

Technical Memorandum #1 – Existing Conditions

To: Dan Farnsworth
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From: Rick Gunderson, PE
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Subject: Cass County Road 18 Extension Study

Date: November 1, 2018

Project: FM Metro COG Project Number 2018-005

SCOPE OF MEMORANDUM

The Cass County Highway Department, in coordination with both the Normanna and Pleasant Township officials, made a request to the Fargo-Moorhead Metro Council of Governments (Metro COG) to study the potential extension of Cass County Roadway 18 (CR 18) along 52nd Street SE. The study area for this project includes 52nd Street SE in Cass County from Cass County Roadway 17 (CR 17) west to Cass County Roadway 15 (CR 15) in both the Normanna and Pleasant Townships within Cass County, North Dakota. The study area for the project is shown in Figure 1. This memorandum (the memo) will include information on the existing conditions of 52nd Street SE in the project area. Additional memoranda will be completed as the project progresses including information on future conditions, alternatives analysis, and other topics to provide information to Cass County and the townships in making decisions related to extending CR 18.

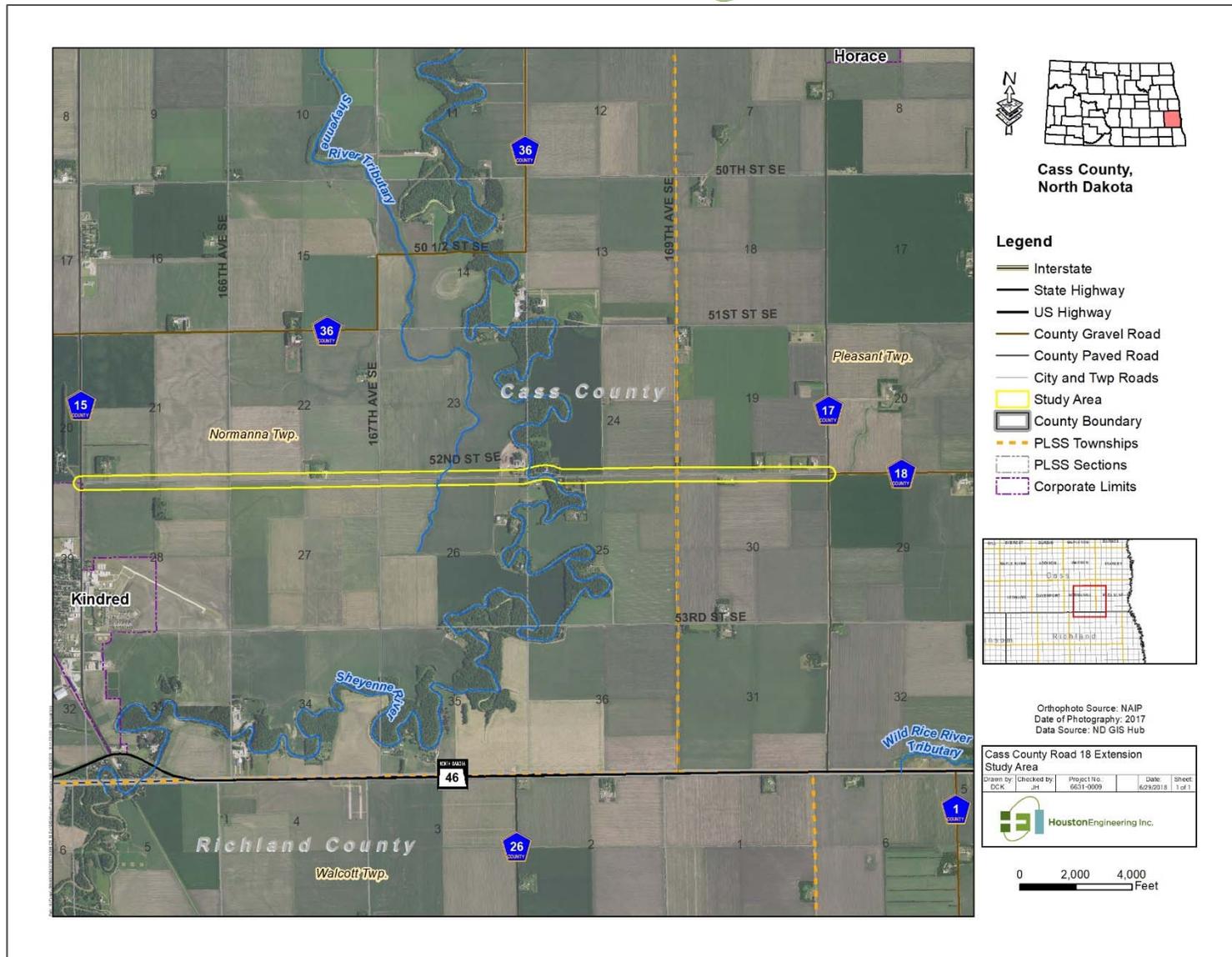


Figure 1. Study Area

EXISTING CONDITION ANALYSIS

ROADWAY TYPICAL SECTION AND ATTRIBUTES

The existing 52nd Street SE and CR 18 roadway typical sections are shown in Figure 2. Three typical sections are shown in Figure 2; one for the existing aggregate surfaced roadway section on 52nd Street SE throughout the study area, CR 18 for the section within 2 miles of CR17, and one for the bridge section across the Sheyenne River. The 52nd Street SE roadway section is currently an aggregate surface with open ditch drainage along both the north and south sides of the roadway. As shown in Figure 2, the roadway, ditch, and right-of-way widths vary based on the location within the corridor, but the aggregate surface is typically 28 to 30 feet wide. The CR 18 typical section is similar to the 52nd Street SE typical section with a slightly wider aggregate surface of approximately 30 to 32 feet. The townships both complete annual aggregate surface maintenance on 52nd Street SE. The spread rate of gravel used for each township vary between 150 cubic yards per mile (CY/mile) to 365 CY/mile based on the amount of available funding. Cass County currently maintains CR 18 at a gravel spread rate of 365 CY/mile.

Driveway and field access locations along both 52nd Street SE and CR 18 typically have corrugated metal pipe culverts for drainage. Flood protection measures have been implemented on the east end of the study area. The measures include levees and sluice gates installed on the north side of the roadway. Approximately 0.75 miles west of the Sheyenne River bridge, two transverse corrugated metal pipe culverts cross 52nd Street SE providing conveyance for a tributary of the Sheyenne River. Several drainage improvements have been made at the intersection of 52nd Street SE and CR 17 including multiple culverts and roadway ditch improvements. The 52nd Street corridor speed limit is 55 miles per hour (MPH) with the exception of reduced speed zones of 40 MPH approaching the Sheyenne River bridge and 25 MPH immediately adjacent to the bridge.

The 52nd Street SE intersection with CR 15 has two-way stop-control on the 52nd Street SE approaches and the intersection with CR 17 is controlled by a yield sign on the 52nd Street SE approach and stop sign on the CR 18 approach. Several north-south township roadways intersect with 52nd Street SE throughout the project study area. The north-south township roadways are typically yield controlled with yield signs at the intersections with 52nd Street SE. Additional access locations along 52nd Street SE are typically at driveway approaches or field locations. The spacing and locations of the access points along the corridor are acceptable, but some may need to be slightly relocated or combined if any improvements to the roadway are made.

The roadways in the study area were included in the functional class figure within the *Cass County Comprehensive and Transportation Plan*. The Cass County Functional Class figure lists both CR 15 and CR 17 as Major Collectors with CR 18 and 52nd Street SE as Local/Township classification. North Dakota 46 is classified as a Minor Arterial in the comprehensive plan and as a State Corridor with the North Dakota Department of Transportation (NDDOT) State Highway Performance Classification System. According to the Comprehensive Plan, both CR 15 and CR 17 are classified as Regionally Significant Candidate Corridors. Vehicle load restrictions are typically placed on CR 15 and CR 17 during the spring thaw.

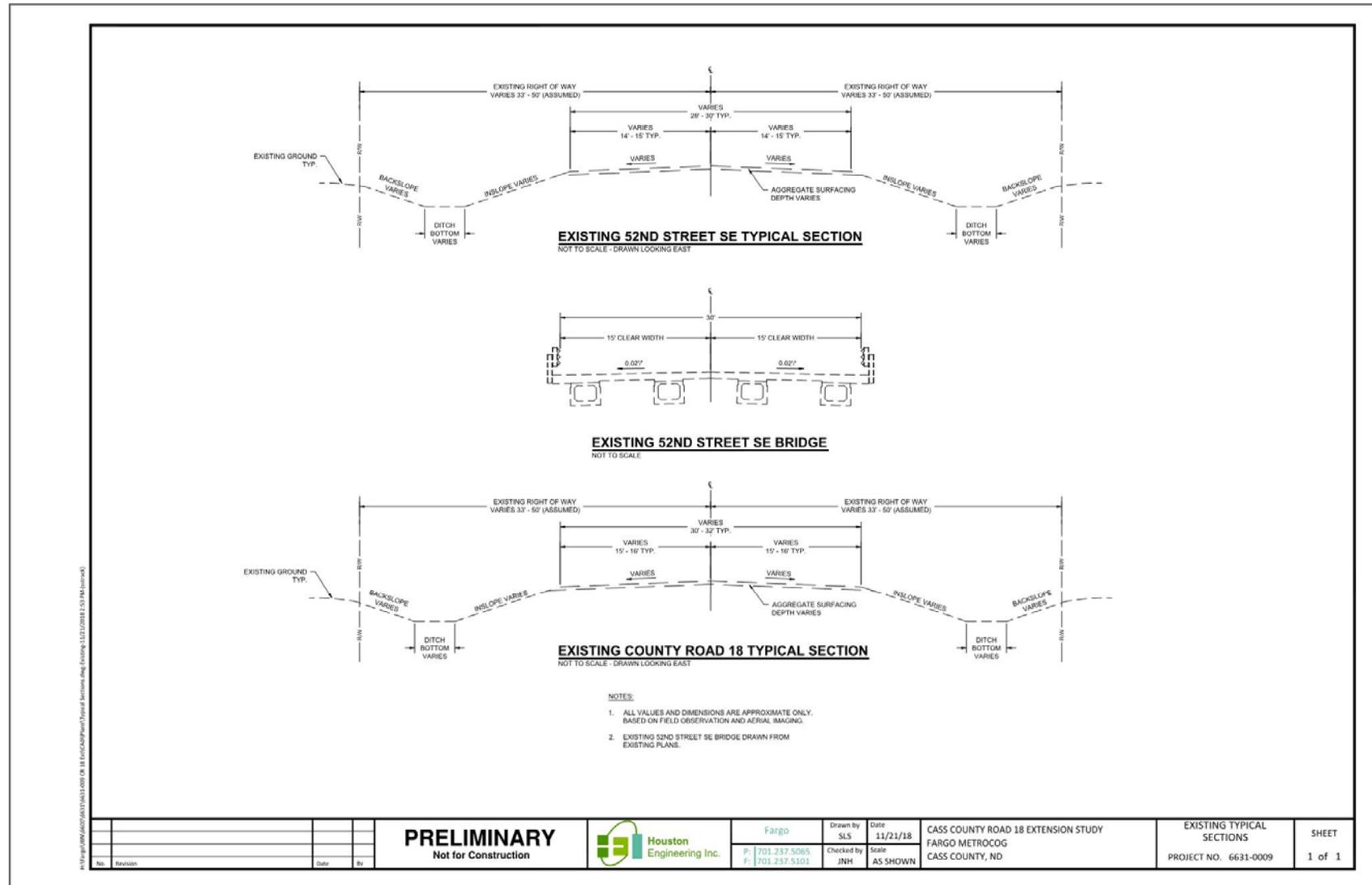


Figure 2. 52nd Street SE Typical Sections

BRIDGE ACROSS THE SHEYENNE RIVER

The existing bridge on 52nd Street SE that crosses the Sheyenne River was constructed in 1995. The typical section for the roadway is shown in Figure 2. The bridge spans are prestressed concrete and the bridge deck is cast-in-place concrete. According to the most recently available National Bridge Inventory (NBI) report from 2015, the overall condition of the bridge is “Good” with the superstructure and substructure both being categorized “Very Good”. The sufficiency rating of the bridge according to the NBI report is a 99.7. The channel bank is beginning to slump, and the embankment protection devices have widespread minor damage according to the NBI report. The bridge was included in *Cass County Comprehensive and Transportation Plan’s* “Cass County Bridge Condition Average” figure with a bridge condition average range of 7.1 to 8.0 out of 10, and in the “2037 and beyond” construction phase for replacement.

EXISTING UTILITIES IN STUDY AREA

The study area does contain electrical, fiber optic, telephone, and rural water utilities. A utility locate and survey were not conducted for this study. Any utility information provided in this memo and study are for information purposes only and are not intended to be used for design or construction. Based on a review of existing above ground utility structures along the corridor, several of the underground utilities run parallel to 52nd Street SE in the backslope of the north ditch of the roadway. Throughout the corridor, fiber optic and telephone underground lines are located north of the roadway and cross beneath the roadway to service residences on the south side of the roadway. Overhead electric utilities are typically located along the north field edges and run most of the eastern half of the project terminating just west of the bridge. There are also short runs of overhead electrical utilities serving the two western most residential and commercial locations within the study area. The overhead electrical lines do cross 52nd Street SE at three locations within a 0.5 mile stretch from the Sheyenne River bridge to the east. At the location of the Normanna Lutheran church, the overhead power lines are located on the south side of the roadway directly across from the church. There are valve locations for Cass County Rural Water located north of 52nd Street SE in the study area. Based on plan documents for the Sheyenne River bridge, the rural water line does cross beneath the roadway at the ag residential locations just west of the bridge.

EXISTING LAND USES WITHIN THE STUDY AREA

The Cass County existing land use plan contained within the *Cass County Comprehensive and Transportation Plan* provides the existing land uses in the study area that are based on the seven land use categories used in Cass County. Along the 52nd Street SE corridor in the study area, the primary land use “agriculture” with a few areas of “single family residential”, “farm exempt”, and “ag with residential”. The residential land uses are located near the Sheyenne River Bridge and at the east end of the study area. There is also a “commercial/industrial/multi-family residential” land use area for a manufacturing facility located 1.5 miles east of the intersection with CR 15. The Normanna Lutheran church, located just east of the Sheyenne River bridge, is classified as a “single-family residential” in the land use plan. The very west 0.75 miles of 52nd Street SE is included in the City of Kindred’s Extraterritorial Area.

EXISTING ENVIRONMENTAL FEATURES

The wetlands for the study area were reviewed using data from the National Wetlands Inventory available from the United States Fish and Wildlife Service. Two figures are provided with Figure 3 showing the palustrine and riverine wetlands that are located within and near the study area and Figure 4 showing a more detailed view of the palustrine and riverine wetlands within the study area. The project study area has the Sheyenne River and the Sheyenne River tributary for flowing water. There are three primary locations for palustrine wetlands located in sections 23 and 26 of the Normanna Township. As shown in Figure 4, the locations that are within the roadway ditch section that are classified as wetlands are located in the section from the Sheyenne River bridge to the west approximately a 0.5 mile.

2018 TRAFFIC VOLUMES

Traffic volumes at two segments of 52nd Street SE and one segment of CR 18 were collected Tuesday May 15th to Friday May 18th and Monday October 15 to Friday October 19 of 2018. The traffic volumes were counted for approximately 72 consecutive hours at all locations. The Kindred Public School system was in session when the traffic volumes were collected. The traffic volumes were reviewed for any differences, and an average of the two counting periods was determined. The traffic volumes included in this memo are Average Annual Daily Traffic (AADT) volumes that are based on the actual number of vehicles counted during the two count periods and then adjusted to account for daily and seasonal variations. AADTs provide the average volume of traffic using the roadway throughout the year. Actual traffic counts on random days may be either above or below the AADT, but the AADT provides an average for the entire year. Intersection turning movements were not counted as a part of this study.

The AADTs for the three count locations are shown in Figure 5, 6 and 7. The AADTs for the spring and fall ranged from 86 and 136 vehicles per day (VPD) on CR 18 near CR 17 to 115 and 197 VPD on the west end of the study area. The traffic consisted of 20 to 25 percent heavy vehicles (vehicles with more than 2 axles) throughout the study area. The heavy vehicle percentages were slightly lower on the existing CR 18 section. It is important to note that the traffic counts were taken while agricultural producers were starting to plant and harvest the agricultural fields in the area surrounding the study area. The travel direction distribution at the count locations was approximately 55 to 60 percent travelling westbound to approximately 40 to 45 percent travelling eastbound during the spring count period and 50 percent eastbound and westbound during the fall count period. The directional distribution may signal that vehicles are traveling west to Kindred or elsewhere on 52nd Street SE, but returning to their residence or place of origin by another route such as North Dakota 46 and a north-south county or township roadway.

The peak hour, the highest volume of four consecutive 15-minute counting periods, for all locations was consistent between 7:00 am and 8:00 am with minor 15-minute adjustments for the morning period of each day. The afternoon/evening peak hour was not as consistent as the morning peak hour for all three locations. The PM peak hour was typically either 3:30 pm to 4:30 pm or approximately around the 5:00 pm hour. A potential reason for the variation of the evening/afternoon peak hour may be due to rain events on one of the count days and the resulting saturated condition of the gravel roadways. Although, there is not enough evidence to draw a conclusion that the condition of the roadway impacts the traffic volume on the roadway. The peak hours from the fall traffic counts were similar in the hour that had the peaking volumes to the spring data.

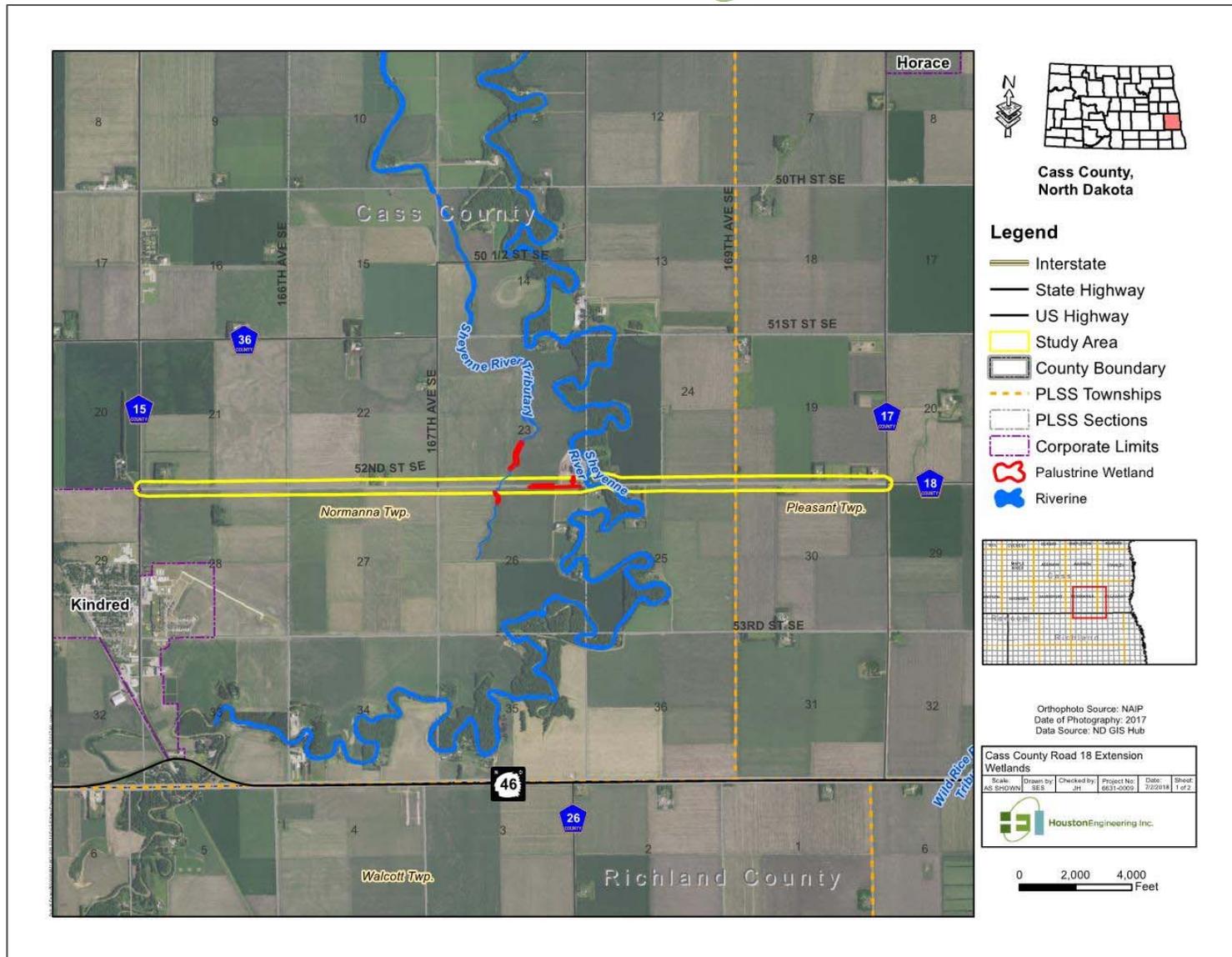


Figure 3. Environmental Map for Study Area

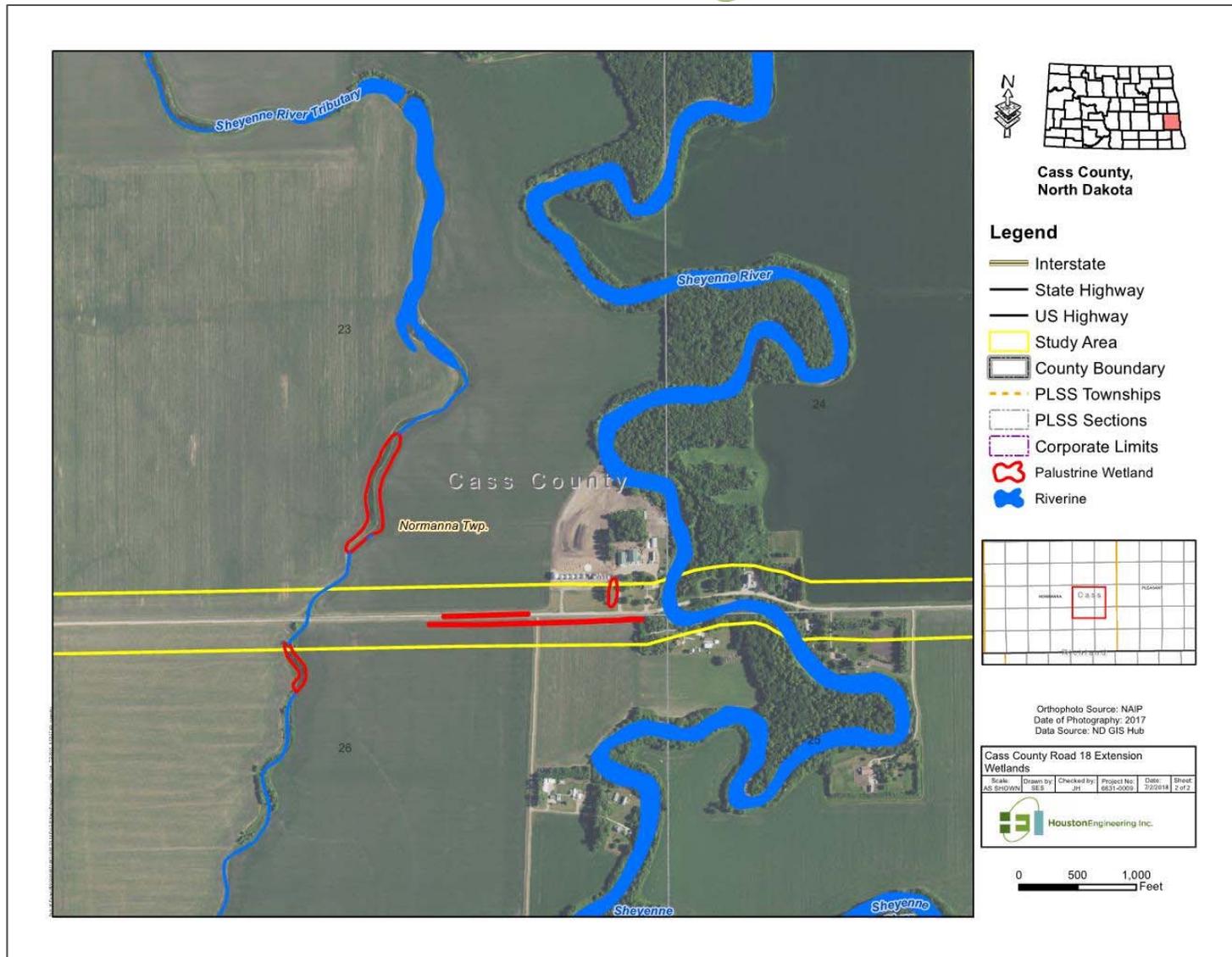


Figure 4. Wetlands within the Study Area

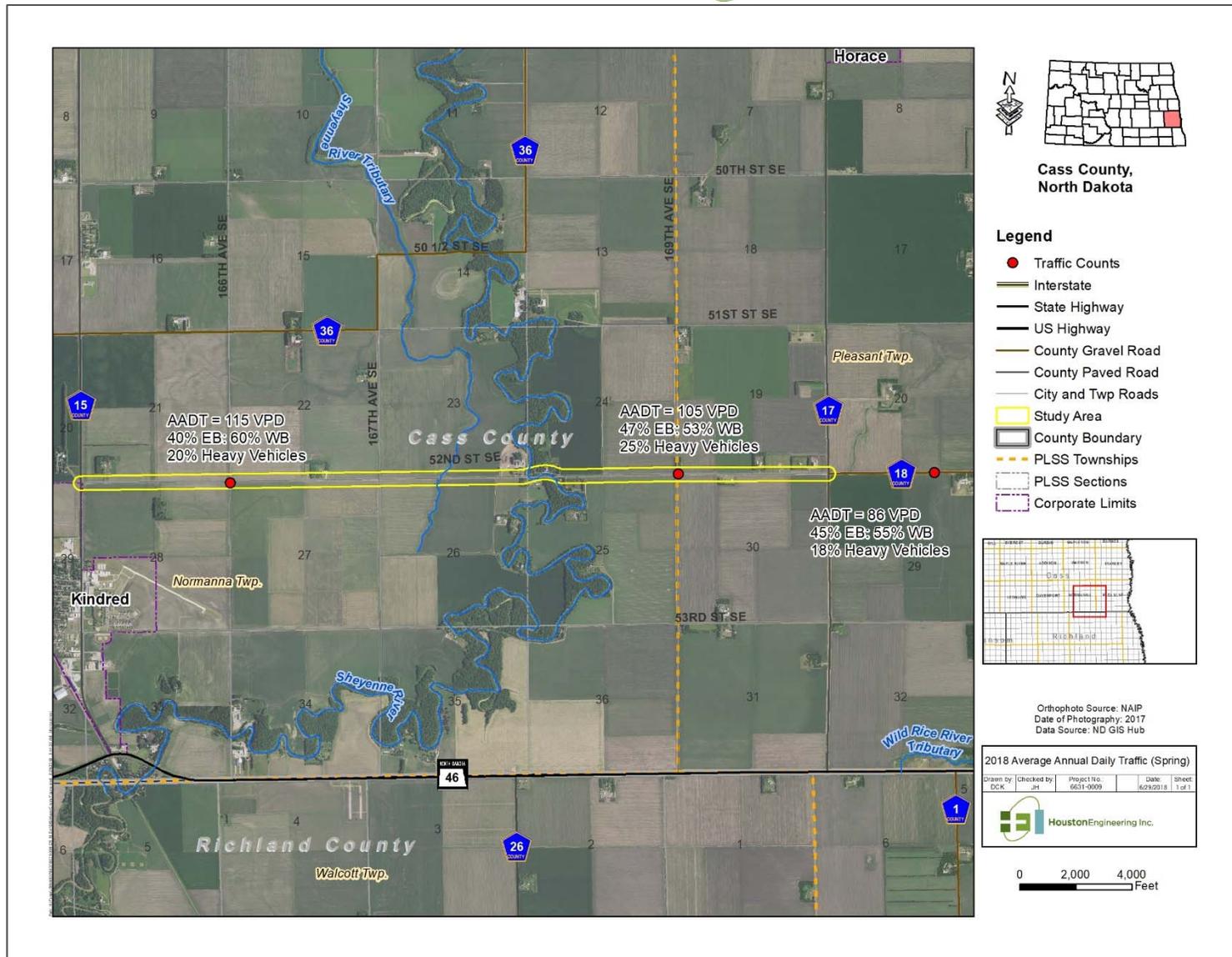


Figure 5. 2018 Average Annual Daily Traffic Volumes (Spring 2018)

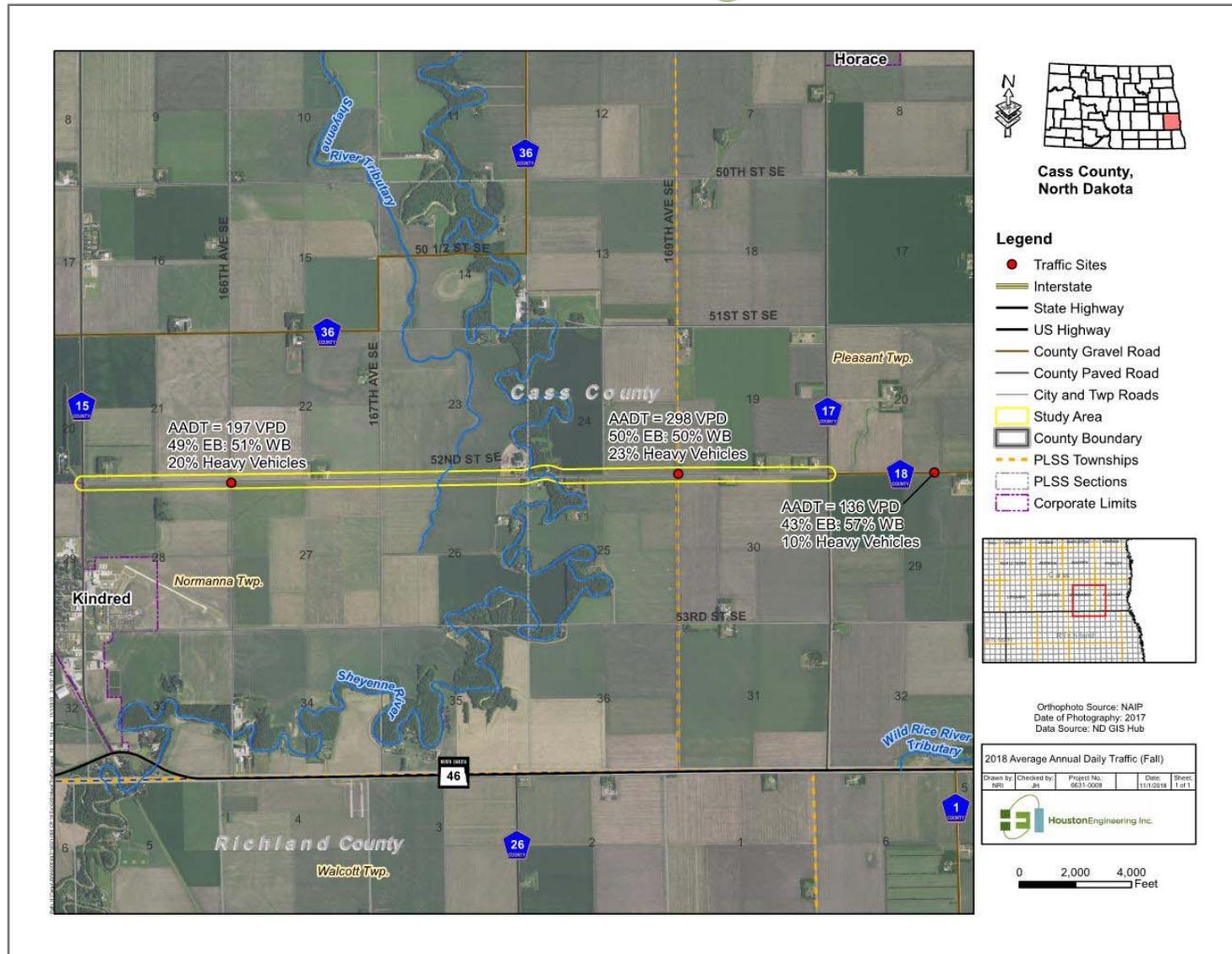


Figure 6. 2018 Average Annual Daily Traffic Volumes (Fall 2018)

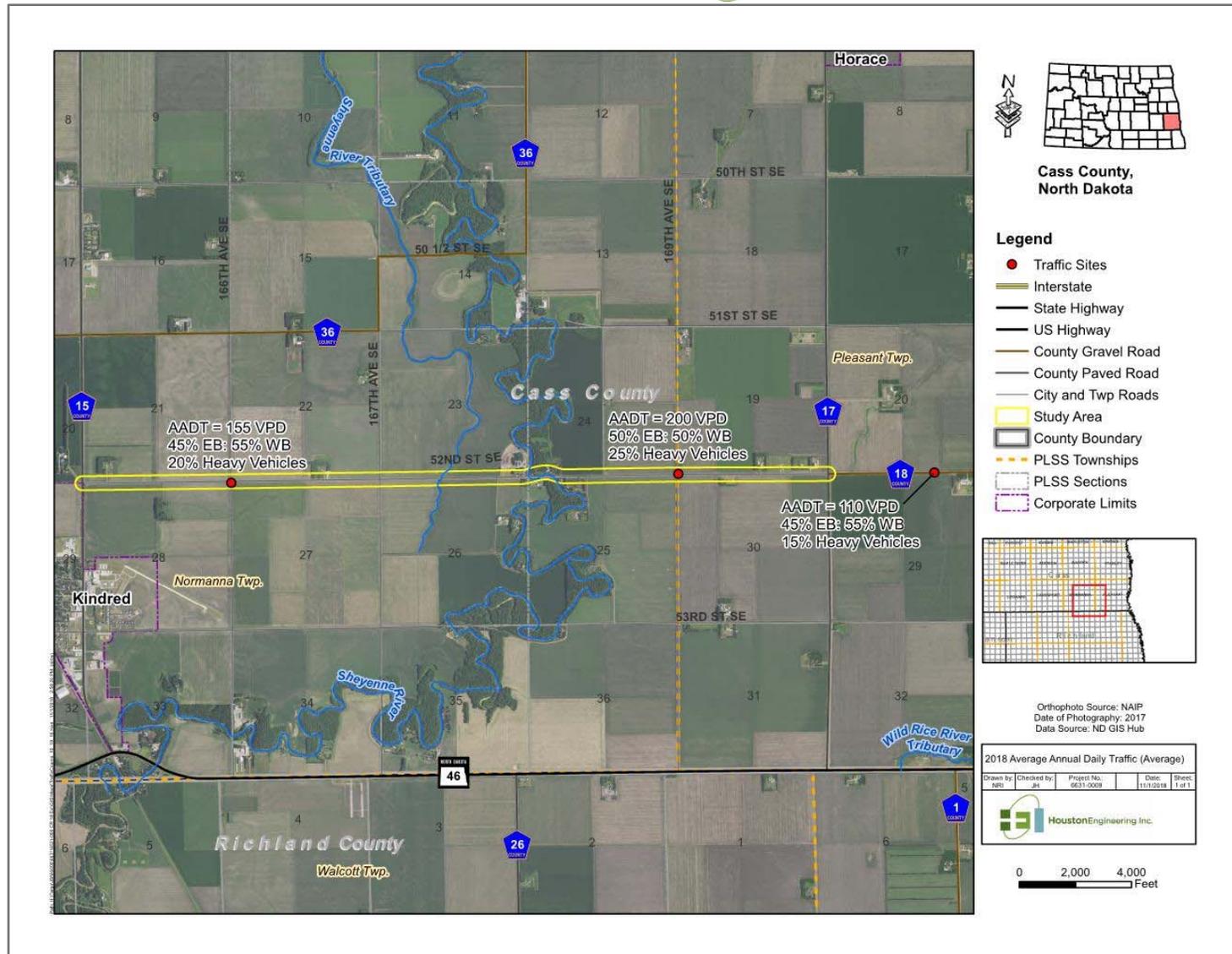


Figure 7. Average Annual Daily Traffic Volumes (Average of Spring and Fall 2018)

2013-2017 TRAFFIC SAFETY PERFORMANCE

The data and information used in the traffic safety section was provided by the Metro COG from a data set that was received from the NDDOT. The data included all traffic crashes in the Metro COG planning boundary for the years 2013 to 2017. The software program ArcGIS was used to select crashes for the study area based on a selection buffer of 250 feet from 52nd Street SE, as shown in Figure 8. The NDDOT and Department of Public Safety maintain criteria for what constituted a reportable traffic crash, and some very minor non-injury crashes may not be considered a reportable traffic crash.

There was a total of six traffic crashes in the study area from 2013 to 2017. The crash locations and severity are included in Figure 8. Additional information for the crashes are included in the following Tables 1 to 4. The corridor had one fatal crash, two injury crashes, and three property damage only crashes from 2013 to 2017. The crash severity by year is shown in Table 2 and the only year with more than one crash was 2014. Typically, fatal and injury crashes occur when vehicles collide either head-to-head or at various angles to each other, of which the right-angle crash is typically the angle manner of collision with the highest potential of injury. Included in Table 3 are the crash severities by the manner of collision. The corridor experienced three angle crashes with two being right angle crashes; resulting in one a fatal crash and one property damage only crash. The study corridor is assumed to have a proportion of the traffic volumes that consists of vehicles travelling to or from the Kindred Public School system buildings in Kindred.

Due to the potential of teen-age drivers travelling on the road, the driver ages of vehicles involved in crashes along the corridor were included in Table 4 to provide information on any patterns that emerged involving younger drivers or drivers of a certain age range. Please note that each driver in a crash is listed and more than one driver may be included in a crash. The 0 to 16 and 17 to 24 age ranges were grouped together so that all teen-age drivers along with younger drivers were included in one group for analysis. Based on the data in Table 4, three of the nine drivers involved in crashes were between 0 and 24 years of age which represents 33 percent of the total drivers. The 0 to 24 and 35 to 44 age ranges had three drivers involved in crashes which was the highest of all ranges.

The fatal crash that occurred along the corridor was further examined to determine if any roadway or traffic control attributes may have been a contributing factor. Based on a review of the information available about the crash, a vehicle failed to yield at a yield sign to another vehicle on 52nd St. SE and a right-angle crash occurred between a passenger vehicle and a semi-truck. Based on the information available, it does not appear that any roadway or traffic control attributes contributed to the crash.

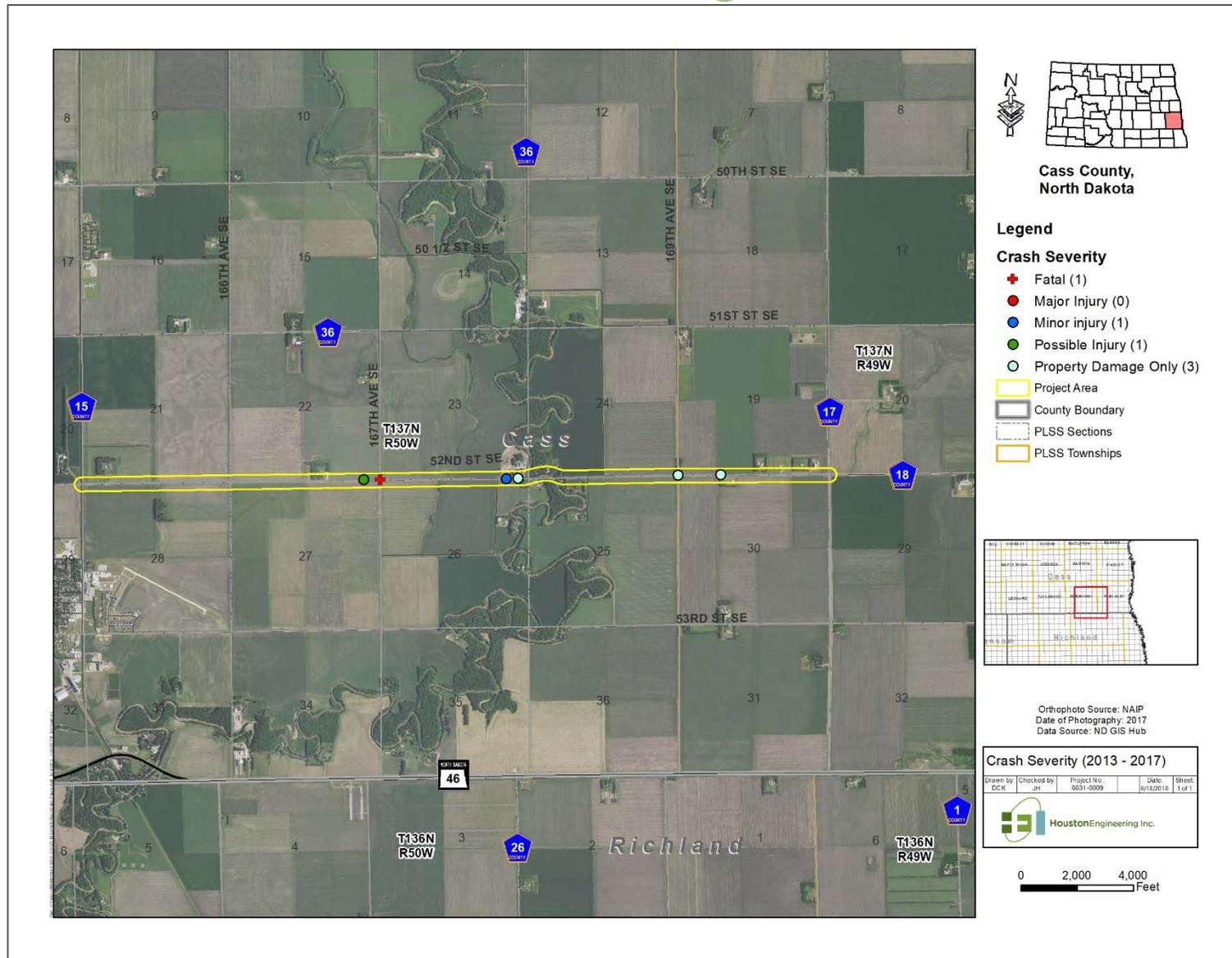


Figure 8. 2013 to 2017 Crash Locations

2013	1
2014	3
2015	1
2016	1
2017	0

Table 1. Crashes by Year ('13 to '17)

	Crash Severity					
YEAR	Fatal	Major Injury	Minor Injury	Possible Injury	Property Damage Only	TOTAL
2013	0	0	0	0	1	1
2014	1	0	0	1	1	3
2015	0	0	0	0	1	1
2016	0	0	1	0	0	1
2017	0	0	0	0	0	0
TOTAL	1	0	1	1	3	6

Table 2. Crash Severity by Year ('13 to '17)

	Crash Severity					
Manner of Collision	Fatal	Major Injury	Minor Injury	Possible Injury	Property Damage Only	TOTAL
Angle (Not Specific)	0	0	0	0	1	1
Non-Collision w/ Motor Vehicle	0	0	1	1	1	3
Right Angle	1	0	0	0	1	2
TOTAL	1	0	1	1	3	6

Table 3. Manner of Collision and Severity ('13 to '17)

	Injury Severity					
AGE	Fatal	Major Injury	Minor Injury	Possible Injury	Property Damage Only	TOTAL
0 to 16	0	0	1	0	0	1
16 to 24	0	0	0	0	2	2
25 to 34	0	0	0	0	1	1
35 to 44	1	0	0	1	1	3
45 to 54	0	0	0	0	0	0
55 to 64	1	0	0	0	1	2
65 to 74	0	0	0	0	0	0
75+	0	0	0	0	0	0
TOTAL	2	0	1	1	5	9

Table 4. Crash Severity by Age ('13 to '17)

SUMMARY OF EXISTING CONDITIONS

Included in this memo was a review of the existing conditions and information associated with the traffic volumes, safety, and other items. As previously mentioned, this memo will be a part of the final report completed for this study. Additional traffic volume information will be collected in the Fall of 2018 and any adjustments will be made to the AADTs as necessary. The information contained in this memo will be utilized in future memos that are a part of this study.