transfer is important because properly aligned roads more appropriately provide the correct level of service, and better align with user expectations for maintenance, operations, safety, and ride quality. It also provides efficiencies for transportation costs associated with constructing, operating, and maintaining the facilities and is aligned with what is expected from road users. For example, if the SDDOT owns and operates a low-volume road that lacks connectivity to the larger state highway system, reconstruction or maintenance as the road meets it service life could be delayed as a result of higher priorities associated with roads having higher traffic volumes. Another example would be a county road located on the periphery of a city/town in which the town is expanding and being developed at an urban density with higher traffic volumes and where road users are expecting urban amenities such as curb/gutter and sidewalks. In each of these examples, the segment of road in question may be better suited if another jurisdiction took over responsibility to better meet customer expectations and overall ownership efficiencies.

In Lincoln County, the following criteria will be considered in determining whether a roadway jurisdiction transfer is warranted between the County/City/Township:

- System Continuity
    - Is the roadway currently located within the boundary of a municipality?
    - Is the roadway located adjacent and parallel to the boundary of a municipality?
    - Is the roadway currently located within a municipal growth area?
    - Has the roadway become a through truck route?
- Roadway Characteristics
    - Does adjacent development contain urban roadway characteristics?
    - Is there a desire for additional roadway amenities (pathways/sidewalks)?
    - Is there a need for public utilities?
    - Are the traffic volumes greater than 250 ADT (for Township gravel roadway)?
    - Are the traffic volumes greater than 2,500 ADT (for 2-lane County asphalt roadway)?
- Functional and/or County Roadway Classification
    - Paved - Urban
    - Paved - Truck Route
    - Paved
    - Gravel
- Streamlined maintenance opportunities
- Optimization of funding
- Future Planning Documents (i.e. county/municipal comprehensive plans)
- Political desire

Considerations associated with each criteria are further described below.

System Continuity/Roadway Characteristics

If the roadway is currently located within the boundaries of one jurisdiction, but operated and maintained by another jurisdiction, the roadway should be given consideration for transfer. An example of this would be CH 111 (Heritage Parkway) and CH 106 (First Street) in Tea. The City has improved or will be improving these streets and maintains them, but they remain under Lincoln County jurisdiction. Further, as municipal boundaries expand by annexation, any developed roadways within the annexation area should be transferred to the annexing municipality.

Another sub-criteria of this category would pertain to the level of adjacent development. If a development is located on the urban fringe, consists of an urbanized level of development, and is anticipated to be annexed or located within the planning area of the municipality, coordination should occur between the City and County to agree upon development standards associated with the future use of the road. When the boundaries of the municipality are amended, the road should meet the standards of the new jurisdiction. An example of this would be the Joint Zoning Regulations between Lincoln County and the City of Sioux Falls within the City's future growth area.

If the traffic volumes on the road exceed the threshold of 2,500 ADT which would typically exceed the traffic volume levels associated with township roads or local county roads, and are located in an increasingly urban area or urban fringe, it may be prudent to transfer the jurisdiction of the road. Additionally, if the traffic volumes of a township road exceed 250 ADT and the road is not near a municipality, the township road should be considered to be transferred to the county.

If a township road has become a route used by through traffic and more specifically truck traffic and is serving a "regional" purpose, the road should be considered for transfer to the county as maintenance and operations of the road would tend to exceed the threshold to which a township would be responsible for.

Finally, if there is desire of additional urban amenities, such as sidewalks, pathways, or curb and gutter along roadways located on the urban fringe, and there is long term cost/benefit to provide the roadway enhancements and turn over jurisdiction of the facility to the municipality, if agreeable, it may be beneficial to consider a roadway jurisdiction transfer.

Roadway Classification

The classification of a particular roadway can also be a determining factor in whether a roadway should be considered for jurisdictional transfer. Each agency is equipped for certain types of road maintenance and operations and may be a better fit for efficiently maintaining certain types of roads. Typically, county road departments are efficient in maintaining roads of a rural cross-section and of bituminous and/or gravel surfacing. In general, municipalities are efficient in maintaining roadways of bituminous or concrete surfacing and with an urban cross-section including curb and gutter. Finally, townships are typically associated in maintaining low volume roads with a rural cross section and gravel surfacing.

If a particular roadway is identified for jurisdictional transfer the roadway classification should be a primary consideration to ensure the appropriate jurisdiction has the resources and expertise available to provide for long term success of the facility. If a

roadway is functioning on a “regional” level, a higher level of agency would be more appropriate for jurisdiction, i.e. the county in-lieu of a township. Municipalities would be the appropriate jurisdiction to own and maintain urban road facilities. In some cases, upgrades of the facility may be required based upon the functional classification in order to make a jurisdictional transfer equitable. For example a gravel road may need to be paved in order to provide an adequate truck route or handle traffic volumes associated with a collector road. The long term maintenance costs should be compared to the up-front capital costs coupled with the long term maintenance costs associated with the new road surface.

An example of a life-cycle cost estimating worksheet is provided in Appendix H to help determine if roadway surfacing enhancement and long-term maintenance costs from converting a gravel road to a paved road are beneficial from an economic perspective.

Streamlined Maintenance/Funding Opportunities

If there are opportunities where the maintenance of a road facility can be optimized, such as where roads cross jurisdictional boundaries, transfer of specific sections of roadways may be beneficial. For example, where there may be an “island” of county road within a city or a peninsula of a city road extending into the county or township. For operation and maintenance purposes, it may be prudent to transfer a section of a roadway to enhance the economies of maintenance and ensure the roadway is maintained at a consistent level for the segment. This methodology would prevent the city or county from being on different maintenance cycles/periods and provide efficiencies in maintenance and improve road user level of service and be congruent expectations for a specific roadway segment.

Future Planning Documents

The Comprehensive Plans for the county and municipalities located within the county should be reviewed and specific roadways along the urban fringe which are expected to support high levels of future development and land use changes should be identified. This methodology will aid in determining the appropriate jurisdiction and roadway characteristics to guide and support the future development. If proper planning is in place, development in these fringe areas can be implemented to meet the road design and planning standards for the jurisdiction to which it will ultimately be located. This philosophy will help save taxpayer dollars in the future from not having to significantly upgrade facilities to conform to the standards of another jurisdiction.

Political Desire

In some circumstances there may be political desire to ensure a specific segment of roadway is maintained in a different manner than what is being done by a different agency. For example, the county may have a park within the city and desires access to be provided in a different or enhanced manner. Transferring the jurisdiction of the access road to the county would allow the county to provide a facility of their choice. In some cases, the current road users may have expectations different that the level being provided by the current maintaining agency and there may be desire and willingness of another agency to provide services at a level congruent with the road users expectations.

In this case, a jurisdictional transfer may provide a solution that is acceptable to all parties.

Criteria Summary

There is not an exhaustive set of criteria to identify road jurisdiction transfers, however the criteria mentioned above provide a framework of considerations to examine when agencies are considering whether a road may be better suited to be operated and maintained by a different agency for economic, functional, or political desires. A table is provided in Appendix H to aid in the consideration if a transfer is warranted. If one or all criteria are satisfied, it may be prudent to further examine whether a transfer may be beneficial. The bottom line is each agency must be agreeable to the transfer of jurisdiction to provide a level of service that is equitable from a resources perspective and economic perspective.

Types of Jurisdictional Transfers in Lincoln County may include and are further described below:

- County/Township transfer to City
- Township transfer to County

County/Township Transfer to City

In urban fringe areas where municipalities are growing and expanding their boundaries, county/township road facilities which are annexed as part of urban/municipal development should be transferred to the annexing municipality. Additionally, if the comprehensive plan for a municipality identifies future growth adjacent to a county corridor, the City and County should work together to identify a process for permitting, access, and responsibilities which triggers the point or level of development which would warrant a jurisdictional transfer. For example if urban amenities are desired, i.e. curb/gutter, sidewalks, multi-use pathways it may make sense to discuss prior to development whether a jurisdiction transfer is warranted.

Township Transfer to County

In areas of the County where a township has roadway jurisdiction and transportation and growth related matters have resulted in a roadway serving as a more “regional” or through route rather than solely providing direct property access, a transfer of jurisdiction between the township and county should be considered.

Methods of Transfer

In all cases noted above, the agency/jurisdiction must be agreeable for a transfer of jurisdiction of a particular road facility. The transfer of jurisdiction can be formalized in multiple ways including by Memorandum of Understanding, assignment of easement or Right-of-Way, or by other agreement as deemed necessary by the legal counsel of the county/city/township and should be considered on a case-by-case basis.

Included in the Appendix is a Life-Cycle Cost Analysis spreadsheet used by the SDDOT for determining the value of a roadway segment considered for jurisdictional transfer. The worksheet would be used for determining the present worth of the roadway,

accounting for future maintenance / upkeep costs over the specified analysis period. More information is included in the Appendix and can also be found in the SDDOT Report SD96-08 “Guidelines for Using Economic Factors and Maintenance Costs in Life-Cycle Cost Analysis”.

Administrative Transfer

Once an agreement has been reached between the parties considering a transfer, the County should follow the procedures outlined in SDCL §31-12-2 and SDDOT Policy to add or delete segments from their County Primary Highway System. This includes the following:

1. The County Commission must pass a resolution describing the desired additions or deletions. Relocations are considered a deletion and an addition to the system.

2. The Commission’s resolution must state the reasons for the requested change. For example, changes in County development patterns or traffic increases on township roads could be cited.

3. The County must forward a copy of the Commission’s resolution to the Secretary of the SDDOT and must include a County map showing the existing road system with proposed additions or deletions marked in contrasting colors.

4. If the resolution requests deletions from the County Highway System, the County should provide proof to SDDOT that notice of the proposed change has been published in an official County newspaper at least 10 days in advance of the Commission meeting at which the proposed action will be considered. The notice must describe the sections being abandoned and the time and place for action to be taken by the County Commission.

5. Published notice is not required for resolutions adding road segments to the County Highway System.

6. Send all resolutions and questions to:
   SDDOT Office of Project Development
   700 E Broadway Ave, Pierre, SD 57501-2586
   Phone 605.773.3157

   SDDOT responsibilities:

   The Secretary of Transportation must wait at least 30 days after receipt of a resolution requesting deletion from the county highway system to formally act on the request. The Secretary is not required to wait 30 days to act on a resolution for an addition to the system.

Roadways Identified for Potential Jurisdictional Transfer

Roadways that have been identified for potential jurisdictional transfer are included in **Figure 3-8** and **Table 3-5**. The road segments were identified based on the considerations listed above and stakeholder meetings with Township and Municipal representatives.

Table 3-5. Roadways Identified for Potential Jurisdictional Transfer

Index	Segment	Transfer Type
1	CH 111 from Sioux Falls to 270th Street	County to Sioux Falls
2	CH 111 from 270th Street to CH 110	County to Tea
3	CH 117 from Sioux Falls to CH 106	County to Sioux Falls
4	CH 117 from CH 106 to CH 110	County to Harrisburg
5	CH 123 from Sioux Falls to CH 106	County to Sioux Falls
6	CH 123 from CH 106 to CH 110	County to Harrisburg
7	CH 106 from 467th Ave to Tea	County to Tea
8	CH 106 from Tea to I-29	County to Tea
9	CH 106 from I-29 to CH 117	County to Sioux Falls
10	CH 106 from CH 117 to CH 135	County to Harrisburg
11	CH 110 from I-29 to 476th Ave (Southeastern Ave)	County to Harrisburg
12	CH 110 from CH 111 to I-29	County to Tea
13	473rd Ave (Western Ave) from Sioux Falls to CH 110	Township to County or Harrisburg
14	476th Ave (Southeastern Ave) from Sioux Falls to CH 106	Township to County or Sioux Falls
15	476th Ave (Southeastern Ave) from CH 106 to CH 110	Township to County or Harrisburg
16	272nd Street from CH 117 to 476th Ave (Southeastern Ave)	Township to County or Harrisburg
17	CH 103 from CH 124 to CH 122 to northern limits of Lennox	County to Lennox
18	CH 105 from CH 122 (278th Street) to northern limits of Lennox	County to Lennox
19	CH 124 from SD 44 to CH 103	County to Lennox
20	CH 124 in Worthing	County to Worthing
21	CH 117 in Worthing	County to Worthing
22	CH 135 from Park Lane to 281st Street	County to Canton
23	CH 126 from US 18 to 281st Street	County to Canton
24	CH 143 in Fairview	County to Fairview
25	CH 143 from Harris Street to Jones Street	County to Hudson
26	CH 152 in Hudson	County to Hudson
27	CH 117 from SD 46 to 296th Street	County to Beresford

LINCOLN COUNTY
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FIGURE 3-8
ROADWAYS IDENTIFIED FOR POTENTIAL JURISDICTIONAL TRANSFER

LEGEND

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Veterans Parkway (Future)
- County Road
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other)
- Airport

Jurisdictional Transfer

- County to Municipality
- Township to County or Municipality

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Lyon
Turner
Sioux
Clay
Union
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Fairview
Hudson
Beresford
269 ST
270 ST
271 ST
272 ST
273 ST
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3.2 Bicycle and Pedestrian Plan

The northern part of Lincoln County has rapidly growing municipal areas with continually developing opportunities for bicycle and pedestrian use. The southern portion of Lincoln County is characterized by agricultural land use with limited infrastructure for accommodation of multi-modal uses. There are three state parks within the County limits including Newton Hills, Great Earth and Lake Alvin. There are also a variety of recreational areas located along the Big Sioux River.

The South Dakota Statewide Long Range Transportation Plan (2010) presents the following considerations:

- Federal Highway Administration policy requires consideration of bicycle and pedestrian facilities on federally funded projects, where appropriate, in all highway construction and reconstruction projects.
- Rural considerations include paved shoulders.
- Urban bicycle considerations include bicycle lanes, bicycle paths, or increased width on outside driving lane to accommodate bicycle users.
- Urban pedestrian considerations include sidewalks or shared use paths.

Due to the rural nature of the County's roadway system, opportunities for bicycle and pedestrian uses are focused around available shoulder space. **Figure 3-9** details the existing road network and availability of shoulder space for accommodation of multi-use activities.

3.2.1 Bicycle and Pedestrian Plan Goals

The following goals have been identified for the Bicycle and Pedestrian Plan:

- Support safe multi-modal use of Lincoln County facilities.
- Promote connectivity of municipalities within Lincoln County.
- Support bicycling and walking as viable transportation modes in Lincoln County.
- Promote bicycling and walking in Lincoln County by improving awareness of bicycle and pedestrian facilities and opportunities.

LINCOLN COUNTY
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FIGURE 3-9
EXISTING PAVED SHOULDER WIDTH

LEGEND

- Interstate Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Veterans Parkway (Future)
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Federal Waterfowl Production
- State Game Production Area
- State Park
- Sioux Falls Park
- Bridge / Culvert (County)
- Bridge / Culvert (Other)
- Airport

Shoulder Width (County)

- 1' to 3'
- 4' or Greater

Shoulder Width (Other)

- 1' to 3'
- 4' or Greater

N

0 1.5 3
MILES

SOURCE: SDDOT

NOTE:
I-29 Has 10' Shoulders
(Not Shown)

Minnehaha
Lyon
Turner
Sioux
Clay
Union
Sioux Falls
Tea
Harrisburg
Lennox
Worthing
Canton
Good Earth
Lake Alvin
Newton Hills SP
Fairview
Hudson
Beresford
269 ST
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3.2.2 Analysis and Recommendations

Pedestrian Accommodation

The Lincoln County road network is generally rural in nature with limited demand for pedestrian use. Current pedestrian accommodation is limited to roadway shoulders. There are portions of the County road system that lie within municipal limits where there is a greater demand for accommodation due to denser development and larger populations. The Cities of Tea and Harrisburg have made improvements along these routes including sidewalks and trails. Roadway segments which are experiencing increasing urbanization should be considered for jurisdictional transfer to the municipality to better address urban, municipal needs. Sidewalk should be installed with urban reconstruction and urban development / re-development. Pedestrian routes in these areas should also be considered for connectivity. The sidewalk should provide route continuity and avoid fragmentation.

Multi-Use Trails and Bicycle Routes

The Sioux Falls MPO prepared a Bicycle Plan in 2009 that identified conceptual Multi-Use Trails and Bicycle Routes in northern Lincoln County. The Sioux Falls MPO later studied the conceptual trail routes in greater detail in the Multi-Use Trail Study (2011). A summary of the findings is included below.

The MPO Multi-Use Trail Study evaluated concepts for trail routes between Harrisburg and Sioux Falls and between Tea and Sioux Falls. Graphics from the plan are included in **Figure 3-10** for reference. The plan identified trails along the following Lincoln County road facilities:

- Harrisburg to Yankton Trail Park
    - CH 123 (Cliff Avenue) between Sioux Falls and CH 110 (Future Complete Street)
    - CH 123 (Cliff Avenue) between 272nd Street and CH 110 (Future Sidepath)
    - CH 110 from Harrisburg High School to Columbia Street (Existing Sidepath)
    - CH 110 from Harrisburg High School to Cliff Avenue (Existing Sidepath)
- Tea to Sioux Falls
    - CH 111 in Tea (Existing Sidepath)
    - CH 106 between Tea and Tallgrass Avenue (Future Sidepath)
    - CH 110 at Exit 71 from I-29 to Nine Mile Creek (Future Sidepath)

The study also identified trail routes within Lincoln County that follow water courses or other features, providing continuity with the road segments listed above. The trail segments are all located within municipal limits or municipal growth areas, except the section of CH 110 at Exit 71. The current Tea Trail Plan is also included in **Figure 3-11**. This is generally consistent with the MPO study identifying routes along CH 111 and CH 106 continuing north toward Sioux Falls.

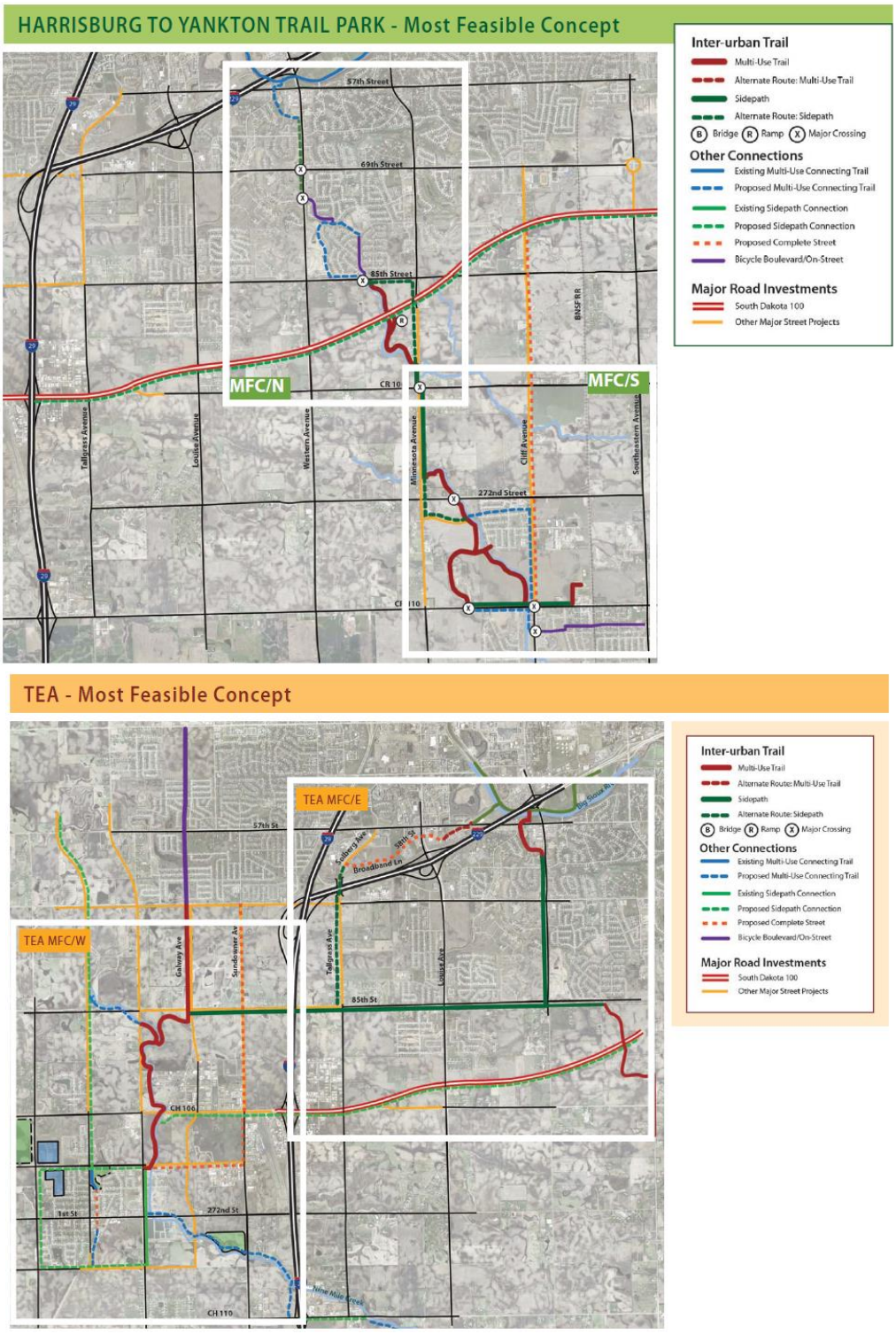

Figure 3-10. Multi-Use Trail Routes (Sioux Falls MPO Multi-Use Trail Study, 2011)

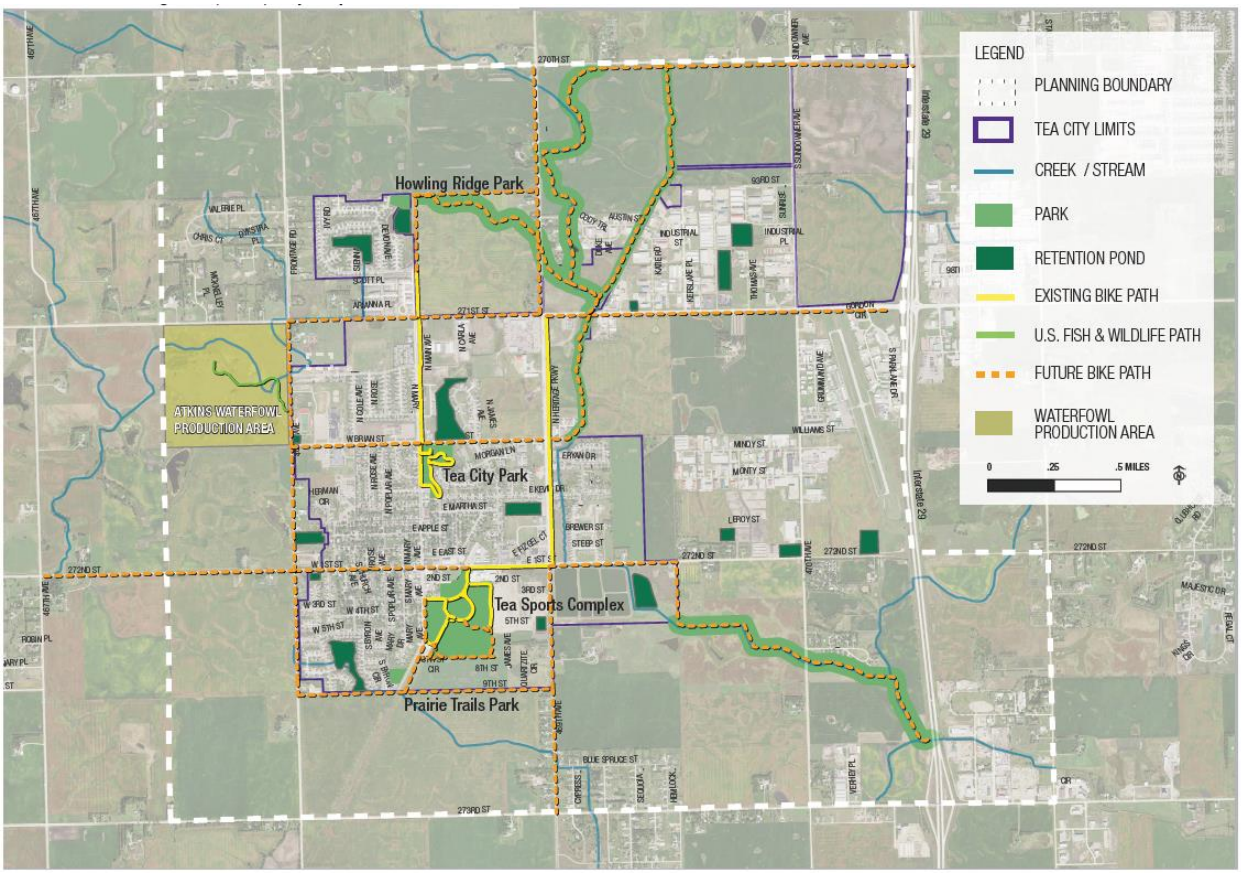

Figure 3-11. Existing and Future Trails in Tea (Tea Comp. Plan Update, 2018)

A number of potential bike routes were evaluated in the 2009 MPO Bicycle Plan. The routes were rated by Connectivity, Comfort, Useable Space and Condition. The recommended bike routes generally provide connectivity between Sioux Falls, Tea, Harrisburg and Canton along with Good Earth State Park and Lake Alvin Recreational Area. The routes on Lincoln County roadways were mostly classified as “Secondary” routes. This classification indicates the routes are lower priority and generally have some limitation for bicycle accommodation such as narrow shoulders. When roadways with limited shoulder space are reconstructed, a shoulder width of at least 4 feet useable space should be considered. There are also short segments of “Urban” routes identified within the municipal limits of Tea and Harrisburg. These routes would have an urban on-street bicycle facility or multi-use path. Although some of the urban routes are currently within Lincoln County jurisdiction, it is anticipated that the road segments will be transferred to the municipality in the future.

The MPO Bicycle Routes Plan is shown in **Figure 3-12** and includes the following:

- North / South routes between Harrisburg and Sioux Falls including SD 115 (Minnesota Avenue), CH 123 (Cliff Avenue) and 476th Avenue (Southeastern Avenue).
- North / South routes between Tea and Sioux Falls included 469th Avenue (CH 111) and the future western loop of Highway 100.
- North / South route between Canton and Sioux Falls on CH 135, providing connectivity to Good Earth State Park.
- East / West route along CH 102 (269th Street) between 480th Avenue and Sioux Falls.
- East / West route along CH 110 between CH 111 and CH 135, providing connectivity between Harrisburg and Tea.
- Multi-Use trail routes focused around Sioux Falls, Harrisburg and Tea.
- Multi-Use trail along entire Veterans Parkway / Highway 100 corridor.

In addition to the MPO planning documents, stakeholder meetings and public outreach were conducted as part of the Lincoln County Master Transportation Plan study. The following bicycle route concepts were identified through these meetings:

- Connection of Harrisburg, Sioux Falls and Good Earth State Park
- Connection of Canton and Good Earth State Park
- Connection of Canton and Newton Hills State Park

The route concepts have generally been addressed with the MPO planning documents except for a potential route extending to Newton Hills State Park. This would logically follow CH 135 beginning in Canton near Chautauqua Park and continue south to CH 140. An internet search of bike routes in the Canton area also showed the use of CH 140 to Fairview and continuing into Iowa, before completing a loop route by returning to Canton via US 18 or 283rd Street.

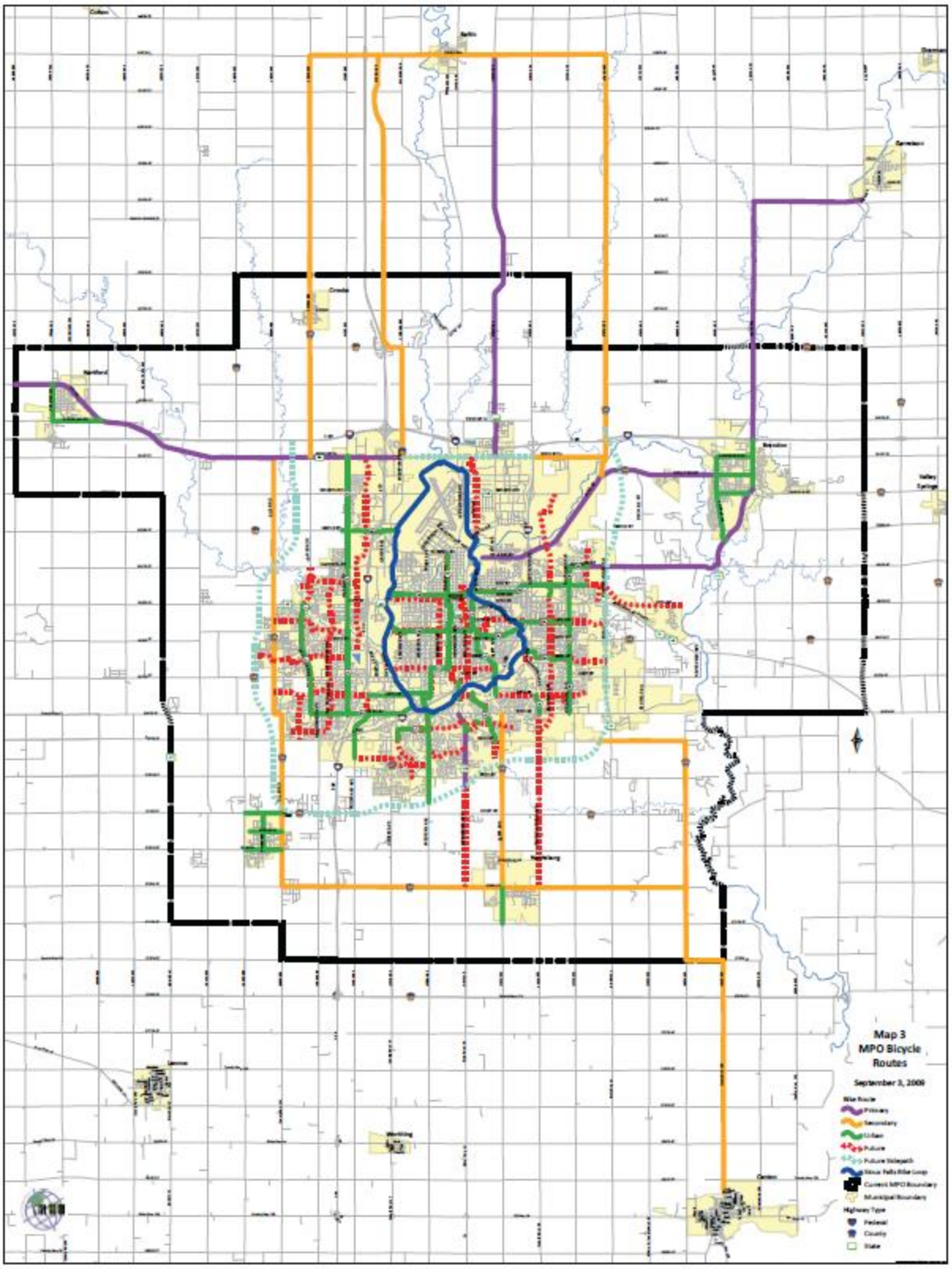

Figure 3-12. MPO Bicycle Routes Plan (Sioux Falls MPO Bicycle Plan, 2009)

3.2.3 Bicycle and Pedestrian Plan

The Lincoln County Bicycle and Pedestrian Plan is shown in **Figure** 3-13 and described in **Table 3-6**. The Bicycle and Pedestrian Plan has been developed using MPO and Municipal planning documents as a basis and supplemented through stakeholder meetings and public input. The following designations have been developed to identify and address the different opportunities and needs for roadways within County limits. Municipal needs for bicycle and pedestrian accommodation have not been included except for County roadways within municipal limits.

Primary Route

The Primary Route designation indicates an existing facility with adequate shoulder width and/or a sidepath for accommodating bicycle and pedestrian use. As shown in **Figure** 3-13, these are generally roadways under state jurisdiction.

County Urban Route

In order to address the rapid development in northern Lincoln County, several roadways are designated as “County Urban Route”. This designation places a greater importance on multi-modal facilities than other designations listed below. These roadways will have an existing or future sidepath or widened shoulders for accommodation of bicycle and pedestrian use. An example of this would be segments within Tea and Harrisburg city limits where the municipality has installed multi-modal improvements along county roadways.

County Route with Shoulder

The County Route with Shoulder designation identifies rural routes where there is demand for widened shoulders for accommodating multi-modal use. It is assumed the facilities would be candidates for wider shoulders, but they could include a sidepath if desired. Since most of the road corridors have limited shoulder widths, widening the shoulder would be a goal for consideration when planning future projects along the identified corridors.

County Paved

The County Paved designation is intended for areas with limited shoulder width and lower or currently unknown demand for multi-modal use. These corridors would be evaluated for widened shoulders when the opportunity is available but are generally lower priority than the designations listed above.

County Gravel

The County Gravel designation indicates an existing County facility with gravel surfacing which is considered to be a limitation for multi-modal uses. This designation indicates the lowest priority. However, when improvements are planned for these corridors, hard surfacing, widened shoulders or other multi-use features can be considered.

Future Route

The Future Route designation identifies corridors where there is demand for multi-modal accommodation and will likely be a Primary Route once the area develops. This would include corridors in an urban growth area that are currently under township jurisdiction and could become County or Municipal jurisdiction in the future as development occurs. Also included are fragmented sections along State routes where there is inadequate facilities to be considered a Primary Route. The Future Routes have generally been identified in planning documents and will require installation of multi-modal facilities when they are reconstructed in the future.

The MPO Bicycle Plan provides the following guidance for Bicycle Routes:

- Roads with a shoulder width less than 4 feet should not be designated or marked as a primary bicycle facility.
- A minimum shoulder width of 4 feet is needed to accommodate bicycle travel. This measurement should be the useable width and should not include the gutter pan or any area treated with rumble strips.
- Shoulders should be on both sides and not encourage head-to-head travel.
- Bridges should have shoulder wherever possible with a high priority to clean off debris.
- Consider widening shoulders on all bicycle routes when reconstructing the roadway.
- Shoulders should be level without abrupt drop-offs.

Currently there are only two sections of County roadway with shoulder widths that are 4’ wide or greater. This includes CH 106 between Tea and I-29 and CH 105 from 286th Street and continuing south to the Clay County border. As roadway projects are identified and planned, shoulder width should generally be considered for accommodation of bicycle and pedestrian activity.

Table 3-6. Bicycle and Pedestrian Routes

Type	Location	Jurisdiction	Existing Shoulder / Path
Primary Route	SD 115 (Minnesota Ave) from Sioux Falls to US 18	SDDOT	6’ Paved Shoulder
Primary Route	SD 44 from Turner County Border to Lennox	SDDOT	8’ Paved Shoulder
Primary Route	SD 44 from Lennox to I-29	SDDOT	5’ Paved Shoulder
Primary Route	SD 17 in Lennox	SDDOT	10’ Sidepath in Lennox
Primary Route	US 18 from I-29 to Canton	SDDOT	5’ – 8’ Paved Shoulder
Primary Route	US 18 from Canton to Iowa Border	SDDOT	6’ Paved Shoulder
Primary Route	SD 46 from I-29 to 486th Avenue (along Lincoln County Border)	SDDOT	4’ Paved Shoulder
County Urban Route	CH 111 from Sioux Falls to CH 110	County	0’ to 2’ Paved Shoulder 8’ Sidepath in Tea
County Urban Route	CH 117 from Sioux Falls to CH 110	County	No Shoulder
County Urban Route	CH 123 from Sioux Falls to CH 110	County	No Shoulder 6’ Granular Path in Harrisburg (2600’)
County Urban Route	CH 106 from CH 111 to Southeastern Ave	County	1’ Paved Shoulder
County Urban Route	CH 106 from 467th Ave to CH 111	County	No Shoulder Sidewalk in Tea
County Urban Route	CH 110 from SD 115 to Southeastern Ave	County	No Shoulder 6’ Granular Path in Harrisburg (3000’)

Table 3-6. Bicycle and Pedestrian Routes

Type	Location	Jurisdiction	Existing Shoulder / Path
County Route with Shoulder	CH 102 from 467th Ave to Sioux Falls	County	1' Paved Shoulder
County Route with Shoulder	CH 102 from Sioux Falls to CH 135	County	No Shoulder
County Route with Shoulder	CH 106 from Southeastern Ave to CH 135	County	1' Paved Shoulder
County Route with Shoulder	CH 110 from CH 111 to Harrisburg	County	No Shoulder
County Route with Shoulder	CH 110 from Harrisburg to CH 135	County	No Shoulder
County Route with Shoulder	CH 111 from CH 110 to 274th Street	County	No Shoulder
County Route with Shoulder	CH 135 from CH 102 to Canton	County	No Shoulder
County Route with Shoulder	CH 135 from Canton to CH 140	County	No Shoulder
County Route with Shoulder	CH 140 from CH 135 to CH 143	County	1' Paved Shoulder
County Route with Shoulder	CH 143 from CH 140 to Fairview	County	1' Paved Shoulder
Future Route	SD 44 in Lennox	SDDOT	2' Paved Shoulder
Future Route	US 18 in Canton	SDDOT	2' Paved Shoulder
Future Route	476th Ave / Southeastern Ave from Sioux Falls to CH 110	Township	Gravel Road
Future Route	473rd Ave / Western Ave from Sioux Falls to CH 110	Township	Gravel Road
Future Route	272nd Street from CH 117 to Southeastern Ave	Township	Gravel Road
Future Route	Veterans Parkway / Highway 100	Sioux Falls	N/A

LINCOLN COUNTY
South Dakota

FIGURE 3-13
BICYCLE AND PEDESTRIAN PLAN

LEGEND

- Interstate Highway
- State Highway
- Township Road
- Urban Road
- Veterans Parkway (Future)
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Federal Waterfowl Production
- State Game Production Area
- State Park
- Sioux Falls Park
- Bridge / Culvert (County)
- Bridge / Culvert (Other)
- Airport

Facility Type

- Primary Route
- County Urban Route
- County Route with Shoulder
- County Paved
- County Gravel
- Future Route

N

0 1.5 3
MILES

SOURCE: SDDOT

Minnehaha
Lyon
Turner
Sioux
Clay
Union
Sioux Falls
Good Earth
Tea
Lake Alvin
Harrisburg
Lennox
Worthing
Canton
Newton Hills SP
Fairview
Hudson
Beresford
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4 Needs Assessment

4.1 Traffic and Safety Projects

As discussed in Section 2, Lincoln County faces a number of needs related to traffic and safety issues. Build Alternatives have been developed to address these needs and include the following:

- Study corridor intersection and roadway cross-section build alternatives to address traffic operations and capacity needs.
- Intersection build alternatives to address safety needs.
- Intersection build alternatives to address future development needs.

4.1.1 Traffic Capacity Improvements Build Alternatives

Table 4-1 through **Table 4-8** present analyzed Build alternatives for the two 2045 Planning Horizon scenarios (with and without Highway 100). Build alternatives that do not meet LOS goals for this study are in Red text and are removed from further consideration. Build alternatives that meet LOS goals should be considered as Traffic and Safety Projects in County planning efforts.

Intersection Tables Key

Cross-Section (Leg) – represents number of lanes for the respective leg (east, west, north, or south)

- 6: six through lanes, three in each direction; typically includes a median and select left-turn lanes
- 4: four through lanes, two in each direction; may or may not include a center turn lane or median
- 2/3: one through lane in each direction; two-lane roadway with left-turn lanes at high volume intersections or a two-lane roadway with a continuous left-turn lane.

Modifications lane configurations:

- LT: left-turn lane
- LT,LT: dual left-turn lane
- T: through lane
- RT: right-turn lane
- T/RT: shared lane for through and right-turn traffic

Table 4-1. 271st Street Intersections (w/Hwy 100 connection to I-29)

271st Street Intersection	Cross-Section (Leg)	Modifications	AM	PM
469th Avenue/ Tea-Ellis Road/ Heritage Parkway	E: 6 W: 4 N: 4 S: 4	Signal – based on Hwy 106 Corridor Study EB: LT,LT,T,T/RT WB: LT,LT,T,T,RT NB: LT,T,T,RT (free, lane add EB) SB: LT,T,T/RT	D (42.5)	C
470th Avenue/ Sundowner	E: 6 W: 6 N: 4 S: 2/3	Signal – based on Bakker Landing TIS EB: LT,LT,T,T,T,RT WB: LT,T,T,T,RT NB: LT,T,RT SB: LT,LT,T,RT	C	D (49.1)
471st Avenue/ Tallgrass Avenue	-	Highway 100 intersection	Future Hwy 100 Improvem.	Future Hwy 100 Improvem.
472nd Avenue/ Louise Avenue	2/3	Maintain existing Roundabout	-	-
473rd Avenue/ Western Avenue	2/3	Roundabout	A	A
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	B	A
SD115/ Minnesota Avenue		Maintain SDDOT improvements	-	-
475th Avenue/ Cliff Avenue	E: 2/3 W: 2/3 N: 4 S: 2/3	Roundabout – assumes 4-lane north of 271st WB bypass to NB lane add SB drop as RT to WB AM: WB and NB LOS D approach; overall C PM: EB LOS F approach; overall C *4-lane needed between 271st and 272nd; included 2/3 lane south to maintain single-lane roundabout*	C	C
	E: 2/3 W: 2/3 N: 4 S: 4	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T,T/RT SB: LT,T,T/RT	C	C
476th Avenue/ Southeastern Avenue	2/3	Roundabout	A	A
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	A
SD11	2/3	Roundabout	A	A

Table 4-2. 273rd Street Intersections (w/Hwy 100 connection to I-29)

273rd Street Intersection	Cross-Section (Leg)	Modifications	AM	PM
471st Avenue/ Tallgrass Avenue	2/3	Maintain existing TWSC	-	-
472nd Avenue/ Louise Avenue	2/3	Maintain existing AWSC	-	-
473rd Avenue/ Western Avenue	2/3	Maintain existing TWSC	-	-
SD115/ Minnesota Avenue	2/3	Maintain SDDOT improvements	-	-
475th Avenue/ Cliff Avenue	2/3	Roundabout – single lane AM: F in WB, NB, and SB approaches PM: SB and EB LOS F approaches; NB LOS E approach *Approaching 4-lane needs on Cliff Ave.*	F	F
	E: 2/3 W: 2/3 N: 4 S: 4	Signal – fully actuated EB: LT,LT,T,RT WB: LT,T,RT NB: LT,LT,T,T/RT SB: LT,T,T,RT	C	C
476th Avenue/ Southeastern Avenue	2/3	AWSC PM: D on EB approach	B	C
		Roundabout	A	A
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	A
SD11	2/3	Roundabout	A	A

Table 4-3. Other Intersections (w/Hwy 100 connection to I-29)

Other Intersections	Cross-Section (Leg)	Modifications	AM	PM
272nd Street & Cliff Avenue	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Roundabout – single lane on all 4 approaches AM: NB LOS F; overall E PM: EB and SB LOS F approach; overall F *4-lane needed between 271st and 272nd; analyzed with a single NB/SB lane to north and south of intersection.*	E	F
	E: 2/3 W: 2/3 N: 4 S: 4	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T,T/RT SB: LT,T,T/RT	A	B
269th Street & 469th Avenue	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Roundabout *LOS results from w/out 100 analysis*	*A*	*A*
		AWSC – no turn lanes AWSC – w/multiple misc. turn lanes added *LOS results from w/out 100 analysis*	*D* *C*	*F* *C*
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	B
272nd Street & 469th Avenue	E: 2/3 W: 2/3 N: 4 S: 2/3	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T,RT (drop)	B	B

Table 4-4. Corridor Summary (w/Hwy 100 connection to I-29)

Cross-Section	Corridor Segments
6-Lane	271st Street – from 469th Avenue/Heritage Parkway to Hwy 100
4-Lane	Cliff Avenue – from Sioux Falls to 273rd Street Sundowner Avenue/470th Avenue – from Sioux Falls to 271st Street
2/3 Lane	All Others

Note: Northern boundaries of the corridor segment cross-section needs limits are 269th Street west of I-29 and 271st Street east of I-29 (i.e. no recommendations for corridor needs on Western Avenue north of 271st Street).

Table 4-5. 271st Street Intersections (w/out Hwy 100 connection to I-29)

271st Street Intersection	Cross-Section (Leg)	Modifications	AM	PM
469th Avenue/ Tea-Ellis Road/ Heritage Parkway	E: 6 W: 4 N: 4 S: 4	Signal – based on Hwy 106 Corridor Study EB: LT,LT,T,T/RT WB: LT,LT,T,T,RT NB: LT,T,T,RT (free, lane add EB) SB: LT,T,T/RT *Approaching 6-lane capacity needs between 469th and Sundowner. Same build-out as w/Hwy 100.*	D (37.3)	C
470th Avenue/ Sundowner	E: 6 W: 6 N: 4 S: 2/3	Signal – based on Bakker Landing TIS EB: LT,LT,T,T,T,RT WB: LT,T,T,T,RT NB: LT,T,RT SB: LT,LT,T,RT *Approaching 6-lane capacity needs between 469th and Sundowner. Same build-out as w/Hwy 100.*	C	D (41.2)
471st Avenue/ Tallgrass Avenue	2/3	Roundabout	C	A
	2/3	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	B	B
472nd Avenue/ Louise Avenue	-	Maintain existing Roundabout	-	-
473rd Avenue/ Western Avenue	2/3	Roundabout	A	A
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	A
SD115/ Minnesota Avenue		Maintain SDDOT improvements	-	-
475th Avenue/ Cliff Avenue	E: 2/3 W: 2/3 N: 4 S: 2/3	Roundabout – assumes 4-lane north of 271st WB bypass to NB lane add SB drop as RT to WB AM: WB LOS E approach; overall C PM: EB LOS F approach; overall D	C	D
	E: 2/3 W: 2/3 N: 4 S: 2/3	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T,RT (drop)	B	C
476th Avenue/ Southeastern Avenue	2/3	Roundabout	B	B
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	B
SD11	2/3	Roundabout	A	A

Table 4-6. 273rd Street Intersections (w/out Hwy 100 connection to I-29)

273rd Street Intersection	Cross-Section (Leg)	Modifications	AM	PM
471st Avenue/ Tallgrass Avenue	2 or 3	Maintain existing TWSC	-	-
472nd Avenue/ Louise Avenue	2 or 3	Maintain existing AWSC	-	-
473rd Avenue/ Western Avenue	2 or 3	Maintain existing TWSC	-	-
SD115/ Minnesota Avenue	2 or 3	Maintain SDDOT improvements	-	-
475th Avenue/ Cliff Avenue	2 or 3	Roundabout – single lane AM: F in WB, NB, and SB approaches	F	C
	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Signal – fully actuated EB: LT,T,RT WB: LT,T,RT NB: LT,T,RT SB: LT,T,RT	C	B
476th Avenue/ Southeastern Avenue	2 or 3	AWSC PM: F on EB approach	C	F
		Roundabout	A	A
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	A
SD11	2 or 3	Roundabout	A	A

Table 4-7. Other Intersections (w/out Hwy 100 connection to I-29)

Other Intersections	Cross-Section (Leg)	Modifications	AM	PM
272nd Street & Cliff Avenue	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Roundabout – single lane on all 4 approaches AM: NB LOS D; overall C PM: EB LOS F approach; overall D	C	D
	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	B	C
269th Street & 469th Avenue	E: 2/3 W: 2/3 N: 2/3 S: 2/3	Roundabout	*A*	*A*
		AWSC – no turn lanes AWSC – w/multiple misc. turn lanes added	*D* *C*	*F* *C*
		Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T/RT	A	A
272nd Street & 469th Avenue	E: 2/3 W: 2/3 N: 4 S: 2/3	Signal – fully actuated EB: LT,T/RT WB: LT,T/RT NB: LT,T/RT SB: LT,T,RT (drop)	B	B

Table 4-8. Corridor Summary (w/out Hwy 100 connection to I-29)

Cross-Section	Corridor Segments
6-Lane	271st Street – from 469th Avenue/Heritage Parkway through the I-29 interchange
4-Lane	Sundowner Avenue/470th Avenue – from Sioux Falls to 271st Street
2/3 Lane	All Others

Note: Northern boundaries of the corridor segment cross-section needs limits are 269th Street west of I-29 and 271st Street east of I-29 (i.e. no recommendations for corridor needs on Western Avenue north of 271st Street).

4.1.2 Safety Improvement Build Alternatives

Many of the intersections experiencing high crash frequency are also identified in the previous section for capacity and operational improvements. The following are proposed Build alternatives to address safety-related needs not related to capacity or traffic operations issues.

272nd Street and 466th Avenue Intersection

Short-term modifications:

- Increase advance warning of stop-controlled intersection approaches
    - Advanced warning signs
    - Stop signs with flashing LED borders
    - Add reflective tape to stop sign posts
    - Larger and/or multiple stop signs
    - Rumble strips
    - Flashing beacons
- Improve approach sight angles
- Consider roadway lighting at the intersection

Long-term modifications:

- Reconstruct intersection with a roundabout

273rd Street and 472nd Avenue Intersection

Short-term modifications:

- Increase advance warning of stop-controlled intersection approaches

Long-term modifications:

- Consider reconstructing intersection as a roundabout with future development and traffic growth

466th Avenue (old SD 17) Corridor

As previously discussed in the safety evaluation, there is a need for intersection safety improvements along the 466th Avenue (old SD 17) corridor. The crash history identifies a trend at intersections along this corridor of motorists disregarding intersection traffic control and thus leading to angle crashes. It is recommended that a blanket safety project be applied to these intersections as follows:

Short-term modifications:

- Increase advance warning of stop-controlled intersection approaches
    - Advanced warning signs
    - Stop signs with flashing LED borders
    - Add reflective tape to stop sign posts
    - Larger and/or multiple stop signs
    - Rumble strips
    - Flashing beacons
- Improve approach sight angles, including working with property owners to remove trees from near the intersection.
- Consider roadway lighting at higher volume intersections

Long-term modifications:

- Reconstruct intersection with a roundabout at intersections with higher levels of vehicular conflict exposure

Any unexpected changes to traffic control for a given route, such as a route that is typically a through route but is stop-controlled at one intersection, should be clearly delineated with advance warning of the upcoming change in intersection route priority.

4.1.3 Future Development Build Alternatives

One of the challenges forecasting traffic volumes along the edge of a metropolitan area is that potential growth and development is difficult to fully incorporate in travel demand models. Timelines, development density, priorities, etc. all regularly fluctuate and thus development plans for the area are often in flux from year to year or model update to model update.

The Sioux Falls MPO travel demand model scenarios used in this study have a gap in development in the general area bound by 271st Street, 273rd Street, 471st Street/Tallgrass Avenue, and SD115/Minnesota Avenue. This area was towards the further reaches of Sioux Falls expanding south, Harrisburg expanding west, and Tea expanding east. Through an incremental outward growth and consideration towards utility and infrastructure needs to support a more dense urban development, this area would be towards the last of development north of 273rd Street.

Recently, the Harrisburg School District passed a bond issue to construct a new elementary school on land east of Louise Avenue and south of 271st Street and Harrisburg is planning to extend utilities to the area. With this extension, the surrounding area is now available for development by tying into these utilities and thus is prime developable land in the near future.

Given this quick development of events, the travel demand model scenarios used for this analysis does not account for the anticipated level of development in this area through year 2045. Therefore, additional considerations for intersections and corridor improvement in the general area need to be planned and incrementally built-out with the surrounding development. The following is a list of development-driven improvements to the section-line roads not previously identified for capacity or operational need-driven improvements:

- 272nd Street and 472nd Avenue/Louise Avenue
- 272nd Street and 473rd Avenue/Western Avenue
- 273rd Street and 472nd Avenue/Louise Avenue
- 273rd Street and 473rd Avenue/Western Avenue

For each of these intersections, an intersection improvement project that includes the possibilities of the following:

- Roundabout
- Turn lanes
- Signalization

Roadway segment improvements in this area will be highly dependent on development timelines and density. Therefore, near-term improvements may include:

- 2-lane roadway with turn lanes at higher volume access locations.
- 3-lane roadway with a continuous center left-turn lane.

For longer-term improvements, the following should be included:

- 5-lane roadway with median, restricted access to development, and turn lanes at high volume intersections.

Ultimately, it will be important to review development as it is proposed through traffic impact studies and providing the MPO with information to update their model. Access management and land use planning will also help each of these corridors and intersections achieve higher levels of capacity and extend the timeframe that existing or less-costly infrastructure accommodates the area's traffic demand.

4.1.4 Summary of Projects Based on Traffic Operations and Safety Needs

Table 4-9, **Table 4-10** and **Figure 4-1** provide a summary of potential Transportation Projects that have been identified based on operational and safety needs. This includes the build alternatives described above and projects related to the segment capacity and safety evaluations conducted with the study. Needs have been identified regardless of the current jurisdiction and the figure indicates where the project will involve Township or SDDOT facilities. There are two intersections on SD 11 that would likely be addressed by SDDOT. The projects on Township roadways could become County or municipal jurisdiction depending on how the parcels adjacent to the roadways develop. **Figure 4-2** includes only Short-Term priority projects.

The projects have been prioritized as Short-, Medium- and Long-Term. Safety projects were generally assigned a Short-Term priority. Some safety projects identified a Short-Term and Long-Term improvement that would be implemented after development occurs or when the segment needs to be reconstructed. Corridors and associated intersections were prioritized based on the urgency of needed capacity improvements. Facilities that do not meet LOS goals for existing traffic levels were assigned a priority of Short-Term. The remaining facilities were assigned Mid-Term and Long-Term priority based on expected future traffic levels.

The projects identified in **Table 4-9** and **Table 4-10** have an estimated construction cost of $149M. Projects prioritized as Short-Term (**Table 4-9**) have an estimated construction cost of $69M. The estimated construction cost does not include engineering, right-of-way, utility relocation, etc.

Table 4-9. Short-Term Prioritized Traffic and Safety Projects

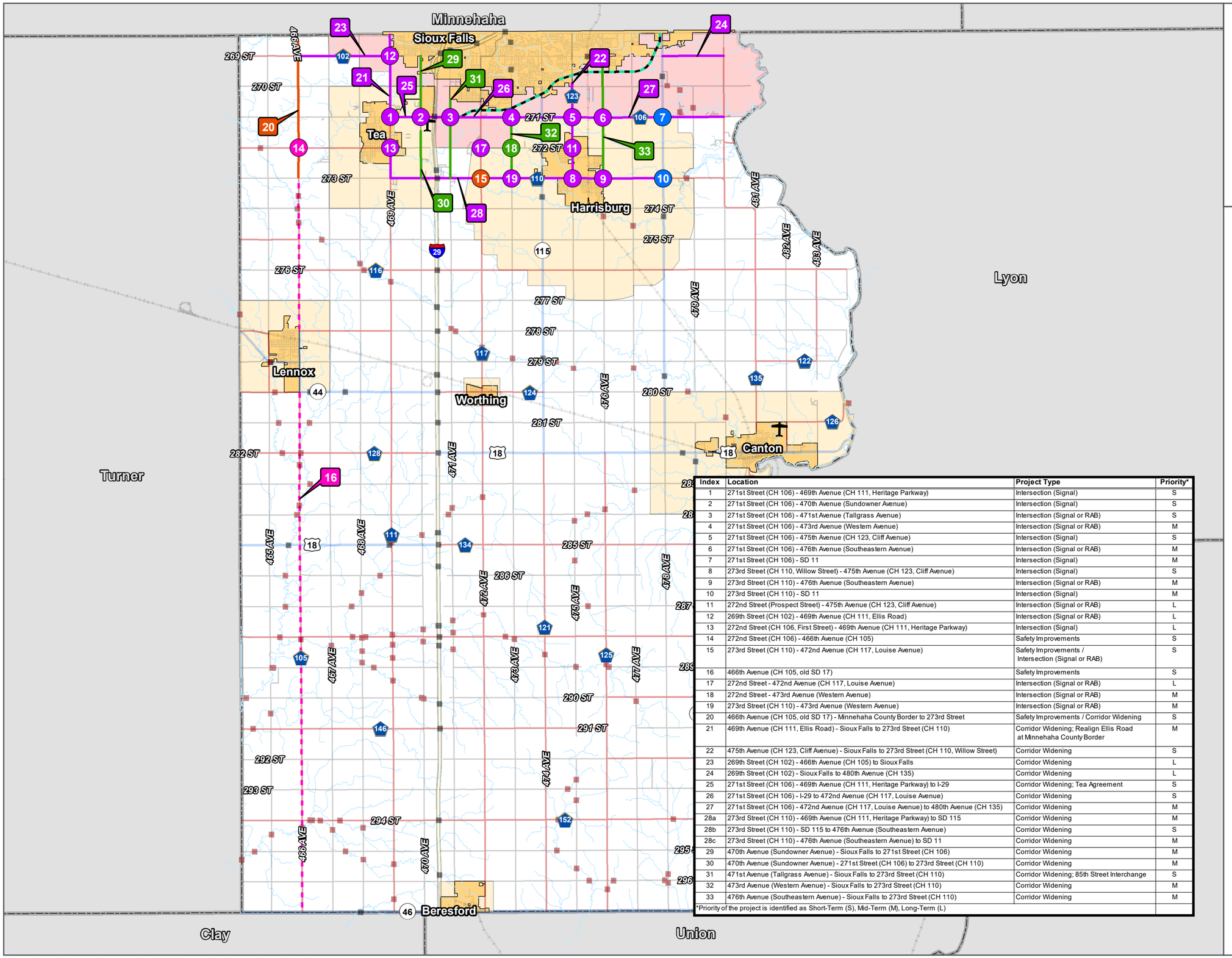
Index	Location	Project Type	Priority*	Cost
1	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway)	Intersection (Signal)	Short-Term	$1,500,000
2	271st Street (CH 106) - 470th Avenue (Sundowner Avenue)	Intersection (Signal)	Short-Term	$1,500,000
3	271st Street (CH 106) - 471st Avenue (Tallgrass Avenue)	Intersection (Signal or RAB)	Short-Term	$1,500,000
5	271st Street (CH 106) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	Short-Term	$1,500,000
8	273rd Street (CH 110, Willow Street) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	Short-Term	$1,500,000
14	272nd Street (CH 106) - 466th Avenue (CH 105)	Safety Improvements	Short-Term	$800,000
15	273rd Street (CH 110) - 472nd Avenue (CH 117, Louise Avenue)	Safety Improvements / Intersection (Signal or RAB)	Short-Term	$1,500,000
16	466th Avenue (CH 105, old SD 17)	Safety Improvements	Short-Term	$350,000
20	466th Avenue (CH 105, old SD 17) - Minnehaha County Border to 273rd Street	Safety Improvements / Corridor Widening	Short-Term	$7,050,000
22	475th Avenue (CH 123, Cliff Avenue) - Sioux Falls to 273rd Street (CH 110, Willow Street)	Corridor Widening	Short-Term	$9,900,000
25	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway) to I-29	Corridor Widening; Tea Agreement	Short-Term	$13,000,000
26	271st Street (CH 106) - I-29 to 472nd Avenue (CH 117, Louise Avenue)	Corridor Widening	Short-Term	$10,500,000
28b	273rd Street (CH 110) - SD 115 to 476th Avenue (Southeastern Avenue)	Corridor Widening	Short-Term	$14,000,000
31	471st Avenue (Tallgrass Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening; 85th Street Interchange	Short-Term	$3,900,000

Index number corresponds to Figures 4-1 and 4-2.

Table 4-10. Medium-Term and Long-Term Prioritized Traffic and Safety Projects

Index	Location	Project Type	Priority*	Cost
4	271st Street (CH 106) - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	Medium-Term	$1,500,000
6	271st Street (CH 106) - 476th Avenue (Southeastern Avenue)	Intersection (Signal or RAB)	Medium-Term	$1,500,000
7	271st Street (CH 106) - SD 11	Intersection (Signal)	Medium-Term	$800,000
9	273rd Street (CH 110) - 476th Avenue (Southeastern Avenue)	Intersection (Signal or RAB)	Medium-Term	$1,500,000
10	273rd Street (CH 110) - SD 11	Intersection (Signal)	Medium-Term	$800,000
11	272nd Street (Prospect Street) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal or RAB)	Long-Term	$1,500,000
12	269th Street (CH 102) - 469th Avenue (CH 111, Ellis Road)	Intersection (Signal or RAB)	Long-Term	$1,500,000
13	272nd Street (CH 106, First Street) - 469th Avenue (CH 111, Heritage Parkway)	Intersection (Signal)	Long-Term	$1,500,000
17	272nd Street - 472nd Avenue (CH 117, Louise Avenue)	Intersection (Signal or RAB)	Long-Term	$1,500,000
18	272nd Street - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	Medium-Term	$1,500,000
19	273rd Street (CH 110) - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	Medium-Term	$1,500,000
21	469th Avenue (CH 111, Ellis Road) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening; Realign Ellis Road at Minnehaha County Border	Medium-Term	$7,400,000
23	269th Street (CH 102) - 466th Avenue (CH 105) to Sioux Falls	Corridor Widening	Long-Term	$6,000,000
24	269th Street (CH 102) - Sioux Falls to 480th Avenue (CH 135)	Corridor Widening	Long-Term	$4,000,000
27	271st Street (CH 106) - 472nd Avenue (CH 117, Louise Avenue) to 480th Avenue (CH 135)	Corridor Widening	Medium-Term	$20,000,000
28a	273rd Street (CH 110) - 469th Avenue (CH 111, Heritage Parkway) to SD 115	Corridor Widening	Medium-Term	$10,000,000
28c	273rd Street (CH 110) - 476th Avenue (Southeastern Avenue) to SD 11	Corridor Widening	Medium-Term	$4,000,000
29	470th Avenue (Sundowner Avenue) - Sioux Falls to 271st Street (CH 106)	Corridor Widening	Medium-Term	$3,000,000
30	470th Avenue (Sundowner Avenue) - 271st Street (CH 106) to 273rd Street (CH 110)	Corridor Widening	Medium-Term	$2,400,000
32	473rd Avenue (Western Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening	Medium-Term	$3,000,000
33	476th Avenue (Southeastern Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening	Medium-Term	$5,700,000

Index number corresponds to Figure 4-1.



Index	Location	Project Type	Priority*
1	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway)	Intersection (Signal)	S
2	271st Street (CH 106) - 470th Avenue (Sundowner Avenue)	Intersection (Signal)	S
3	271st Street (CH 106) - 471st Avenue (Tallgrass Avenue)	Intersection (Signal or RAB)	S
4	271st Street (CH 106) - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	M
5	271st Street (CH 106) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	S
6	271st Street (CH 106) - 476th Avenue (Southeastern Avenue)	Intersection (Signal or RAB)	M
7	271st Street (CH 106) - SD 11	Intersection (Signal)	M
8	273rd Street (CH 110, Willow Street) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	S
9	273rd Street (CH 110) - 476th Avenue (Southeastern Avenue)	Intersection (Signal or RAB)	M
10	273rd Street (CH 110) - SD 11	Intersection (Signal)	M
11	272nd Street (Prospect Street) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal or RAB)	L
12	269th Street (CH 102) - 469th Avenue (CH 111, Ellis Road)	Intersection (Signal or RAB)	L
13	272nd Street (CH 106, First Street) - 469th Avenue (CH 111, Heritage Parkway)	Intersection (Signal)	L
14	272nd Street (CH 106) - 466th Avenue (CH 105)	Safety Improvements	S
15	273rd Street (CH 110) - 472nd Avenue (CH 117, Louise Avenue)	Safety Improvements / Intersection (Signal or RAB)	S
16	466th Avenue (CH 105, old SD 17)	Safety Improvements	S
17	272nd Street - 472nd Avenue (CH 117, Louise Avenue)	Intersection (Signal or RAB)	L
18	272nd Street - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	M
19	273rd Street (CH 110) - 473rd Avenue (Western Avenue)	Intersection (Signal or RAB)	M
20	466th Avenue (CH 105, old SD 17) - Minnehaha County Border to 273rd Street	Safety Improvements / Corridor Widening	S
21	469th Avenue (CH 111, Ellis Road) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening; Realign Ellis Road at Minnehaha County Border	M
22	475th Avenue (CH 123, Cliff Avenue) - Sioux Falls to 273rd Street (CH 110, Willow Street)	Corridor Widening	S
23	269th Street (CH 102) - 466th Avenue (CH 105) to Sioux Falls	Corridor Widening	L
24	269th Street (CH 102) - Sioux Falls to 480th Avenue (CH 135)	Corridor Widening	L
25	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway) to I-29	Corridor Widening; Tea Agreement	S
26	271st Street (CH 106) - I-29 to 472nd Avenue (CH 117, Louise Avenue)	Corridor Widening	S
27	271st Street (CH 106) - 472nd Avenue (CH 117, Louise Avenue) to 480th Avenue (CH 135)	Corridor Widening	M
28a	273rd Street (CH 110) - 469th Avenue (CH 111, Heritage Parkway) to SD 115	Corridor Widening	M
28b	273rd Street (CH 110) - SD 115 to 476th Avenue (Southeastern Avenue)	Corridor Widening	S
28c	273rd Street (CH 110) - 476th Avenue (Southeastern Avenue) to SD 11	Corridor Widening	M
29	470th Avenue (Sundowner Avenue) - Sioux Falls to 271st Street (CH 106)	Corridor Widening	M
30	470th Avenue (Sundowner Avenue) - 271st Street (CH 106) to 273rd Street (CH 110)	Corridor Widening	M
31	471st Avenue (Tallgrass Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening; 85th Street Interchange	S
32	473rd Avenue (Western Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening	M
33	476th Avenue (Southeastern Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening	M

*Priority of the project is identified as Short-Term (S), Mid-Term (M), Long-Term (L)

LINCOLN COUNTY
South Dakota

FIGURE 4-1
TRAFFIC & SAFETY PROJECTS

LEGEND

- Interstate Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Highway 100 (Future)
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other Jurisdiction)

Intersection Project

- Capacity
- Capacity (Township)
- Capacity (State)
- Safety
- Capacity & Safety

Corridor Project

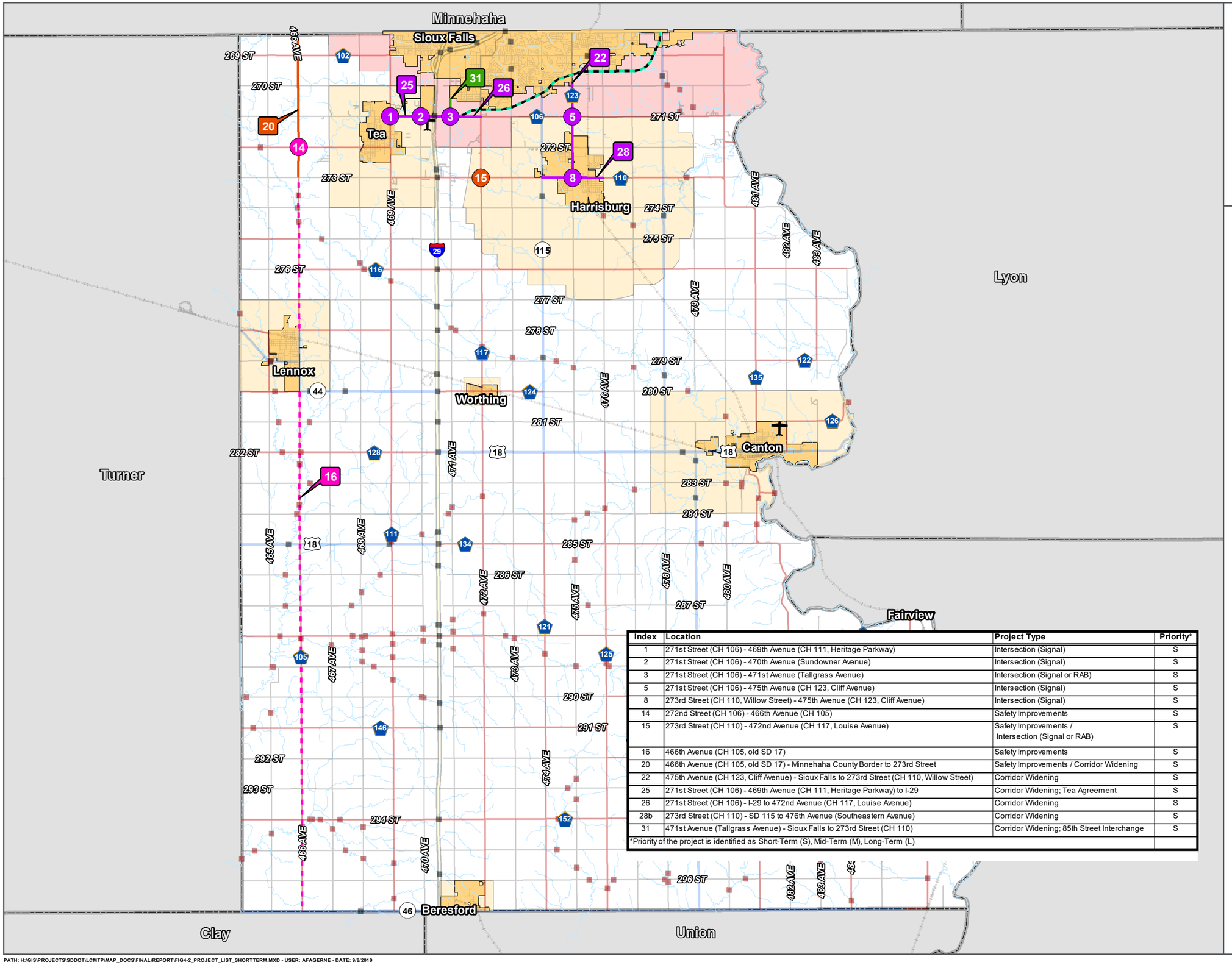
- Capacity
- Capacity (Township)
- Safety
- Capacity & Safety

N

0 1.5 3
MILES

SOURCE: SDDOT

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG4-1_PROJECT_LIST.MXD - USER: AFAGERNE - DATE: 9/9/2019



Index	Location	Project Type	Priority*
1	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway)	Intersection (Signal)	S
2	271st Street (CH 106) - 470th Avenue (Sundowner Avenue)	Intersection (Signal)	S
3	271st Street (CH 106) - 471st Avenue (Tallgrass Avenue)	Intersection (Signal or RAB)	S
5	271st Street (CH 106) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	S
8	273rd Street (CH 110, Willow Street) - 475th Avenue (CH 123, Cliff Avenue)	Intersection (Signal)	S
14	272nd Street (CH 106) - 466th Avenue (CH 105)	Safety Improvements	S
15	273rd Street (CH 110) - 472nd Avenue (CH 117, Louise Avenue)	Safety Improvements / Intersection (Signal or RAB)	S
16	466th Avenue (CH 105, old SD 17)	Safety Improvements	S
20	466th Avenue (CH 105, old SD 17) - Minnehaha County Border to 273rd Street	Safety Improvements / Corridor Widening	S
22	475th Avenue (CH 123, Cliff Avenue) - Sioux Falls to 273rd Street (CH 110, Willow Street)	Corridor Widening	S
25	271st Street (CH 106) - 469th Avenue (CH 111, Heritage Parkway) to I-29	Corridor Widening; Tea Agreement	S
26	271st Street (CH 106) - I-29 to 472nd Avenue (CH 117, Louise Avenue)	Corridor Widening	S
28b	273rd Street (CH 110) - SD 115 to 476th Avenue (Southeastern Avenue)	Corridor Widening	S
31	471st Avenue (Tallgrass Avenue) - Sioux Falls to 273rd Street (CH 110)	Corridor Widening; 85th Street Interchange	S

*Priority of the project is identified as Short-Term (S), Mid-Term (M), Long-Term (L)

LINCOLN COUNTY
South Dakota

FIGURE 4-2
TRAFFIC & SAFETY PROJECTS (SHORT-TERM)

LEGEND

- Interstate Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Highway 100 (Future)
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Bridge / Culvert (County)
- Bridge / Culvert (Other Jurisdiction)

Intersection Project

- Capacity
- Capacity (Township)
- Capacity (State)
- Safety
- Capacity & Safety

Corridor Project

- Capacity
- Capacity (Township)
- Safety
- Capacity & Safety

N

0 1.5 3
MILES

SOURCE: SDDOT

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG4-2_PROJECT_LIST_SHORTTERM.MXD - USER: AFAGERNE - DATE: 9/8/2019

4.2 Bridge Plan

The 2018 Lincoln County Bridge Inspection included 149 structures. The inspection summary identified maintenance, rehabilitation or replacement costs for 78 of the structures, totaling approximately $45.5M. Assuming grants are obtained for the identified projects, the County's contribution was estimated at 20% of the total cost or $9.1M. The 2018 bridge inspection summary is included in Appendix K.

The County's 5-Year Highway and Bridge Improvement Plan addresses 22 of these structures over the 2019-2023 timeframe. The remaining 56 structures would be addressed in the future as funding becomes available.

The 2018 inspection summary includes a "Modified Need" rating, which is a function of the bridge sufficiency rating that has been weighted based upon the type of road facility it carries. The Modified Need was used to prioritize future bridge projects.

Table 4-11 contains a list of prioritized bridge projects and **Figure 4-3** shows the location of the County's Bridge facilities, including bridges identified for future projects. The projects were prioritized as follows:

- The 22 structures that are in the current 5-year plan were prioritized as "Short-Term".
- Bridges that were assigned a replacement cost and had a Modified Need rating that was less than 40 were prioritized as "Medium-Term". This totals 17 structures.
- Bridges that were assigned a replacement cost and had a Modified Need rating that was 40 or greater were prioritized as "Long-Term". This totals 39 structures.

In Table 4-10, the Priority column indicates whether the bridge projects is "Short-Term" (S), "Medium-Term" (M) or "Long-Term" (L). The priority is also color-coded in **Figure 4-3**. Short-Term bridge projects account for $13.0M of the identified improvements. An investment of $18.4M would be needed to address Short-Term needs and repair the remaining bridges that are currently in "Poor" condition.

Existing railroad crossings of County facilities are included in **Table 4-12**. Railroad crossings should be considered for grade separation as future roadway improvements are needed. Grade separation of County railroad crossings was identified as a potential need through stakeholder meetings and public outreach.

Table 4-11. Lincoln County Prioritized Bridge Plan

Bridge Number	Road Facility	Crossing	Location	Sufficiency Rating (2018 Inspection)	Condition (2018 Inspection)	Project Cost (2018 Inspection)	20% Project Cost (2018 Inspection)	Modified Need Rating (2018 Inspection)	Priority	Year Programmed (5-Year Plan)
42-000-095	464th Avenue	Long Creek	0.5N & 2W of Lennox	31	Poor	$605,000	$121,000	29.45	M	
42-000-274	464th Avenue	Blind Creek	7W & 1.6N of Beresford	44.4	Fair	$765,400	$153,080	35.52	M	
42-001-220	290th Street	Long Creek	11S & 1.9W of Lennox	32	Poor	$605,000	$121,000	32	M	
42-007-040	272nd Street	Beaver Creek	3.5W of Tea	43.5	Fair	$559,600	$111,920	34.8	S	2021, 2023
42-010-109	Cleveland Avenue	Long Creek	SW Corner of Lennox	41.5	Fair	$559,600	$111,920	33.2	M	
42-010-225	465th Avenue	Trib. to Vermillion Rvr	11.5S & 1W of Lennox	61.4	Good	$468,800	$93,760	58.33	L	
42-010-265	465TH AVENUE	BLIND CK	6W & 2.5N BERESFORD	N/A	N/A	$0	$0	N/A	N/A	
42-011-210	289th Street	Long Creek	10S & 0.9W of Lennox	36	Poor	$958,600	$191,720	34.2	S	2021
42-012-130	281st Street	Long Creek	2S & 0.8W of Lennox	77.4	Good	$559,600	$111,920	73.53	L	
42-012-210	289th Street	Long Creek	10S & 0.8W of Lennox	21.4	Poor	$958,600	$191,720	20.3	S	2021
42-015-180	286th Street	Long Creek	7S & 0.5W of Lennox	35	Poor	$514,200	$102,840	33.25	M	
42-019-060	274th Street	Beaver Creek	4N & 0.1W of Lennox	42	Fair	$559,600	$111,920	40.38	S	2021, 2023
42-020-144	466th Avenue	Long Creek	2.6N of Jct. US Hwy 18	80.3	Good	$765,400	$153,080	64.24	S	2021
42-020-156	466th Avenue	Long Creek	1.3N of Jct US Hwy 18	82.6	Good	$765,400	$153,080	66.08	S	2021
42-020-201	466th Avenue	Saddle Creek	3.2S of Jct. US Hwy 18	83.7	Good	$350,000	$70,000	66.95	S	2023
42-020-264	466th Avenue	Blind Creek	2.7N of Jct. SD Hwy 46	92.7	Good	$185,000	$37,000	74.16	S	2021
42-023-130	281st Street	Long Creek	2S & 0.3E of Lennox	40	Fair	$559,600	$111,920	38	M	
42-030-203	467th Avenue	Saddle Creek	1E & 9.3S of Lennox	47.6	Fair	$844,600	$168,920	45.22	S	2019, 2021
42-034-270	295th Street	Tributary to Blind Creek	2N & 3.6W of Beresford	40	Fair	$491,000	$98,200	38	M	
42-036-190	287th Street	Snake Creek	8S & 1.6E of Lennox	33.9	Poor	$457,200	$91,440	32.21	S	2019
42-040-078	468th Avenue	Beaver Creek	2.2N & 2E of Lennox	54.5	Fair	$434,000	$86,800	51.78	L	
42-040-187	468th Avenue	Snake Creek	7.7S & 2E of Lennox	52.1	Fair	$468,800	$93,760	49.5	L	
42-040-205	468th Avenue	Trib. to Saddle Creek	9.5S & 2E of Lennox	76.7	Good	$445,600	$89,120	72.87	L	
42-040-208	468th Avenue	Haram Creek	9.8S & 2E of Lennox	88.4	Good	$514,200	$102,840	83.98	L	
42-040-273	468th Avenue	Tributary to Blind Creek	3W & 1.7N of Beresford	69.6	Good	$468,800	$93,760	66.12	L	
42-043-210	289th Street	Haram Creek	10S & 2.3E of Lennox	77.4	Good	$559,600	$111,920	77.4	L	
42-046-180	286th Street	Snake Creek	7S & 2.6E of Lennox	33	Poor	$559,600	$111,920	31.35	S	2019
42-050-084	469th Avenue	Beaver Creek	1.6N & 3E of Lennox	77.7	Good	$514,200	$102,840	62.16	L	

Table 4-11. Lincoln County Prioritized Bridge Plan

Bridge Number	Road Facility	Crossing	Location	Sufficiency Rating (2018 Inspection)	Condition (2018 Inspection)	Project Cost (2018 Inspection)	20% Project Cost (2018 Inspection)	Modified Need Rating (2018 Inspection)	Priority	Year Programmed (5-Year Plan)
42-050-202	469th Avenue	Trib. to Saddle Creek	9.2S & 3E of Lennox	47.5	Fair	$559,600	$111,920	38	S	2019
42-050-287	469th Avenue	Tributary to Ash Creek	2W & 0.3N of Beresford	47.3	Fair	$434,000	$86,800	37.84	M	
42-060-168	470th Avenue	Snake Creek	5.8S & 4E of Lennox	63.4	Good	$468,800	$93,760	60.23	L	
42-060-201	470th Avenue	Trib. to Saddle Creek	9.1S & 4E of Lennox	76.4	Good	$559,600	$111,920	72.58	L	
42-068-160	284th Street	Snake Creek	4S & 1.2W of Worthing	77.4	Good	$434,000	$86,800	77.4	L	
42-070-098	471st Avenue	Beaver Creek	2.2N & 1W of Worthing	75.5	Good	$559,600	$111,920	71.73	L	
42-070-158	471st Avenue	Snake Creek	3.8S & 1W of Worthing	68.5	Good	$514,200	$102,840	65.08	L	
42-070-195	471st Avenue	Saddle Creek	1W & 7.5S of Worthing	36	Poor	$468,800	$93,760	34.2	M	
42-070-204	471st Avenue	Trib. to Saddle Creek	1W & 8.4S of Worthing	66.4	Good	$514,200	$102,840	63.08	L	
42-071-100	278th Street	Beaver Creek	2N & 0.9W of Worthing	77.4	Good	$559,600	$111,920	73.53	L	
42-080-052	472nd Avenue	Nine Mile Creek	0.2S & 3W of Harrisburg	39.9	Poor	$559,600	$111,920	31.92	S	2019
42-080-107	472nd Avenue	Beaver Creek	1.5N of Worthing	37.9	Poor	$765,400	$153,080	30.32	S	2019
42-080-193	472nd Avenue	Saddle Creek	7.3S of Worthing	65.2	Good	$1,221,400	$244,280	52.16	L	
42-107-250	293rd Street	Trib. to W Brule Creek	4N & 2.7E of Beresford	63.4	Good	$366,400	$73,280	60.23	L	
42-110-162	475th Avenue	S Fork of Beaver Creek	2.2S & 5W of Canton	N/A	N/A	$0	$0	N/A	N/A	
42-110-175	475th Avenue	Trib to S Fork Beaver Ck	3E & 5.5S of Worthing	N/A	N/A	$0	$0	N/A	N/A	
42-110-247	475th Avenue	Trib. to W Brule Creek	3E & 4.3N of Beresford	80.5	Good	$559,600	$111,920	76.48	L	
42-110-253	475th Avenue	West Brule Creek	3E & 3.7N of Beresford	34	Poor	$491,000	$98,200	32.3	M	
42-110-276	475th Avenue	West Brule Creek	3E & 1.4N of Beresford	60.7	Good	$514,200	$102,840	57.67	L	
42-113-060	274th Street	Nine Mile Creek	1S & 0.3E of Harrisburg	83.4	Good	$605,000	$121,000	79.23	L	
42-114-190	287th Street	S Fork of Beaver Creek	7S & 3.4E of Worthing	77.4	Good	$605,000	$121,000	73.53	L	
42-120-062	476th Avenue	Nine Mile Creek	1.2S of Harrisburg	47.6	Fair	$514,200	$102,840	45.22	L	
42-120-158	476th Avenue	S Fork of Beaver Creek	1.8S & 4W of Canton	69	Good	$844,600	$168,920	55.2	L	
42-120-283	476th Avenue	Trib. to W Brule Creek	4E & 0.7N of Beresford	47.5	Fair	$559,600	$111,920	38	S	2020, 2022
42-122-280	296th Street	Trib. to W Brule Creek	1N & 4.2E of Beresford	58.4	Fair	$559,600	$111,920	55.48	L	
42-130-113	477th Avenue	Beaver Creek	3W & 2.7N of Canton	46	Fair	$1,221,400	$244,280	43.7	L	
42-130-152	477th Avenue	S Fork of Beaver Creek	3W & 1.2S of Canton	47	Fair	$491,000	$98,200	44.65	L	
42-130-222	477th Avenue	Saddle Creek	3W & 8.2S of Canton	58.6	Fair	$559,600	$111,920	55.67	L	
42-140-278	478th Avenue	Trib. to E Brule Creek	6E & 1.2N of Beresford	43.1	Fair	$514,200	$102,840	40.95	L	

Table 4-11. Lincoln County Prioritized Bridge Plan

Bridge Number	Road Facility	Crossing	Location	Sufficiency Rating (2018 Inspection)	Condition (2018 Inspection)	Project Cost (2018 Inspection)	20% Project Cost (2018 Inspection)	Modified Need Rating (2018 Inspection)	Priority	Year Programmed (5-Year Plan)
42-142-260	294th Street	Trib. to E Brule Creek	0.8W of Norway Center	62.3	Good	$1,084,200	$216,840	49.84	L	
42-144-270	295th Street	Trib. to E Brule Creek	2N & 6.4E of Beresford	37	Poor	$559,600	$111,920	35.15	S	2020, 2022
42-147-120	280th Street	Beaver Creek	2N & 1.2W of Canton	36	Poor	$639,800	$127,960	34.2	M	
42-148-050	273rd Street	Nine Mile Creek	3.3E of Harrisburg	32.7	Poor	$1,004,000	$200,800	26.16	S	2019, 2022
42-160-215	480th Avenue	Pattee Creek	6W & 2.5S of Fairview	39	Poor	$559,600	$111,920	37.05	M	
42-160-227	480th Avenue	East Brule Creek	6W & 3.7S of Fairview	46.7	Fair	$468,800	$93,760	44.37	L	
42-160-284	480th Avenue	East Brule Creek	8E & 0.6N of Beresford	59.4	Fair	$605,000	$121,000	56.43	L	
42-165-280	296th Street	East Brule Creek	1N & 8.5E of Beresford	36	Poor	$559,600	$111,920	36	M	
42-168-270	295th Street	East Brule Creek	2N & 8.8E of Beresford	88.4	Good	$605,000	$121,000	83.98	L	
42-170-155	481st Avenue	Beaver Creek	1.6S of Canton	85.1	Good	$1,084,200	$216,840	68.08	L	
42-170-234	481st Avenue	East Brule Creek	5W & 4.4S of Fairview	40	Fair	$514,200	$102,840	38	M	
42-175-153	283rd Street	Big Sioux River	1.6S & 0.6E of Canton	89.6	Good	$314,226	$62,845	85.12	S	2019
42-180-069	482nd Avenue	Trib. to Big Sioux River	1E & 7.1N of Canton	16.2	Poor	$491,000	$98,200	15.39	M	
42-180-223	482nd Avenue	Trib. to Pattee Creek	4W & 2.8S of Fairview	43.9	Fair	$468,800	$93,760	35.12	S	2019
42-186-250	293rd Street	Trib. to Pattee Creek	4N & 10.6E of Beresford	66.4	Good	$434,000	$86,800	63.08	L	
42-190-223	483rd Avenue	Trib. to Pattee Creek	8.3S & 2E of Canton	72.4	Good	$605,000	$121,000	68.78	L	
42-190-249	483rd Avenue	Trib. to Pattee Creek	11E & 4.1N of Beresford	39.6	Poor	$468,800	$93,760	37.62	S	2020
42-190-274	483rd Avenue	Trib. to Finnie Creek	4.5W & 1.4S of Hudson	58.6	Fair	$468,800	$93,760	55.67	L	
42-190-286	483rd Avenue	Trib. to Finnie Creek	4.5W & 2.6S of Hudson	61.4	Good	$605,000	$121,000	58.33	L	
42-200-125	281ST STREET	BIG SIOUX RV	3E & 1.5N CANTON	N/A	N/A	$0	$0	N/A	N/A	
42-200-226	484th Avenue	Trib. to Pattee Creek	3W & 3.6N of Hudson	35.9	Poor	$468,800	$93,760	32.31	S	2020
42-200-249	484th Avenue	Trib. to Pattee Creek	3.5W & 1.1N of Hudson	40	Fair	$514,200	$102,840	36	M	
42-200-287	484th Avenue	Trib. to Finnie Creek	3.5W & 2.7S of Hudson	82.3	Good	$605,000	$121,000	65.84	L	
42-214-250	293rd Street	Pattee Creek	1N & 2.1W of Hudson	38	Poor	$514,200	$102,840	36.1	M	
42-244-255	294th Street	Big Sioux River	State Line east of Hudson	99.3	Good	$319,176	$63,836	79.44	S	2019

Table 4-12. Existing At-Grade Railroad Crossings

Roadway Facility	Municipal Growth Area	Railroad
271st Street (CR 106)	Sioux Falls / Harrisburg	Burlington Northern Santa Fe (BNSF)
273rd Street (CR 110)	Harrisburg	Burlington Northern Santa Fe (BNSF)
276th Street (CR 116)	Harrisburg	Burlington Northern Santa Fe (BNSF)
Harris Street (CR 152)	Hudson	Dakota and Iowa (D&I)
1st Street (CH 124)	Worthing	Burlington Northern Santa Fe (BNSF)
472nd Avenue (CH 117)	Worthing	Burlington Northern Santa Fe (BNSF)
469th Avenue (CH 111)	N/A	Burlington Northern Santa Fe (BNSF)

LINCOLN COUNTY
South Dakota

FIGURE 4-3
LINCOLN COUNTY PRIORITIZED BRIDGE PLAN

LEGEND

- Interstate Highway
- State Highway
- County Road
- Township Road
- Urban Road
- Highway 100 (Future)
- Rivers/Streams
- Railroad
- City
- Sioux Falls Joint Jurisdiction
- Municipal Growth Boundary
- Existing Railroad Crossing
- Airport

Bridge / Culvert

- Bridge / Culvert - Good Condition
- Bridge / Culvert - Fair Condition
- Bridge / Culvert - Poor Condition
- Bridge / Culvert (Other)

Project Priority

- Short-Term
- Medium-Term
- Long-Term
- Undetermined

N

0 1.5 3
MILES

SOURCE: SDDOT

NOTE:
Bridge Condition rating is adapted from Lincoln County 2018 Bridge Inspection

PATH: H:\GIS\PROJECTS\SDDOT\LCMTP\MAP_DOCS\FINAL\REPORT\FIG4-3_BRIDGE_PLAN.MXD - USER: AFAGERNE - DATE: 9/8/2019

4.3 Pavement Maintenance Plan

As previously indicated, the County has a significant funding commitment to maintain existing surfacing on County facilities. Initial estimates of the annual cost for the County to maintain the existing road network at a level equal to the current condition (average PCI of 70) ranged from $4.5M / year to $6.4M / year. As the actual budget and rehabilitation costs were refined, this range was updated to $1.5M / year to $4.6M / year.

This range in annual budget expenditure was developed from 3 life cycle cost estimates as follows:

- Network Value – this is simple annual budget estimate computed by taking the total value of Lincoln County's roadway network, estimated at $229M, and dividing that by the ultimate life of a roadway. The estimated annual budget using this methodology is approximately $4.57M.
- Average Condition by Pavement Type - a second method to validate the annual budget is to identify the average PCI by pavement type and the associated rehabilitation requirements. We then estimate the number of miles required to be rehabilitated each year based on a typical life cycle for that rehabilitation activity. Based on this estimate the County needs to spend approximately $1.88M/year to maintain the current condition average for the roadway network.
- Total Deficit - the third methodology to confirm the required amount of annual funding is to identify the current roadway deficiency and then divide by the typical life cycle of each rehabilitation activity. This is referred to as the Fix All Estimate and Life Cycle Cost. For Lincoln County, the Fix All Estimate is approximately $26.1 Million and the Life Cycle Cost is $1.54M/year.

Figure 4-4 and **Figure 4-5** illustrate the effects of the budget / funding level on the network average PCI. The blue line represents all of the analysis results that were run in an effort to establish the relationship between Post Rehab PCI and the annual investment. The $2.1M budget is called "Steady State PCI" as it represents the budget required to maintain the current network average PCI at a 69. The "PCI Control Budget" focuses on keeping the network average PCI above a minimum PCI value of 65. The current Lincoln County funding level is $3.1M / year which would result in a PCI of 77 after the first 5 years of implementation. The full pavement condition analysis can be found in Appendix E.

Table 4-13 includes a list of surfacing maintenance projects identified for implementation into the 5-year plan. These projects were identified through the pavement condition analysis and associated optimization based on the current funding level of $3.1M / year.

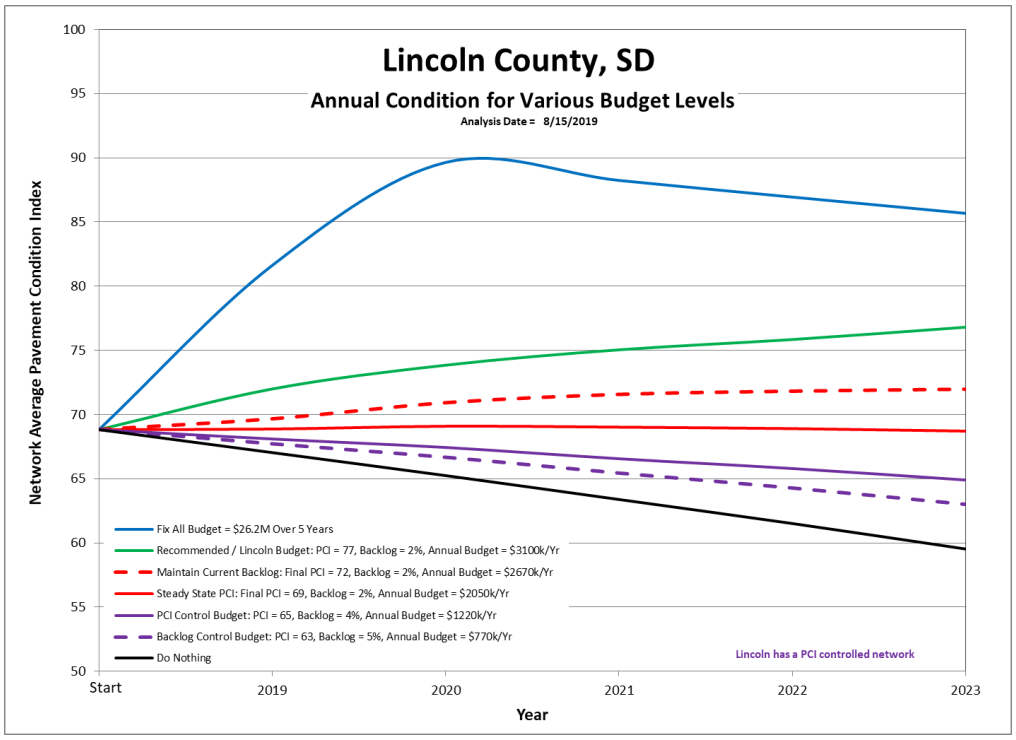


Figure 4-4. Network Pavement Condition Index for Various Budget Levels

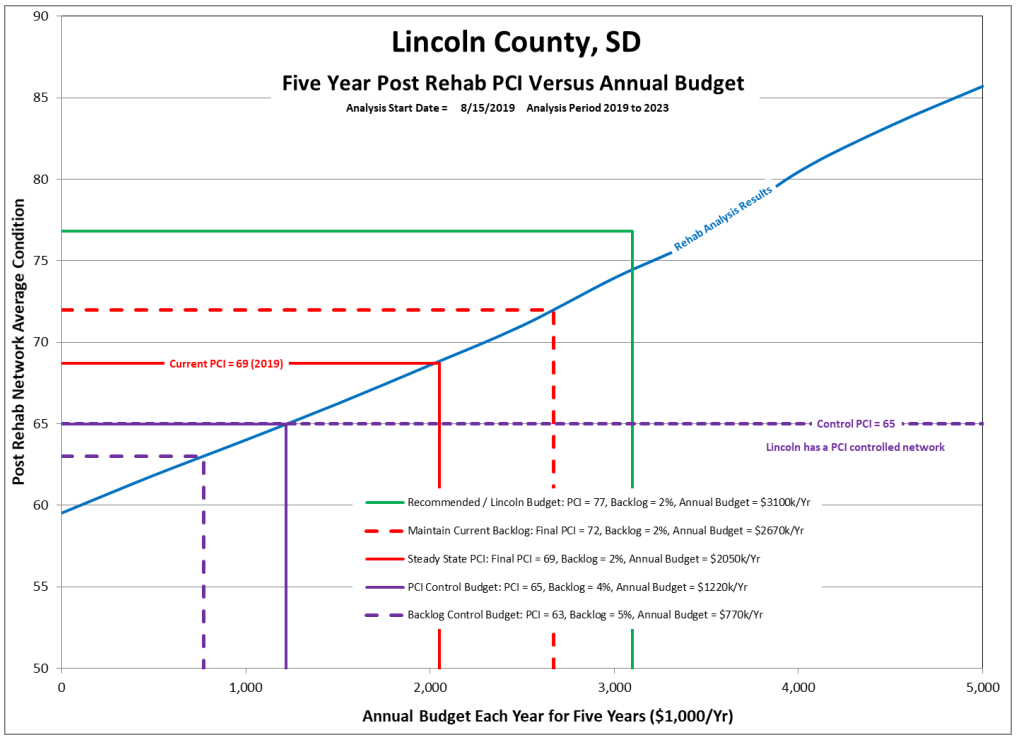


Figure 4-5. Post Rehabilitation Network Pavement Condition Index

Table 4-13. Surfacing Maintenance Projects Identified through the Pavement Condition Analysis

Rehabilitation Year	Street	From Street	To Street	Rehabilitation Activity	Length (ft)	Length (mi)	Cost
1	272 ST	480 AVE	COUNTY BOUNDARY	Edge Mill + Thin Overlay (1.5 - 2.0)	2038	0.39	$41,225
1	274 ST	DS@3696E 274/480 TRANSITION TURN	481/274 TRANSITION TURN	Edge Mill + Thin Overlay (1.5 - 2.0)	4236	0.80	$86,720
1	480 AVE	274/480 TRANSITION TURN	274 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	729	0.14	$16,150
1	481 AVE	274 ST	481/274 TRANSITION TURN	Edge Mill + Thin Overlay (1.5 - 2.0)	1351	0.26	$30,779
1	285 ST	DS@2640E 481/285 TRANSITION TURN	482/285 TRANSITION TURN	Chip Seal	4180	0.79	$23,912
1	481 AVE	285 ST	481/285 TRANSITION TURN	Chip Seal	676	0.13	$4,117
1	482 AVE	482/285 TRANSITION TURN	285 ST	Chip Seal	7698	1.46	$43,749
1	292 ST	DS@4752E 481 AVE	482 AVE	Chip Seal	31519	5.97	$181,122
1	293 ST	487 AVE	HUDSON AVE	Chip Seal	7349	1.39	$44,124
1	486 AVE	293 ST	486/293 TRANSITION TURN	Chip Seal	661	0.13	$3,866
1	9TH ST	HARRIS ST	HUDSON AVE	Chip Seal	734	0.14	$4,291
1	HUDSON AVE	9TH ST	293 ST	Chip Seal	2517	0.48	$14,106
1	294 ST	486 AVE	294/486 TRANSITION TURN	Chip Seal	25188	4.77	$150,282
1	486 AVE	486/294 TRANSITION TURN	294 ST	Chip Seal	5574	1.06	$32,421
1	294 ST	DS@4752E 478 AVE	SD HWY 11	Chip Seal	12568	2.38	$74,640
1	469 AVE	DS@4752N 288 ST	287 ST	Chip Seal	63481	12.02	$351,444
1	480 AVE	EXISTING PAVEMENT CHNG	RIVERSIDE PL	Edge Mill + Thin Overlay (1.5 - 2.0)	27354	5.18	$578,521
1	481 AVE	283 ST	CEDAR ST	Chip Seal	13640	2.58	$78,858
1	CEDAR ST	481 AVE	12TH ST	Chip Seal	2633	0.50	$21,817
1	481 AVE	DS@4752N 281 ST	280 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5295	1.00	$116,773
1	DAKOTA ST	PARK LN	481 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	1596	0.30	$29,215
1	481 AVE	DS@4752N 277 ST	276 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	25383	4.81	$552,570
1	482 AVE	UNKNOWN	288 ST	Chip Seal	10546	2.00	$62,941
1	481 AVE	DS@4752N 276 ST	275 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5299	1.00	$112,295
1	482 AVE	DS@528N UNKNOWN	DS@1056N UNKNOWN	Chip Seal	30149	5.71	$179,690
1	486 AVE	288 ST	MAPLE ST	Chip Seal	28534	5.40	$162,060
1	CLIFF AVE	270 ST	MEDIAN BREAK	FWM + Thick Overlay (> 2.0 - 3.0) + Strctrl Ptch	1487	0.28	$100,926
				SUBTOTAL	***322415***	***61.06***	***$3,098,614***
2	271 ST	DS@4752E 471 AVE	472 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	11209	2.12	$139,651

Table 4-13. Surfacing Maintenance Projects Identified through the Pavement Condition Analysis

Rehabilitation Year	Street	From Street	To Street	Rehabilitation Activity	Length (ft)	Length (mi)	Cost
2	273 ST	DS@4752E 477 AVE	SD HWY 11	Edge Mill + Thin Overlay (1.5 - 2.0)	5283	1.00	$111,946
2	276 ST	DS@4752E 472 AVE	473 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	26197	4.96	$456,463
2	285 ST	DS@4224E 477 AVE	DS@4752E 477 AVE	Chip Seal + Strctrl Ptch	6864	1.30	$93,691
2	288 ST	DS@4752E 478 AVE	SD HWY 11	Edge Mill + Thin Overlay (1.5 - 2.0)	8880	1.68	$252,599
2	291 ST	DS@4752E 467 AVE	468 AVE	Chip Seal + Strctrl Ptch	24317	4.61	$261,038
2	294 ST	DS@4752E 484 AVE	485 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	36697	6.95	$554,564
2	466 AVE	DS@2112S SD HWY 17	DS@2640S SD HWY 17	Surry Seal / Preventive Maintenance	22727	4.30	$134,482
2	469 AVE	S ELLIS RD	COUNTY BOUNDARY	Edge Mill + Thin Overlay (1.5 - 2.0)	12505	2.37	$160,372
2	S ELLIS RD	W 65TH ST	469 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	3443	0.65	$82,391
2	469 AVE	DS@4752N 270 ST	269 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5297	1.00	$130,795
2	472 AVE	DS@4752N 275 ST	274 ST	Chip Seal	31736	6.01	$477,655
2	476 AVE	DS@4752N 296 ST	295 ST	Surry Seal / Preventive Maintenance	5292	1.00	$3,358
2	484 AVE	DS@4752N 296 ST	295 ST	Surry Seal / Preventive Maintenance	5284	1.00	$3,503
2	4TH ST	BARTLETT ST	HARRIS ST	Edge Mill + Thin Overlay (1.5 - 2.0)	1942	0.37	$60,156
2	PARKWAY	5TH ST	294 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	71	0.01	$1,777
2	CLIFF AVE	DS@4752N 271 ST	270 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5268	1.00	$119,604
2	HARRIS ST	2ND ST	1ST ST	Edge Mill + Thin Overlay (1.5 - 2.0)	2641	0.50	$55,353
				SUBTOTAL	***215653***	***40.84***	***$3,099,398***
3	269 ST	DS@10032E E 69TH ST	480 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	10614	2.01	$230,520
3	271 ST	DS@2640E SYCAMORE AVE	DS@3168E SYCAMORE AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	18784	3.56	$413,068
3	273 ST	ANNA WAY	476 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	14617	2.77	$324,600
3	WILLOW ST	IVY LN	ANNA WAY	Edge Mill + Thin Overlay (1.5 - 2.0)	3133	0.59	$69,249
3	276 ST	DS@4752E SD HWY 115	475 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	15890	3.01	$348,407
3	278 ST	DS@4224E 466 AVE	DS@4752E 466 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	4752	0.90	$98,670
3	285 ST	DS@528E 480 AVE	DS@1056E 480 AVE	FWM + Thick Overlay (> 2.0 - 3.0)	2052	0.39	$83,045
3	288 ST	DS@4752E SD HWY 11	480 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	18504	3.50	$674,368
3	294 ST	DS@2112E SD HWY 11	DS@2640E SD HWY 11	Edge Mill + Thin Overlay (1.5 - 2.0)	2640	0.50	$62,050
3	486 AVE	295 ST	295 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5297	1.00	$120,139

Table 4-13. Surfacing Maintenance Projects Identified through the Pavement Condition Analysis

Rehabilitation Year	Street	From Street	To Street	Rehabilitation Activity	Length (ft)	Length (mi)	Cost
3	466 AVE	DS@4752N 292 ST	291 ST	Chip Seal	5278	1.00	$35,106
3	469 AVE	DS@4752N SD HWY 44	279 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5294	1.00	$126,990
3	472 AVE	DS@4752N 290 ST	289 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	10575	2.00	$257,729
3	475 AVE	DS@4752N PROSPECT ST	271 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	8324	1.58	$195,265
3	CLIFF AVE	KENT ST	PROSPECT ST	Edge Mill + Thin Overlay (1.5 - 2.0)	2264	0.43	$50,637
3	476 AVE	DS@4752N 286 ST	285 ST	Surry Seal / Preventive Maintenance	15831	3.00	$9,640
				SUBTOTAL	***143849***	***27.24***	***$3,099,483***
4	271 ST	CLIFF AVE	DS@528E CLIFF AVE	FWM + Thick Overlay (> 2.0 - 3.0)	3124	0.59	$163,709
4	273 ST	I 29 N1	IRONWORKS AVE	FWM + Thick Overlay (> 2.0 - 3.0)	1584	0.30	$70,308
4	275 ST	DS@4752E COUNTY BOUNDARY	465 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	4999	0.95	$108,460
4	276 ST	DS@4752E 480 AVE	481 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	10520	1.99	$226,415
4	282 ST	DS@4752E 469 AVE	470 AVE	Chip Seal + Strctrl Ptch	10583	2.00	$73,960
4	283 ST	481 AVE	COUNTY BOUNDARY	FWM + Thick Overlay (> 2.0 - 3.0)	2408	0.46	$116,263
4	285 ST	481 AVE	481/285 TRANSITION TURN	FWM + Thick Overlay (> 2.0 - 3.0)	13633	2.58	$924,108
4	481 AVE	285 ST	481/285 TRANSITION TURN	FWM + Thick Overlay (> 2.0 - 3.0)	579	0.11	$27,897
4	288 ST	DS@3168E 483 AVE	DS@3696E 483 AVE	FWM + Thick Overlay (> 2.0 - 3.0)	21633	4.10	$824,176
4	294 ST	I 29 S1	I 29 N2	Edge Mill + Thin Overlay (1.5 - 2.0)	18549	3.51	$448,759
4	WILLOW ST	SHEBAL AVE	273 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5283	1.00	$115,413
				SUBTOTAL	***92895***	***17.59***	***$3,099,468***
5	472 AVE	DS@3696N 281 ST	LOUISE AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	4064	0.77	$97,368
5	LOUISE AVE	2ND ST	1ST ST	Edge Mill + Thin Overlay (1.5 - 2.0)	1200	0.23	$29,717
5	271 ST	DS@4752E CLIFF AVE	SOUTHEASTERN AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	4768	0.90	$103,581
5	272 ST	468 AVE	FIRST ST	Edge Mill + Thin Overlay (1.5 - 2.0)	261	0.05	$5,950
5	469 AVE	DS@2112N BLUE SPRUCE ST	DS@2640N BLUE SPRUCE ST	Edge Mill + Thin Overlay (1.5 - 2.0)	3629	0.69	$91,018
5	273 ST	DS@4752E 476 AVE	477 AVE	FWM + Thick Overlay (> 2.0 - 3.0)	11978	2.27	$370,110
5	275 ST	DS@4752E 465 AVE	466 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	5276	1.00	$112,294
5	276 ST	DS@4752E 471 AVE	472 AVE	Edge Mill + Thin Overlay (1.5 - 2.0)	6599	1.25	$140,846

Table 4-13. Surfacing Maintenance Projects Identified through the Pavement Condition Analysis

Rehabilitation Year	Street	From Street	To Street	Rehabilitation Activity	Length (ft)	Length (mi)	Cost
5	285 ST	DS@1584E 478 AVE	DS@2112E 478 AVE	Surf Recon + Base Rehab / FWM + Strctrl Ptch + Olay	8293	1.57	$659,734
5	288 ST	DS@4752E 485 AVE	486 AVE	FWM + Thick Overlay (> 2.0 - 3.0)	14785	2.80	$618,243
5	465 AVE	SD HWY 44	4TH AVE	FWM + Thick Overlay (> 2.0 - 3.0)	3221	0.61	$127,860
5	466 AVE	DS@4752N 274 ST	273 ST	Chip Seal	10582	2.00	$66,135
5	472 AVE	DS@4752N 288 ST	287 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	20594	3.90	$502,607
5	486 AVE	DS@4224N 486/297 TRANSITION TURN	296 ST	Edge Mill + Thin Overlay (1.5 - 2.0)	5616	1.06	$123,387
				SUBTOTAL	***100866***	***19.10***	***$3,048,850***

5 Public Outreach Summary

Public outreach for the Transportation Plan included an initial round of public meetings and stakeholder meetings held in Harrisburg and Canton. An online travel survey coincided with these initial meetings. A second public meeting was conducted in Harrisburg after a substantial amount of study material had been developed forming the basis of the plan. A website was also available for people to review study materials and submit comments. A summary of the outreach events is included in **Table 5-1**.

Table 5-1. Public Outreach Events

Item	Location	Timeframe
Study Website	http://lincolncountytransportationplan.com/	December 2018 – November 2019
Online Travel Survey	(accessed from website)	December 2018 – January 2019
Stakeholder Meetings 1A	Harrisburg, SD	December 12, 2018
Public Meeting 1A	Harrisburg, SD	December 12, 2018
Stakeholder Meetings 1B	Canton, SD	December 13, 2018
Public Meeting 1B	Canton, SD	December 13, 2018
Stakeholder Meetings 2	Harrisburg, SD	July 8, 2019
Public Meeting 2	Harrisburg, SD	July 8, 2019
Presentation at Commission Meeting	Canton, SD	July 9, 2019
Presentation at MPO Meetings	Sioux Falls, SD	September 18 & 19, 2019

5.1 Public Meeting and Stakeholder Meetings

Public Outreach Meetings were conducted on December 12 and 13, 2018. The purpose of these initial meetings was to announce the study and gather feedback from the public related to known or perceived transportation needs. Two sets of meetings were conducted to provide a convenient forum for people living in the northern and southern parts of the County. Stakeholders from these areas were invited to attend group meetings during the day and a public meeting was held in the evening for the general public. Stakeholders included local School Districts, Townships and Municipalities.

A second round of Stakeholder Meetings and a Public Meeting were conducted on July 8, 2019. The purpose of the meetings was to present study findings and gather feedback from the public related to transportation needs. These meetings were held in Harrisburg, South Dakota with a similar presentation at the Lincoln County Commission Meeting occurring the next day (July 9, 2019). Stakeholders were invited to attend group meetings during the day and a public meeting was held in the evening for the general public. Stakeholders included local Townships and Municipalities. A detailed summary of the public and stakeholder meetings can be found in Appendix L.

5.2 Website Comments and Online Travel Survey

A website was established for the study that would allow sharing of study documents and also provide an opportunity for people to submit comments. An Online Travel Survey was available from the study website during December 2018 and January 2019. There were approximately 20 multiple choice and open ended questions that participants could answer. Responses were very diverse and are included in Appendix L along with comments submitted through the website.

5.3 Summary of Meeting Comments

There were a variety of comments and broad discussion items that developed from the Public Outreach efforts conducted as part of the study. It was clear that the northern part of the County is experiencing rapid growth and the transportation network is struggling to keep up with demands. Growth in and around Harrisburg was an important topic along with the need for multi-modal facilities and road capacity improvements. The southern part of the County is experiencing agricultural growth which is putting stress on low volume township roads and bridges. Many township bridges throughout the County are in poor condition and limit opportunities for agricultural hauling and sometimes access.

Additional themes identified from Stakeholder discussions include the following:

- Improvements needed on County and Township roads in order to keep up with development and growth.
- Impact and timing of Highway 100 completion.
- Maintenance needed on township roads due to increasing traffic, increasing levels of heavy agricultural equipment and changing drainage patterns.
- Bridge deficiencies on low volume roads.
- Need for connected bicycle and pedestrian facilities within and between municipalities.
- Capacity needs for the 271st Street corridor, Cliff Avenue corridor, Willow Street corridor
- Capacity needs for the intersections of Cliff Avenue / Willow Street and Cliff Avenue / Industrial Boulevard.
- New schools expected to put additional stress on existing transportation facilities.
- Consideration of jurisdictional transfers of road corridors to address urbanization and increasing traffic levels.

6 Conclusions and Recommendations

Lincoln County faces a number of challenges including rapid growth and development of Sioux Falls, Tea and Harrisburg placing stress on existing infrastructure in the northern part of the County, as well as challenges of maintaining existing infrastructure important to the agricultural economy and local communities to the south. The Lincoln County Master Transportation Plan provides a framework for managing County transportation facilities through the 2045 planning horizon.

A Major Road Plan has been developed providing a road classification system unique to the County's needs. The road plan provides guidance for design standards, access considerations, traffic analysis and traffic studies. This information will help the County plan for the future, proactively address development and growth around population centers, address infrastructure needs to maintain a connected network and prioritize network components important for the agricultural economy.

The Bicycle and Pedestrian Plan provides guidance on future projects and opportunities to provide a connected multi-modal network throughout the County. This plan reflects an opportunistic approach, where the County is positioned to pursue outside funding sources, incorporate multi-modal accommodations in future reconstruction projects, and partner with local agencies to tie into existing facilities while linking communities together.

The County's existing road network has been evaluated from an operational perspective under current and projected traffic levels. A crash history review provides insight into locations where safety issues may be occurring. A list of projects has been developed in order to address traffic capacity and safety needs. An investment of $149M is anticipated to address traffic and safety needs identified at the time of this study with $69M needed to address short-term, higher priority needs.

The condition of the existing road network and bridge structures has been evaluated and recommendations have been provided to assist the County in maintaining their investment in existing infrastructure. The County's historic investment of funding for transportation items has resulted in adequate road surface conditions. However, needs related to bridge improvements have been accumulating. An estimated $45M in bridge needs have been identified with $18M needed to address bridges currently in poor condition. Unfortunately, many of the bridges in need of improvement are located on township roads with low traffic volumes. Since traffic volume is often factored into grant opportunities, it is unlikely there will be grant funding available for many of the bridge needs.

Heading into the future, it will be important to continue partnering with municipal and township governments to proactively plan for and address development and growth throughout the community, whether it is urban city expansion or new large-scale agricultural facilities. This Master Transportation Plan provides a framework for the County and partnering agencies to approach issues such as roadway jurisdiction, access, design, and funding while addressing growth and changing transportation needs.

General recommendations for implementation of the Lincoln County Master Transportation Plan include:

- Maintain and preserve existing transportation facilities
    - Continue to focus efforts on maintaining the County's roads and bridges in a systematic and sustainable manner
    - The cost to repair infrastructure after it has deteriorated beyond the point which it can be rehabilitated, is typically greater than the cost to maintain it.
- Prioritize projects in order to address the greatest needs and maximize system benefits
- Identify and evaluate funding opportunities
    - Continue to leverage the Bridge Improvement Grant program
    - Leverage the recently implemented wheel tax increase
    - Continue to evaluate an Opt Out of Property Tax limitations in order to generate more funds for transportation projects
    - Present an annual recap of benefits provided through additional funding to the public
- Proactively partner with municipalities and townships to address multi-modal infrastructure needs due to development and growth
- Carefully consider identified standards for access, design and traffic impact studies when new development is proposed
    - The County has a great opportunity to guide and manage impacts to the transportation system while planning for the future
- Continue to seek input from the public and stakeholders as priorities and perspectives change over time

Appendix A. Crash History Review

Appendix B. Traffic Forecasts Technical Memorandum

Appendix C. 2018 Existing Conditions and 2045 No-Build Conditions Traffic Operations Technical Memorandum

Appendix D. Highway Segment Capacity Needs Technical Memorandum

Appendix E. Pavement Condition Evaluation

Appendix F. Major Roads Plan Technical Memorandum

Appendix G. Traffic Impact Study Guidance Technical Memorandum

Appendix H. Jurisdictional Transfer Guidance Technical Memorandum

Appendix I. Bicycle and Pedestrian Plan Technical Memorandum

Appendix J. Build Alternatives Technical Memorandum

Appendix K. Long Term Bridge Plan Technical Memorandum

Appendix L. Public Outreach Documentation