Transportation

Overview

Transportation is critical for connecting residents with services, businesses, and activities within the community. It also helps to support markets in every community and even outside them. Traditionally, transportation is thought of as origins and destinations, but other factors such as rail lines, bridges, surface conditions, airports, and truck volumes also play vital roles when analyzing the quality of the current transportation system and what may be needed in the future. The primary goal of this section is to craft local polices, standards, and guidelines to guide major transportation investments and policy decisions for the future of Boone County.

Transportation Goals

- Goal 1: Ensure that Boone County plans for proper growth and coordinates that growth with with IADOT and local municipalities
    - Continue to develop and coordinate local capital improvement plans with the Boone County roadway improvement plan while looking for state and federal funding.
    - Encourage design and land use that supports a wide range of transportation options, with careful thought regarding types of land use near major roadways.
    - Guide future development to roadways capable of accommodating growing future traffic.
    - Develop roadways and street systems with consideration for speeds, congestion, safety, impact, and noise.
- Goal 2: Proactively assess current facility needs and evaluate future development
    - Support an appropriate hierarchy of streets and facilitate the connectivity of adjacent land uses.
    - Regularly evaluate roadway width and adjust roadway configurations as opportunities, funds, or needs arise.
    - Establish a complete regional roadway network that balances local and regional needs that include sustainable practices.
    - Analyze current bridge and roadway surface conditions to assist in prioritizing future investment.
- Goal 3: Promote financially responsible transportation investments
    - Prioritize updating existing infrastructure over creating more.
    - Create goals and check-ins for timely completion of major projects.
    - Ensure all infrastructure is properly installed to required specifications.

Figure 7.1 – Rock Island Caboose

Source: Boone County

Existing Conditions

Traffic Volumes

Average daily traffic volumes show how many cars travel on a road on an average day. Traffic volumes, and subsequent congestion, are one of the key indicators of a roadway's performance. Generally, traffic volumes are higher on the eastern edge of the county and lower on the west, closer to the urbanized places throughout the county. The most recently collected traffic volume data is shown in Table 7.1. The FHWA has a simplified way of measuring capacity of different roadways. Table 7.2 shows the capacity thresholds and we have found that none of Boone County's major highways are approaching the FHWA threshold. This means that no expansion is needed in the near term unless existing conditions rapidly change. Figure 7.2 visualizes the ADT of the major corridors. Hwy 30 has the highest ADT of the County and is greatest in the eastern side of the County from Ames to the City of Boone.

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Table 7.1: Corridor Average Daily Traffic Volumes			
Road Name	**Roadway Type**	**Total Truck**	**ADT**
210th St	Two-Lane Roadway	223	1780
230th St	Two-Lane Roadway	241	5300
325th St / Apple Rd	Two-Lane Roadway	184	1850
330th St	Two-Lane Roadway	152	2690
334th Rd	Two-Lane Roadway	98	1980
D Ave	Two-Lane Roadway	204	2122
H Ave	Two-Lane Roadway	423	3230
Hwy 17	Two-Lane Roadway	348	6400
Hwy 30	Four-Lane Divided Roadway	884	9365
Iowa 210	Two-Lane Roadway	98	1210
S Ave	Two-Lane Roadway	393	5360
T Ave	Two-Lane Roadway	282	2630

Table 7.1 – Corridor Average Traffic

Source: Iowa DOT

Table 7.2: Capacity Thresholds and Potential Constraints		
Roadway Types	**Volumes Approaching Capacity**	**Corridors Approaching Thresholds**
Two-Lane Roadway	12,000-14,000	None
Three-Lane Roadway	14,500-17,000	None
Four-Lane Roadway	20,000-24,000	None
Four-Lane Divided Roadway	68,000-80,000	None

Table 7.2 – Capacity Thresholds and Potential Constraints

Source: Iowa DOT

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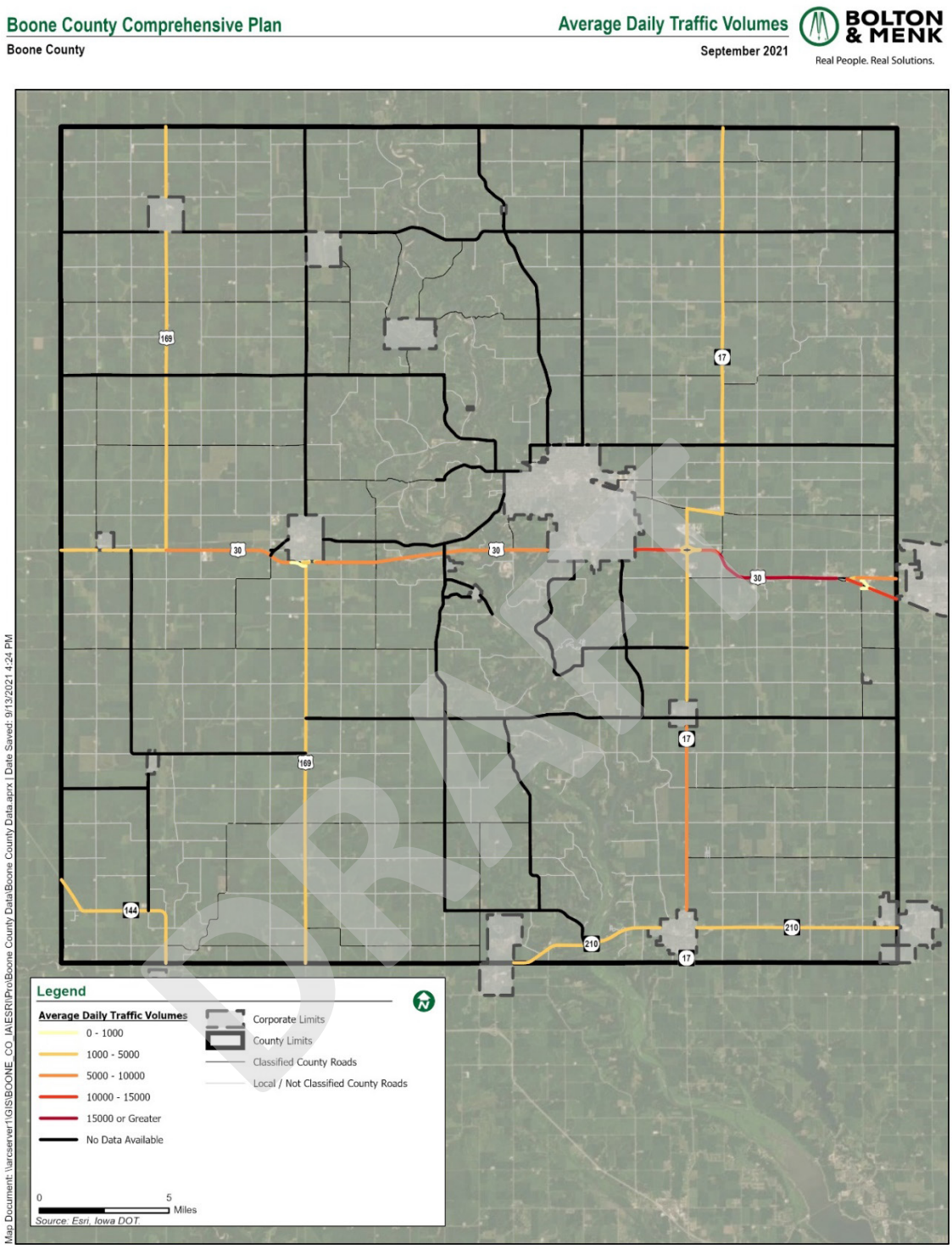

Figure 7.2 – Average Daily Traffic Volumes

Source: Iowa DOT

Created: Bolton & Menk Inc.

Truck Traffic

Roadways that connect farms to markets and have good connectivity often have high truck traffic. Truck traffic can decrease a roadways performance because they have long stopping distances, long acceleration distances, and can degrade pavement conditions at a higher rate than other vehicles. Truck traffic on county roads range from 4.5% to 17.4% of the total traffic. Despite sizeable truck percentages, the actual truck counts are quite low ranging from 98 to 1245 trucks a

day. The most recently collected truck traffic volume data is shown in Figure 7.5. Figure 7.3 shows the ADT of of all vechiles compared to that of only trucks. The truck traffic as a percentage of total ADT traffic is shown in Figure 7.4. Trucks do not make up a majority of traffic on any roadway, but are present on all roadways measured.

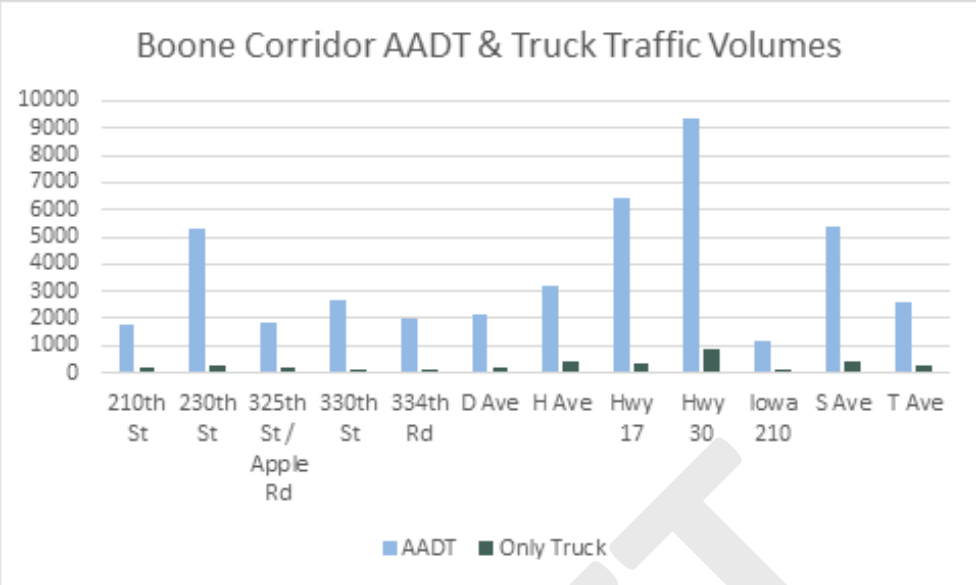

Figure 7.3 – Corridor Average Traffic Volumes

Source: Iowa DOT

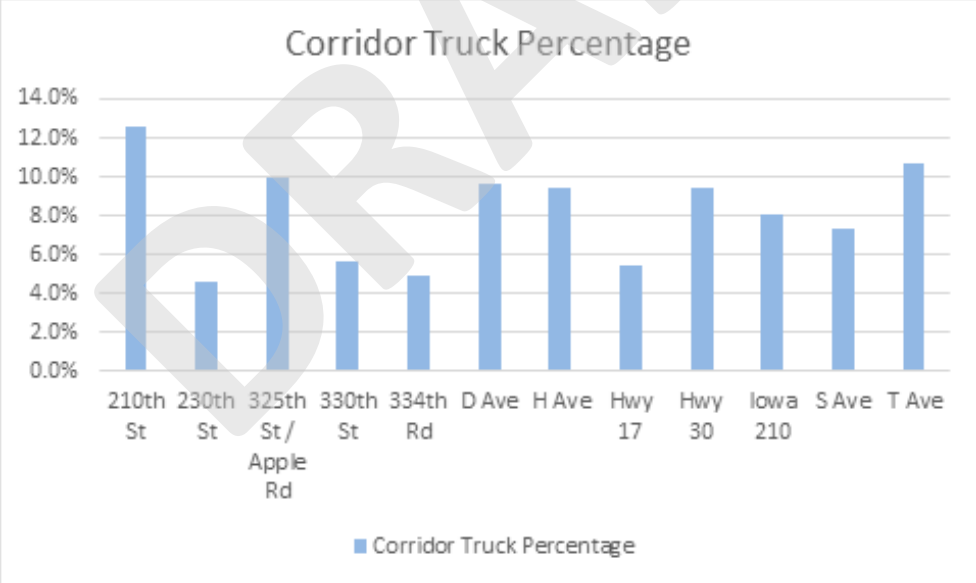

Figure 7.4 – Corridor Percentage of Truck Traffic Volume

Source: Iowa DOT

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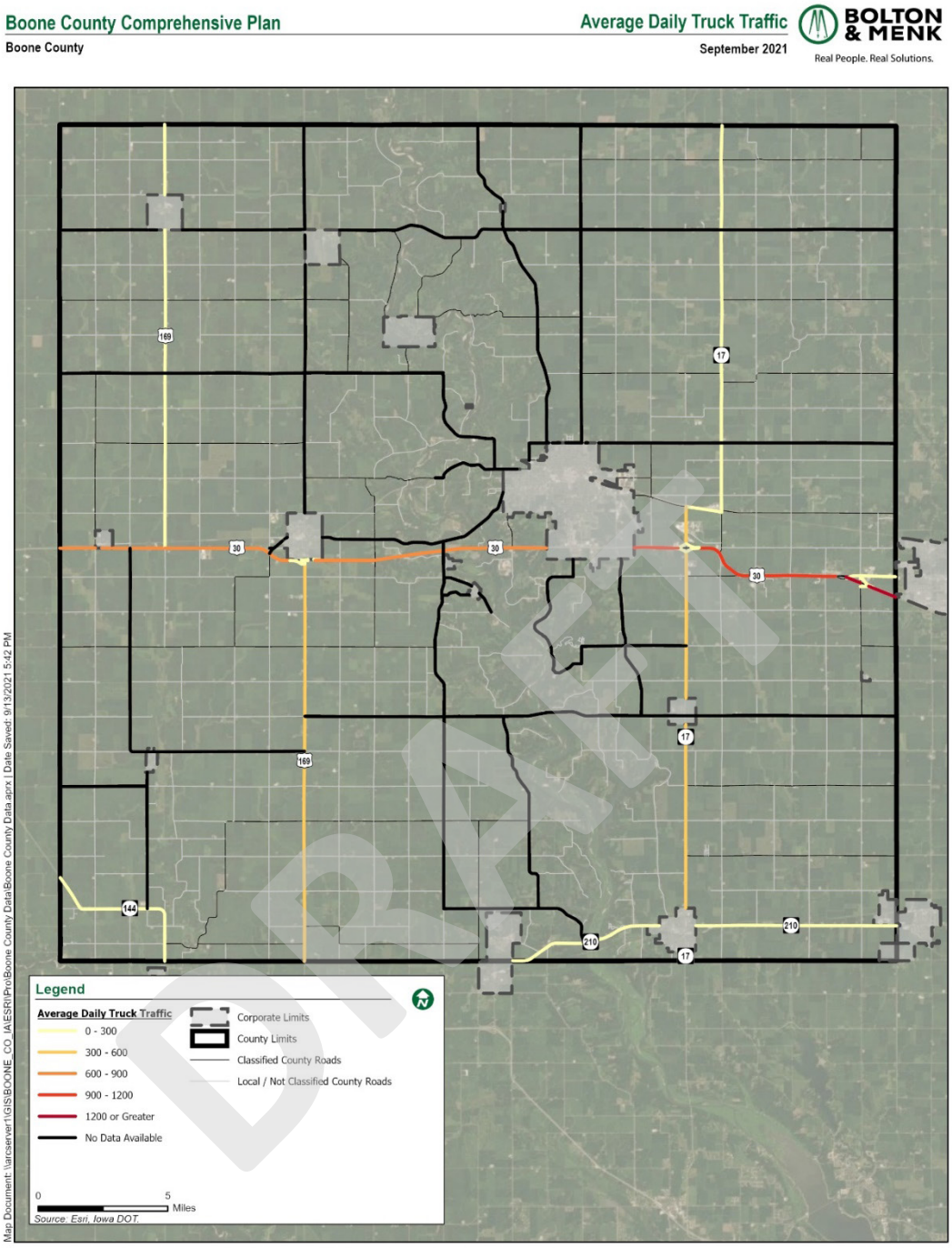

Figure 7.5 – Average Daily Truck Traffic

Source: Iowa DOT

Created: Bolton & Menk Inc.

Functional Classification

The functional classification system is used to create a roadway network that efficiently collects and distributes traffic from individual properties and neighborhoods to the state or federal highway system. A successful system coordinates and manages several componenets within transportation including mobility, roadway design, and route alignment. It also seeks to match current and future access and land use with the adjacent roadway's purpose, speeds, and spacing. The functional classification system is comprised of principal arterials, minor arterials, major and minor collectors, and roadways. Each classification has a different function, with interstates or freeways prioritizing mobility with very strict

access controls while a local road prioritizes property access over mobility, as shown in Figure 7.6. Most travel relies on a network of roads at multiple classification levels.

In Boone County, US 169 and US 30 are the only principal arterial roads and are under the jurisdiction of the Federal Highway Administration. State Highway 144, Highway 17, Highway 210 are the only minor arterials and are under the jurisdiction of the State of Iowa's Department of Transportation. Many County Highways are listed as major or minor collectors, including P70, R21, R27, E18, E26, R18, E57, P54, and more. Roadways listed as major collectors are eligible for state and federal funding. All functionally classified roadways within Boone County are shown in Figure 7.7.

The Federal Highway Administration provides guidelines for the percent of mileage for each functional classification, as shown in Table 7.3. It is difficult to generalize the functional class makeup of many rural areas due to the diverse and often less orderly development of land. Generally, Boone County stays within the federally recommended functional class makeup, with the only exception being that local roads are below the recommended range by 0.7%.

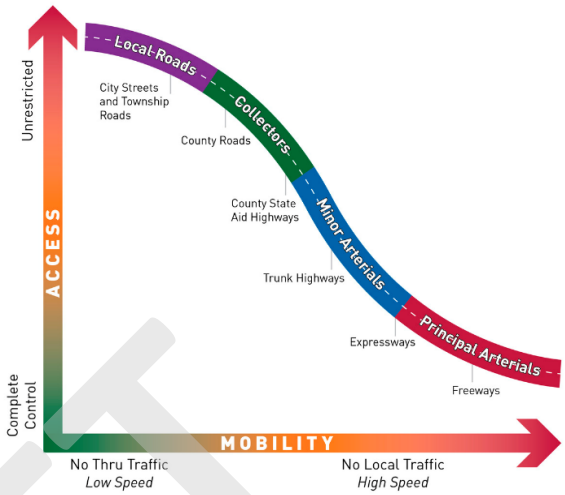

Table 7.6 - Functional Classification Access vs. Mobility Flow Chart

Source: American Planning Association

Table 7.3: Federal Functional Class Makeup			
Class Name	Total Mileage	Percent of Type	Federal Recommendation
Principal Arterial – Other	67.8 Miles	5.80%	2%-6%
Minor Arterial	54.9 Miles	4.70%	2%-6%
Major Collector	176.1 Miles	15.1%	8%-19%
Minor Collector	153.8 Miles	13.2%	3%-15%
Local	715.8 Miles	61.3%	62%-74%

Table 7.3 – Federal Functional Class Makeup

Source: Federal Highway Administration

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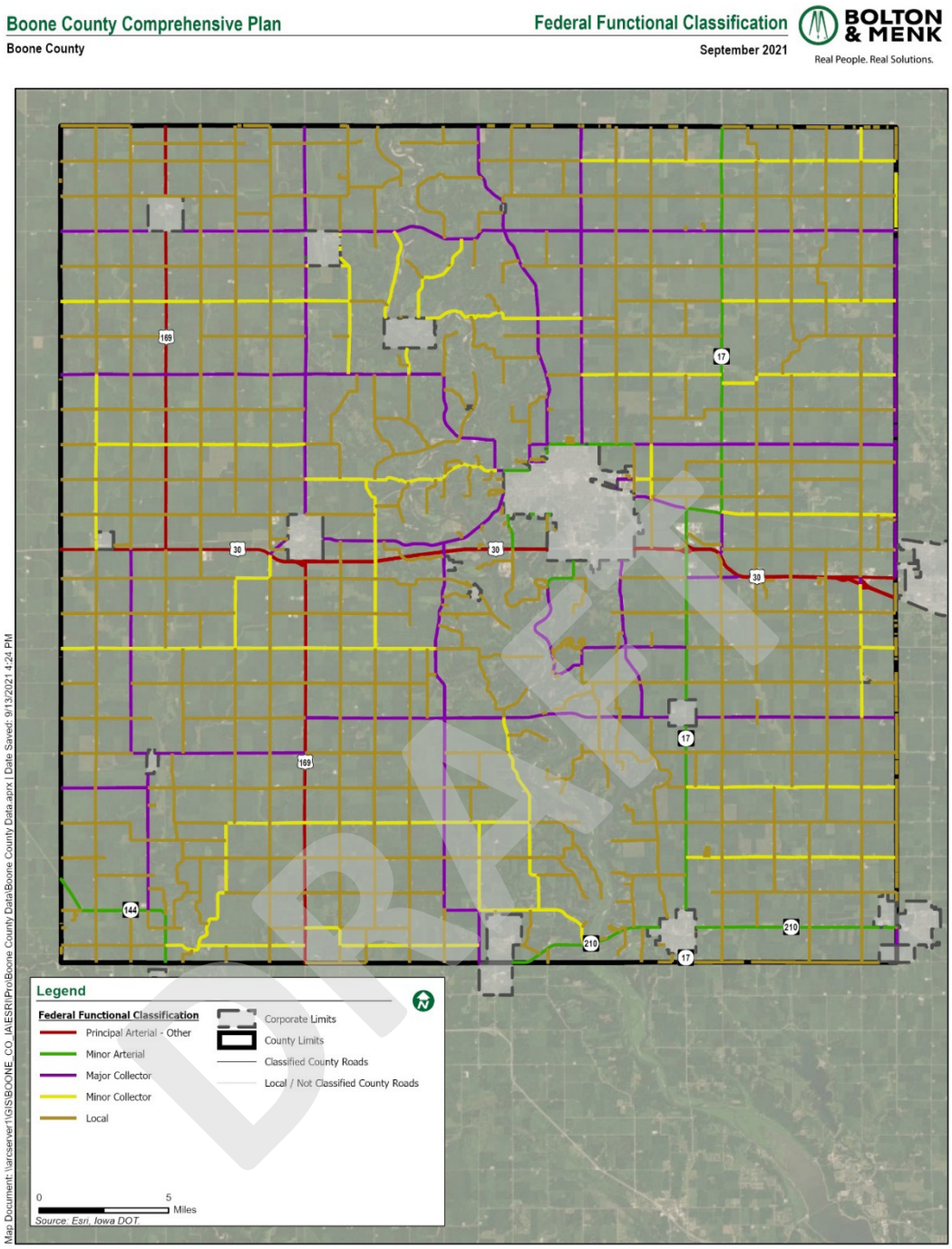

Figure 7.7 – Federal Functional Classifications

Source: Iowa DOT

Created: Bolton & Menk Inc.

Traffic Safety

Traffic safety is a high priority for all agencies responsible for managing transportation facilities. Reviewing historic crash information can help identify existing deficiencies and assist the County in prioritizing transportation funds over the next 25 years. Crash records from 2016 through 2020 were collected from the Iowa Department of Transportation. Crashes that occurred within municipal boundaries and on Federal Highways (US 169 and US 30) and State Highways (Highway 210, Highway 930, Highway 17, and Highway 144) were excluded.

Between 2016 and 2020, 417 crashes occurred. This included two fatalities and 17 major injuries. There were no re-

ported bicycle or pedestrian crashes on Boone County roadways. The major crash trends identified in Boone County are shown in Figure 7.8. Locations of crashes are shown in Figure 7.9 in the form of a heat map of reported accidents along with locations of injuries and fatalities.

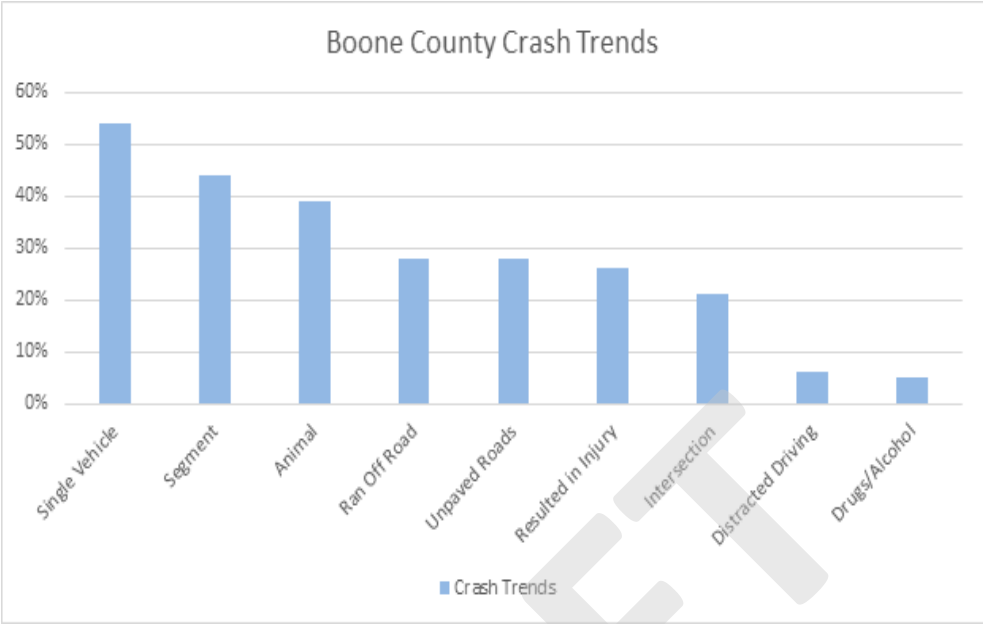

Figure 7.8 – Boone County Crash Trends

Source: Boone County Data

In addition to the trend analysis, a density analysis was completed to identify where there are clusters of crashes. These segments were reviewed to identify any trends that could be tied to the information. Around 40% of all crashes were single vehicle crashes, often involving an animal such as a deer or smaller animal. Distracted driving and alcohol were involved in approximately 5% of crashes. Table 7.4 lists the major trends that have occurred on each major crash corridor.

Table 7.4: Boone County Crash Information

Corridor/Count	Total Crashes	Animal Involved	Fixed Object	Vehicle	Single Vehicle	Other
Co Rd E18/130TH ST	24	14	2	1	6	1
Co Rd E26/170TH ST	17	9	2	1	4	1
Co Rd E41/216TH DR	30	13	11	0	6	0
Co Rd E57/270TH ST	12	6	4	2	0	0
Co Rd P70/H AVE	18	14	0	1	3	0
Co Rd R18/L AVE	19	7	2	5	5	0
Co Rd R21/NATURE RD	17	8	1	0	8	0
Co Rd R38/500TH AVE	27	22	0	1	4	1

Table 7.4 – Boone County Crash Information

Source: Boone County Data

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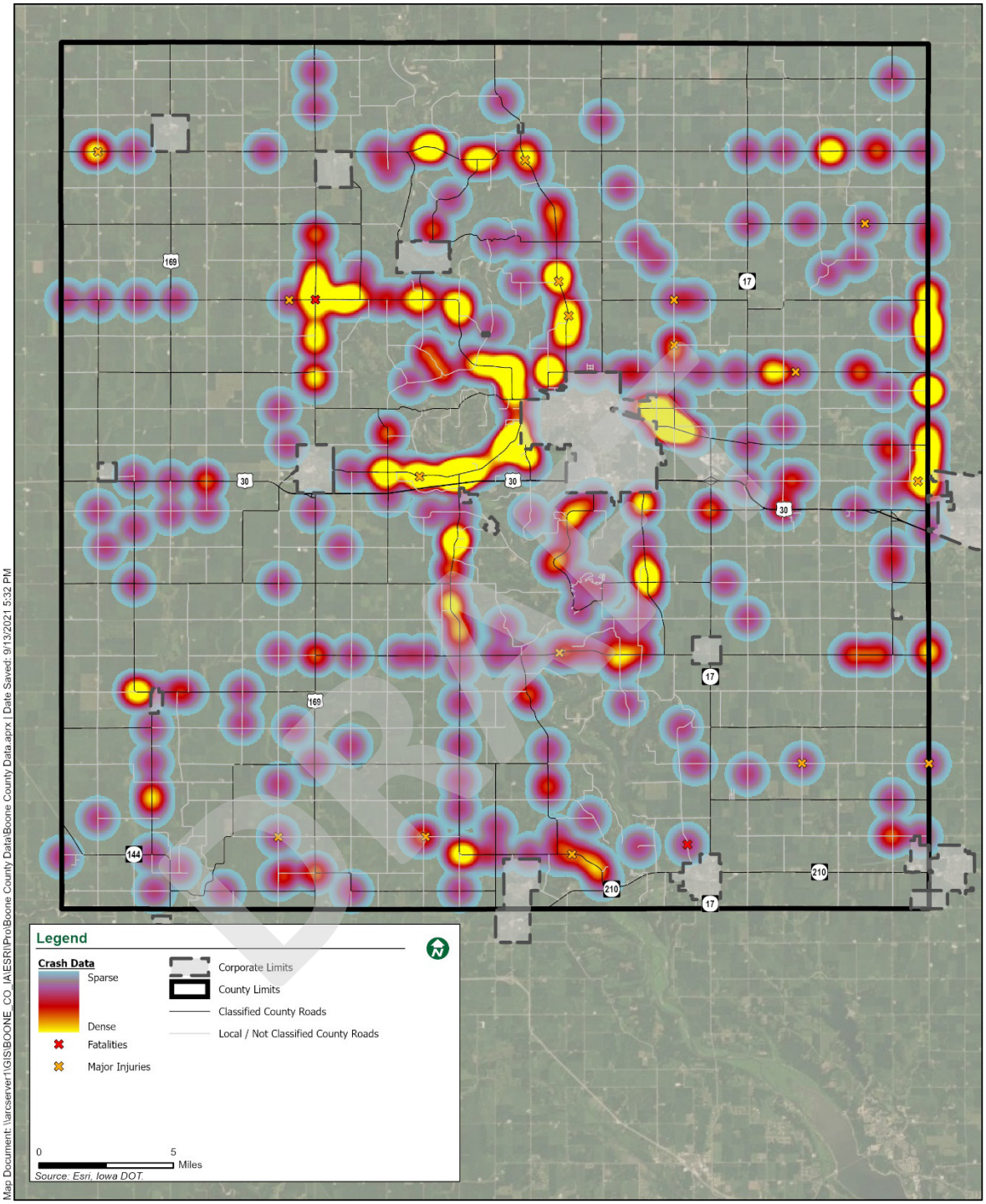

Figure 7.9 – Boone County Crash Data

Source: Boone County Data

Created: Bolton & Menk Inc.

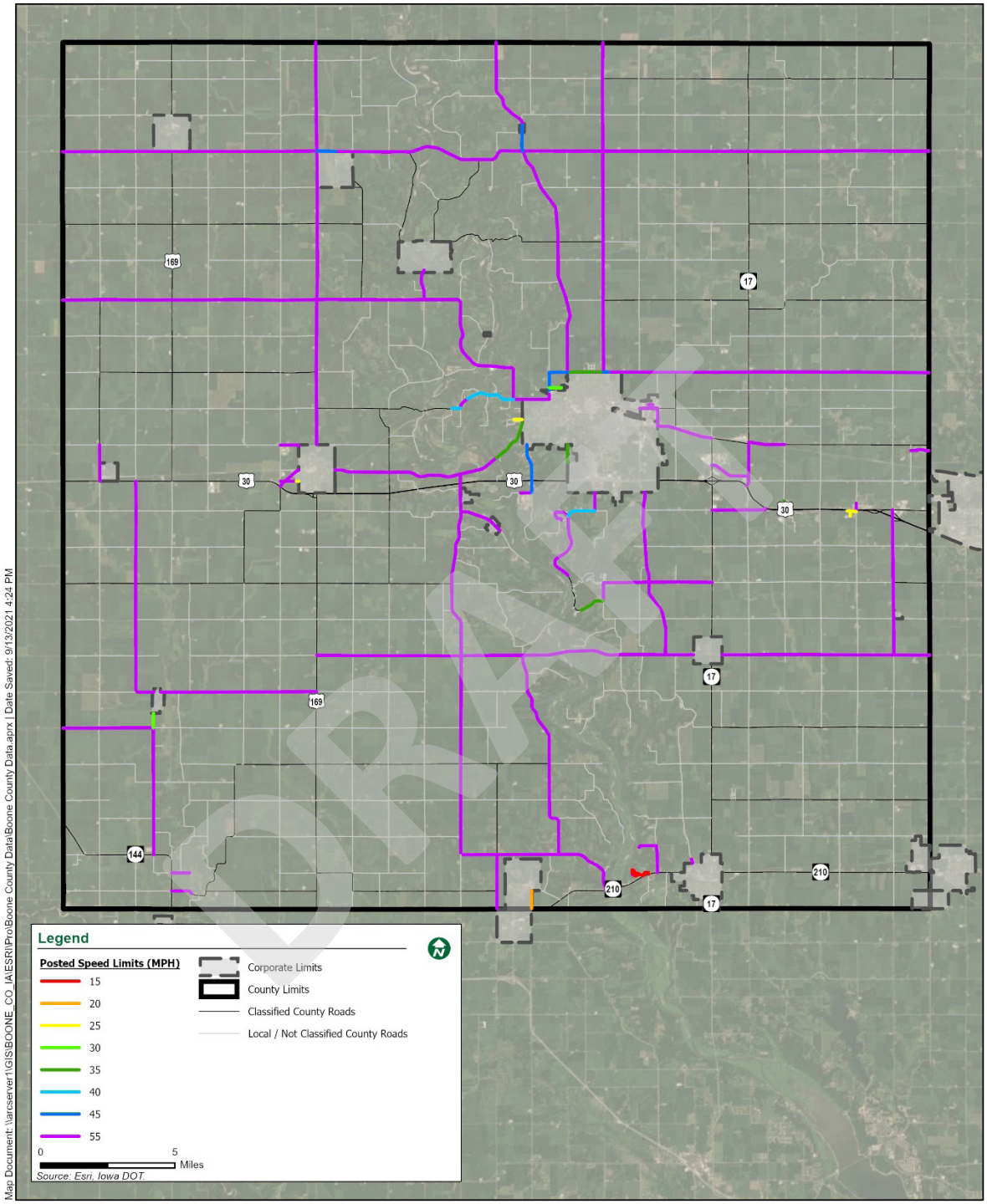

Figure 7.10 – Boone County Posted Speed Limits

Source: Boone County Data

Created: Bolton & Menk Inc.

Surface Type and Condition

The 272.6 miles of county roadways (excluding federal, state, township, and municipal roadways) are split between paved (concrete, asphalt) and unpaved/gravel surfaces. Paved roadways are typically found on higher traffic corridors or corridors with good connectivity to economic centers, while gravel roadways are typically found in low volume corridors.

Roadway surface type is shown in Figure 7.12, with a breakdown by surface type and mileage in Table 7.5. In Figure 7.11, the pavement condition of Boone County roadways can be found and explained. Approximately 83.5% of these roadways are in either Good, Very Good, or Excellent condition with the overall largest grouping of roadways being in Very Good condition within Boone County. Figure 7.13 shows the condition of each of the major roadways which are under the jurisdiction and maintenance of the County.

Table 7.5: Roadway Surface Mileage		
Surface Type	Miles	% of Total Roadways
Concrete	124.1	45.6%
Asphalt	55.1	20.2%
Seal Coated Pavement	1.3	0.5%
Gravel	1.5	0.6%
No Data	90.6	33.1%
Total	272.6	100.0%

Table 7.5 – Boone County Roadway Surface Mileage

Source: Boone County Data

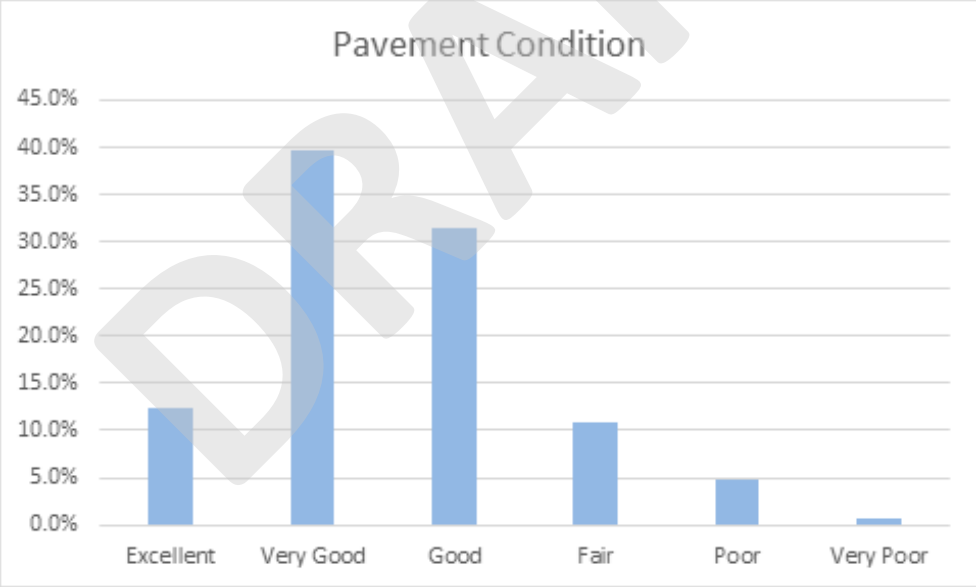

Figure 7.11 – Pavement Condition

Source: Boone County Data

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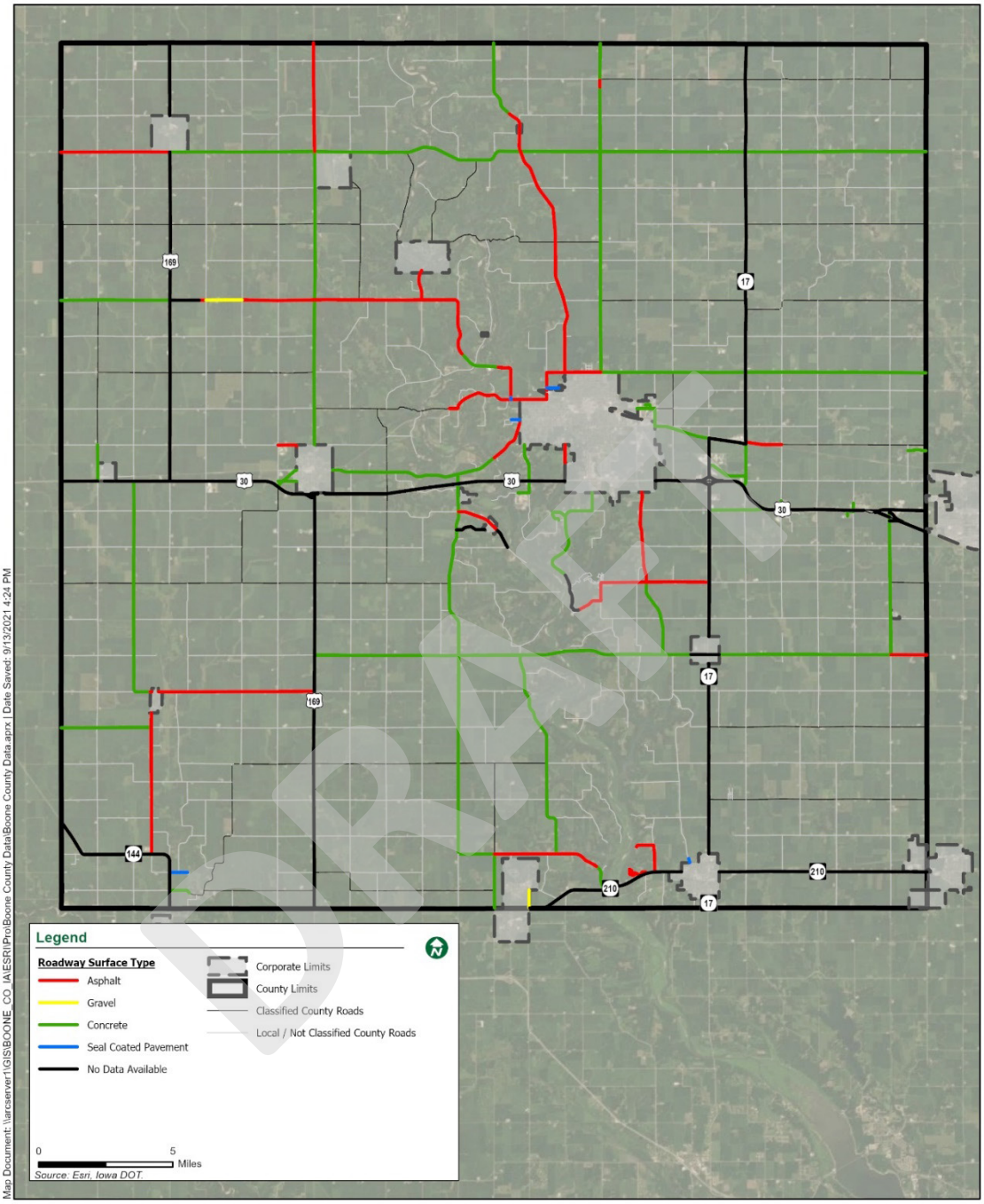

Figure 7.12 – Roadway Surface Type

Source: Boone County Data

Created: Bolton & Menk Inc.

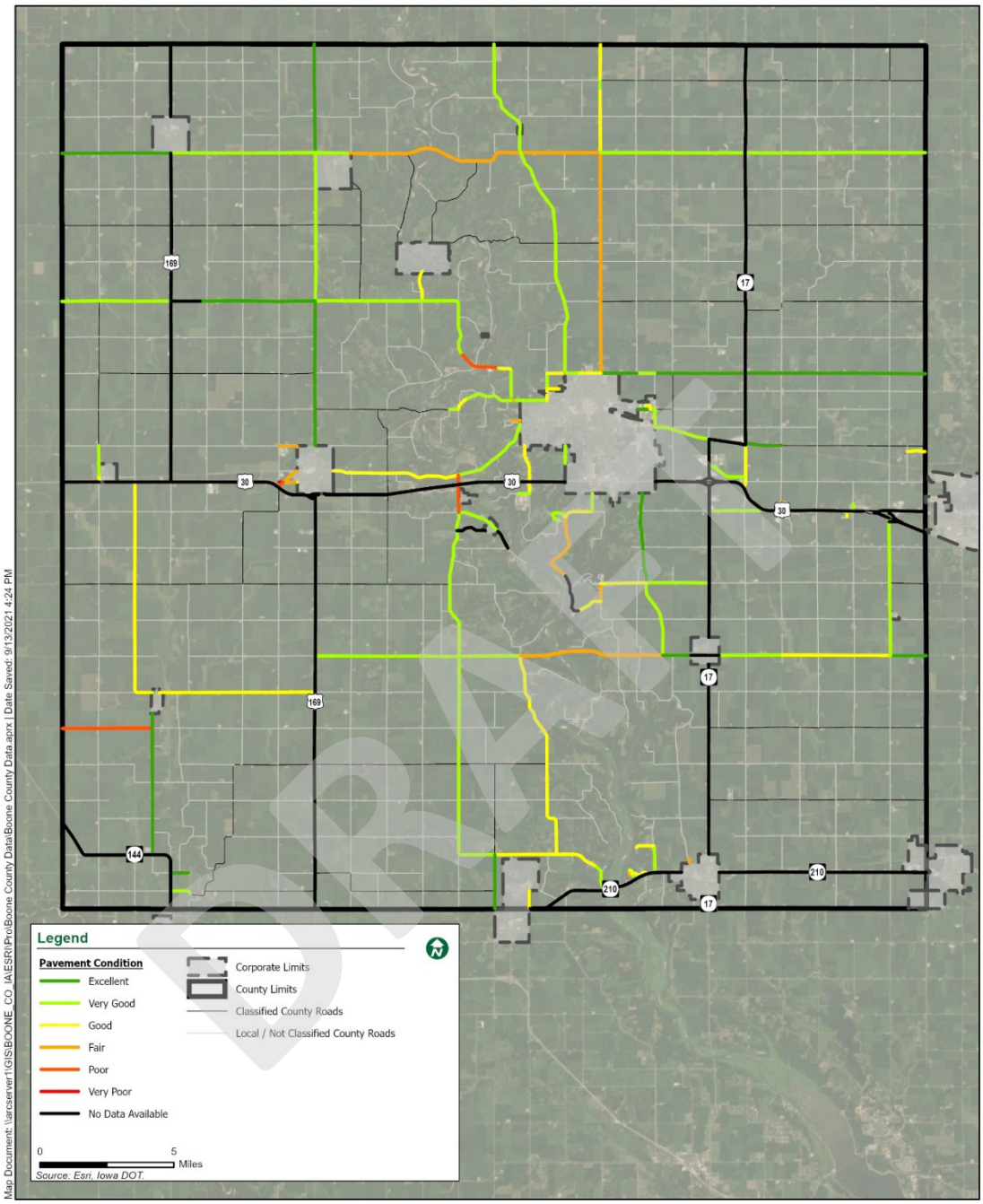

Figure 7.13 – Roadway Surface Conditions

Source: Boone County Data

Created: Bolton & Menk Inc.

Bridge Conditions

Boone County maintains 139 bridge structures and culverts, including multiple bridges that span more than 20 feet. Of these structures, 2.2% were built before 1960. Bridges built before 1960 are often functionally obsolete due to width, height, and weight restrictions. There are 33 bridges that are structurally deficient and 3 are obsolete within Boone County. Obsolete does not necessarily mean they need replacement or rehab, just that their design does not meet the current design standards and may have weight restrictions, clearance issues, or narrow lanes.

Of the bridges in Boone County, 48.9% have a sufficiency rating of 80 or greater with another 32.4% having a sufficiency rating between 50 and 80. Just 26 bridges, or 18.7% have a sufficiency rating below 50. A breakdown of bridge sufficiency by range is shown in Figure 7.14. Bridge location and sufficiency is shown in Figure 7.16.

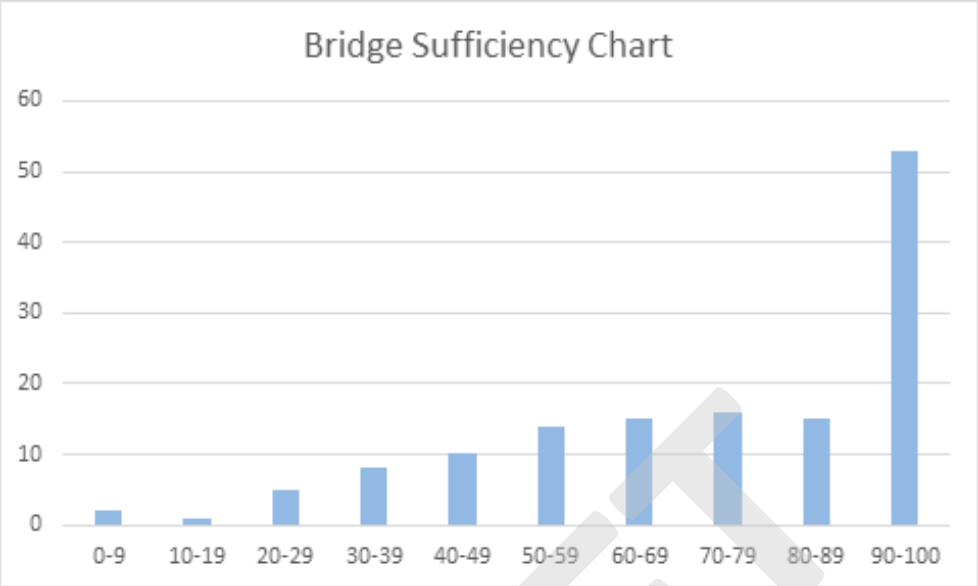

Figure 7.14 – Bridge Sufficiency Chart

Source: Boone County Data

Created: Bolton & Menk Inc.

Bridge Evaluation and Investment Review

A major component of this plan is to identify and prioritize bridge investments across the County. A County bridge prioritization process was performed based on the county's existing inventory of structures related to existing National Bridge Inventory data sheets. For the purposes of this analysis it was assumed that existing bridges in the 5 Year Program would remain the highest priorities for future investment. Future investments were then prioritized based on sufficiency rating, posting limit, and average condition of the structure.

- Bridges were analyzed in four sufficiency bins, those with sufficiency ratings less than 50, those between 50 and 75, those between 75 and 90, and those greater than 90.
- Within each quartile ranking, bridges were prioritized based on three primarily planning level data inputs: sufficiency rating, posting limit, and average condition of the structure.
- Condition average was developed based on a combination of inputs involving the superstructure, substructure and deck rating.
- Analysis and prioritization within each sufficiency bin was completed based on posting values (scaled between zero and five) and the condition average of greater than or less than six. This matrix was used to determine the final ranking.

This is a technical priority list and should be used to assist the County in developing future investment priorities. However, external factors like funding availability, coordinated road construction, environmental, and political factors may result in changing priorities. This list is intended to be flexible. Figure 7.15 shows what condition each of Boone County's bridges are in. Roughly 26.6% of bridge are in good condition, and 42.4% are in fair condition. It was found that 28.8% of bridges or 40 bridges in the County are in poor/deficient condition.

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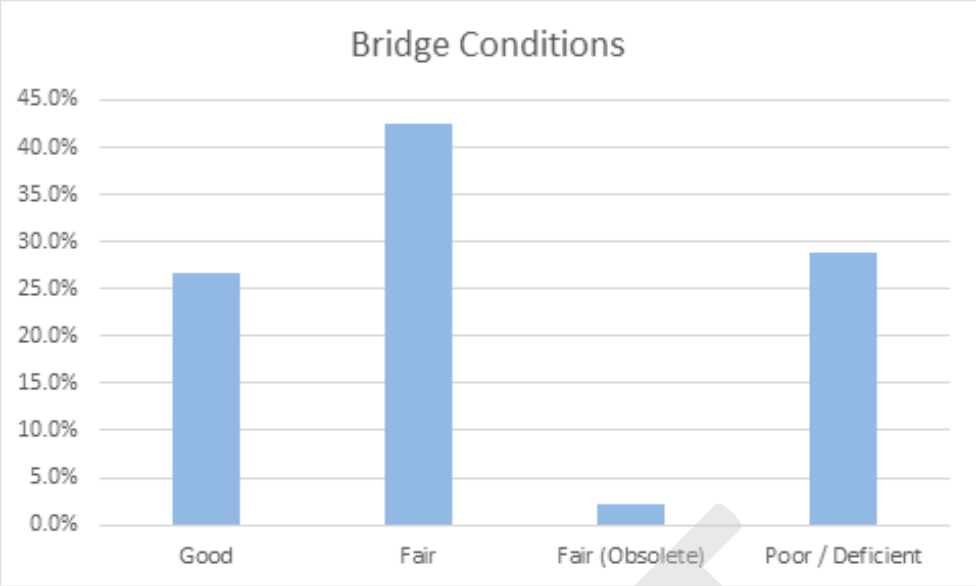

Figure 7.15 – Bridge Conditions

Source: Boone County Data

Created: Bolton & Menk Inc.

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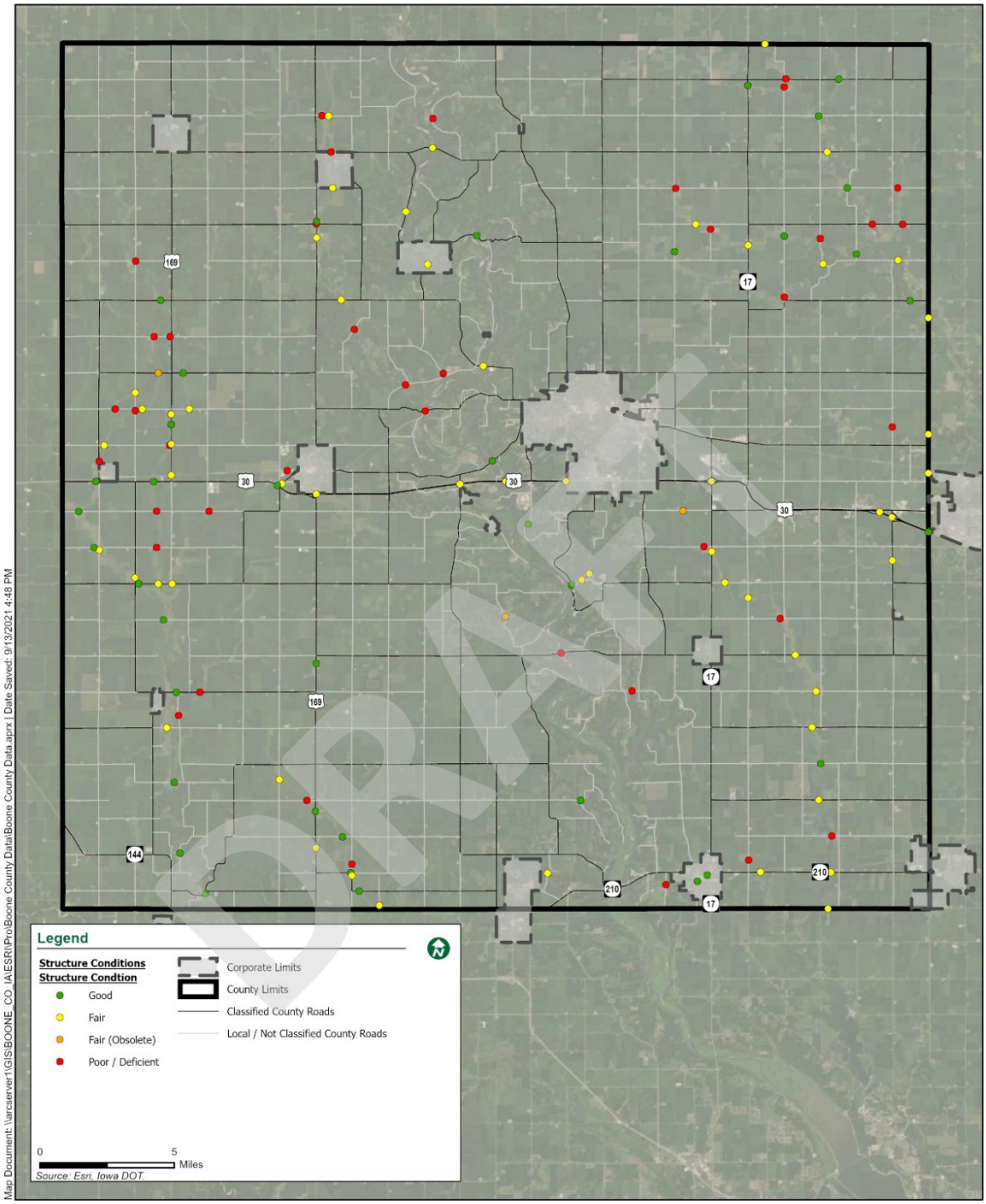

Figure 7.16 – Bridge Conditions Across Boone County

Source: Boone County Data

Created: Bolton & Menk Inc.

Rail Lines and At-Grade Crossings

Union Pacific railroad provides freight services to and through Boone County. The Boone and Scenic Valley Short Line Railroad is a heritage railroad within the County and operates freight and passenger excursions. The Union Pacific and Boone and Scenic Valley Short Line rail lines create 59 railroad crossing locations with roadways, most of which are within Boone and Ogden. All but 7 rail crossings are at-grade crossings and their public crossings are shown in Figure 7.17.

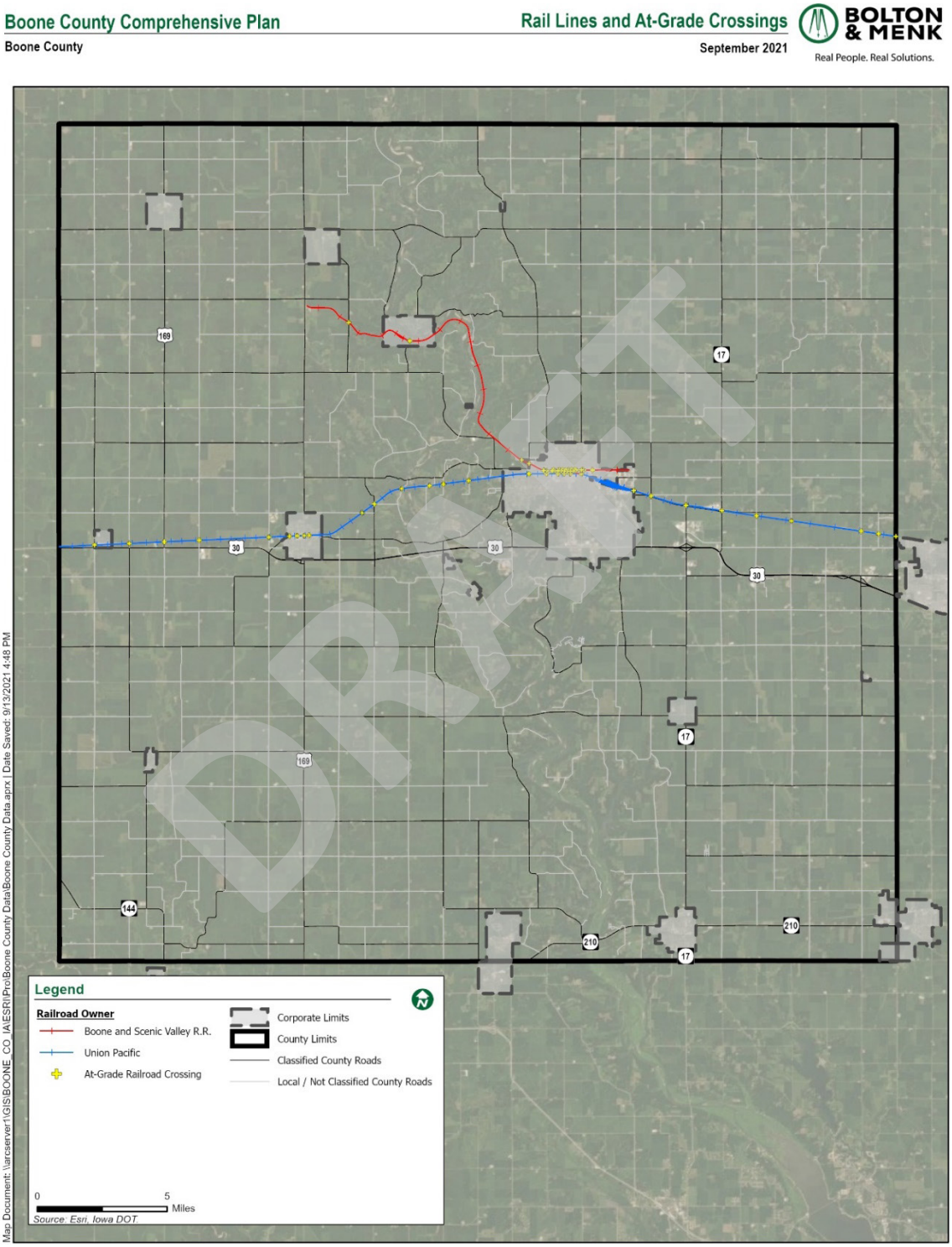

Figure 7.17 – Rail lines and Crossings

Source: Boone County Data

Created: Bolton & Menk Inc.

The survey showed mixed responses to current roadway conditions with 31.7% thinking they were in good condition, 30.6% remaining neutral, and 37.7% not believing they were in good condition. Only 20.3% of respondents believe there are adequate transportation options for all community members with 42.3% disagreeing with that statement. The top priorities for transportation in Boone County were gravel, paved, and winter roadway maintenance. The transportation goals focus on maintenance, coordination with state and local governments, and responsible investments.

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