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Mankato/North Mankato Area Planning Organization

Lookout Drive Corridor Study

Final Report

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I. Introduction

The Lookout Drive corridor is an industrial, commercial, and residential corridor with users of all modes, ages, and abilities. From the northern end of the corridor to the southern end of the corridor, Lookout Drive serves an industrial and residential growth area, provides a connection to US Highway 14, and serves established residential, institutional, and commercial areas.

The Mankato/North Mankato Area Planning Organization (MAPO), the City of North Mankato, and Nicollet County are working together to identify multimodal transportation improvements on Lookout Drive from 512th Street on the north end to Lee Boulevard (lower) on the south end. This corridor study will seek to understand transportation needs and opportunities along the corridor, develop and evaluate alternatives that address those needs and opportunities, and develop an implementation plan that is reasonable and implementable.

STUDY AREA

This study will evaluate Lookout Drive from 512th Street to Lee Boulevard (lower), including 15 study intersections. The study area and intersections are shown in **Figure 2**.

- 512th Street
- CSAH 6/Timm Road
- Carlson Drive
- Ringhofer Drive
- Howard Drive
- US 14 West Ramps
- US 14 East Ramps
- Commerce Drive
- Commerce Lane
- Lee Boulevard (upper)
- Pleasant View Drive
- Allan Avenue
- Marie Lane
- Carol Court
- Lee Boulevard (Lower)

Figure 1: Photos of Lookout Drive

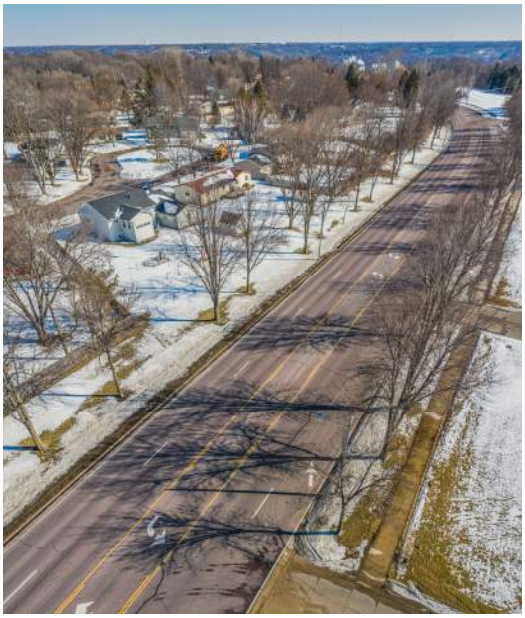
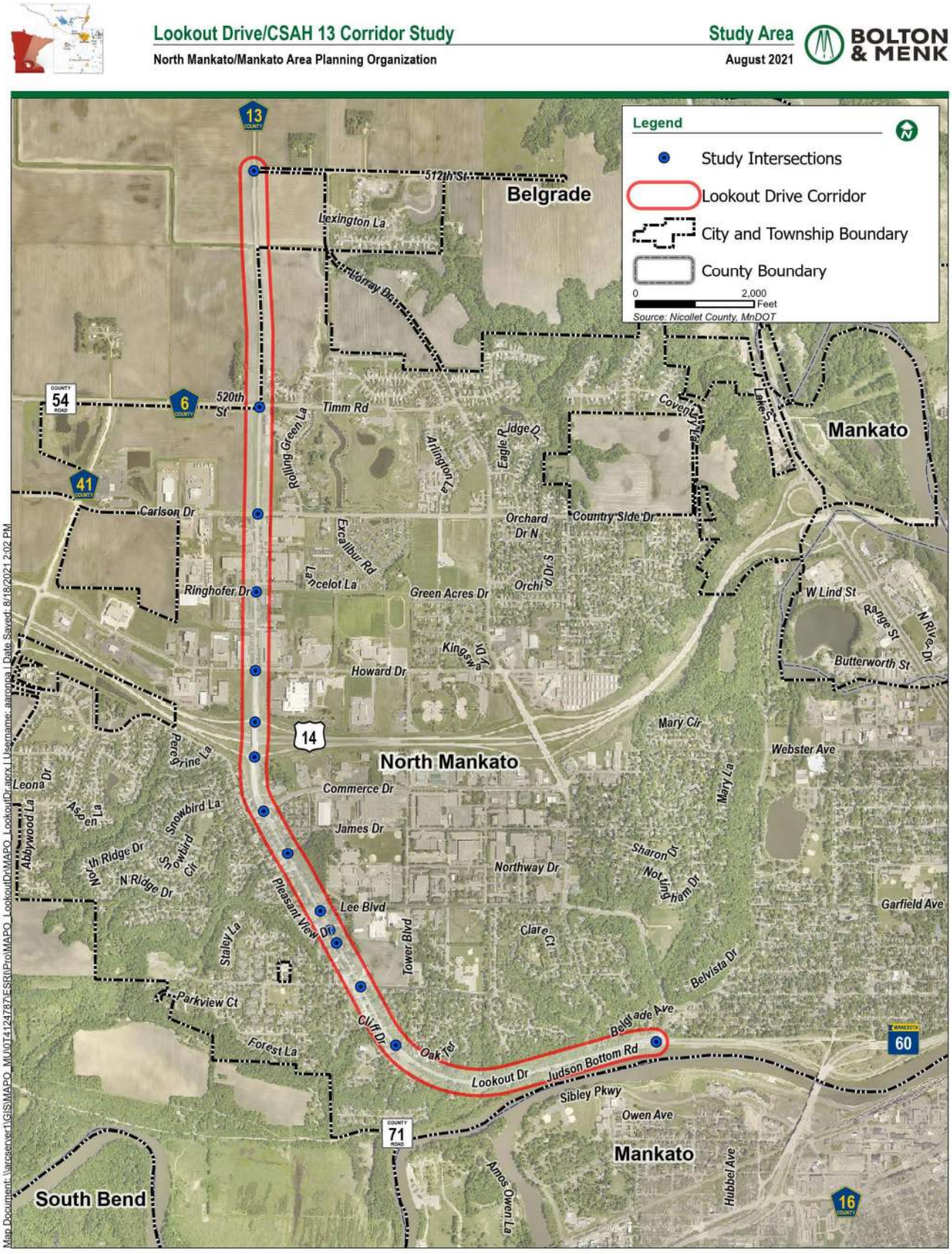


Figure 2: Corridor Study Area and Intersections



PREVIOUS STUDIES

Several planning efforts over the past decade have helped shape a transportation vision for the Lookout Drive corridor. This section highlights relevant background information and existing plans for land use and transportation along the corridor. These planning efforts provide a basis of understanding to ensure that this corridor study is consistent with existing plans for the surrounding area.

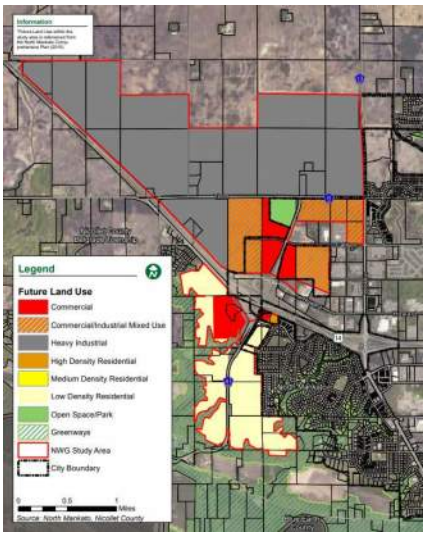
HIGHWAY 14 PEDESTRIAN BRIDGE STUDY

Concurrent with this study, MAPO along with the City of North Mankato and the Minnesota Department of Transportation are evaluating a potential pedestrian bridge that would provide safe and efficient pedestrian connectivity across Highway 14 to Caswell Park between Lookout Drive and Lor Ray Drive.

NORTHWEST GROWTH AREA STUDY

The City of North Mankato completed the Northwest Growth Area Study in November 2020. This study was completed to develop a shared vision for the northwest area of North Mankato, understand the market and future land uses necessary, and develop a framework to guide future development. This study was influential in developing future traffic projections for Lookout Drive. The future land use plan is shown in **Figure 3**.

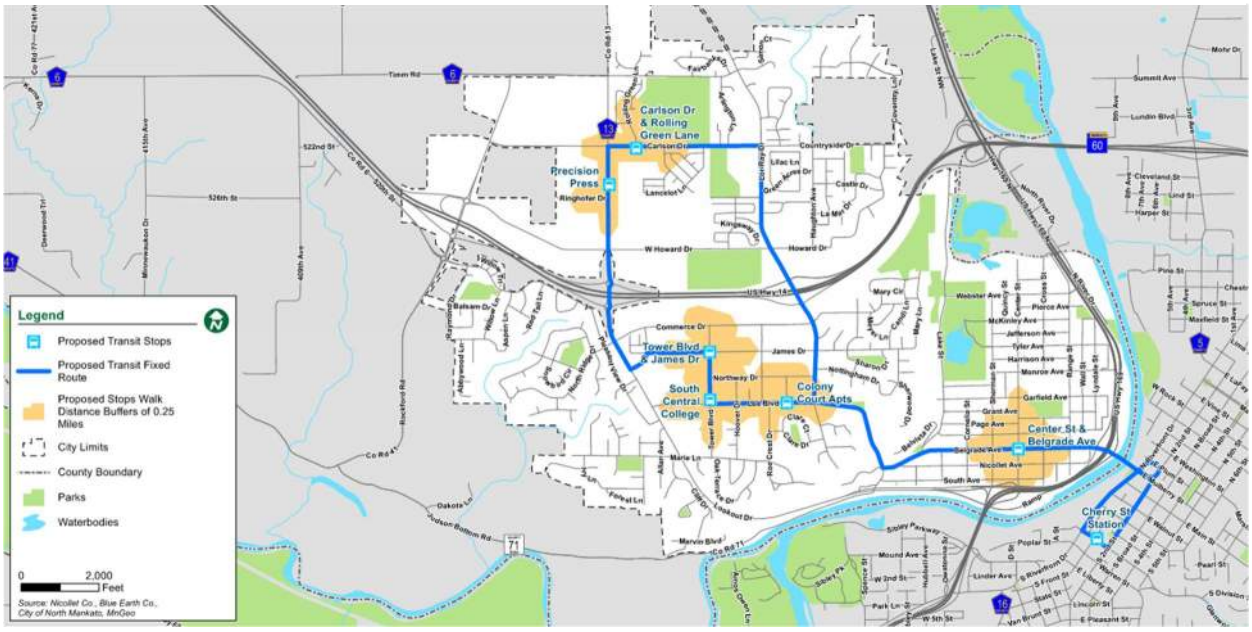
Figure 3: Future Land Use Plan Developed from Northwest Growth Area Study



NORTH MANKATO TRANSIT SERVICE REVIEW AND RECOMMENDATIONS

In 2020, North Mankato completed a transit service review. This review recommended a revised routing, as shown in **Figure 4**. The proposed route change would reduce trip travel times by around 50 percent and better match shift start times for North Mankato's industrial businesses. This route would run along Lookout Drive between James Drive and Carlson Drive, with one stop at Precision Press between Ringhofer Drive and Carlson Drive. This route has since been implemented.

Figure 4: North Mankato Transit Route



Long Range Transportation Plan Update

In 2020, MAPO updated the Long Range Transportation Plan (LRTP). This plan identifies actionable multimodal transportation projects to meet transportation needs throughout the Mankato area. This plan is fiscally constrained, meaning projects identified in this plan have a reasonable expectation of implementation over the life of the plan, through 2045. Throughout the LRTP, there were multiple needs identified for Lookout Drive:

- Jurisdictional transfer from Nicollet County to North Mankato for CSAH 13 between Howard Drive and CSAH 41 (512th Street), contingent upon the CSAH 41 connection to CSAH 13
- Fair to poor pavement conditions between 512th Street and Howard Drive
- Poor traffic operations on Lookout Drive between Marie Lane and Lee Boulevard (lower)
- Connect CSAH 41 to Lookout Drive at 512th Street (further study necessary to determine final connection location)
- Bicycle and pedestrian improvement needs throughout Lookout Drive

From 2020 to 2045, North Mankato is estimated to have $82 million in transportation funds and Nicollet County is estimated to have $16 million. Lookout Drive is anticipated to receive just over $9 million, with most to occur in the long term (2036 through 2045). For projects marked illustrative, that means the project is a high priority need but there is no funding currently available.

Table 1: Lookout Drive Projects Included in LRTP

Roadway	Termini	Description	Time Frame	Estimated Cost
Lookout Dr	Marie Ln to Commerce Dr	SRTS Infrastructure Improvements	Short	$883 K
Lookout Dr	Carlson Dr to 512th St	New Trail	Mid 1	$604 K
CSAH 13	506th St to Howard Dr	Two- and Three-Lane Major Rehabilitation, Safety, Multimodal Improvements	Long	$2.8 M
Lookout Dr	Commerce Dr to Marie Ln	Three-/Five-Lane Urban Major Rehabilitation, Safety, Multimodal Improvements	Long	$4.8 M
Lookout Dr	Marie Ln to Lee Blvd Lower	Three-/Five-Lane Urban Major Rehabilitation, Safety, Multimodal Improvements	Illustrative	-
Lookout Dr	Howard Dr	Single Lane Roundabout	Illustrative	-
Lookout Dr	Multiple	Traffic Control Improvements (Marie Ln, Lee Blvd, Commerce Dr, Carlson Dr, CSAH 6/Timm Rd)	Illustrative	-
Lookout Dr	Lee Blvd (Lower) to Marie Ln	New Trail	Illustrative	-

2022 – 2025 Transportation Improvement Program

The 2022 – 2025 Transportation Improvement Program (TIP) includes one project for Lookout Drive: Safe Routes to School infrastructure improvements surrounding Hoover Elementary School (2024).

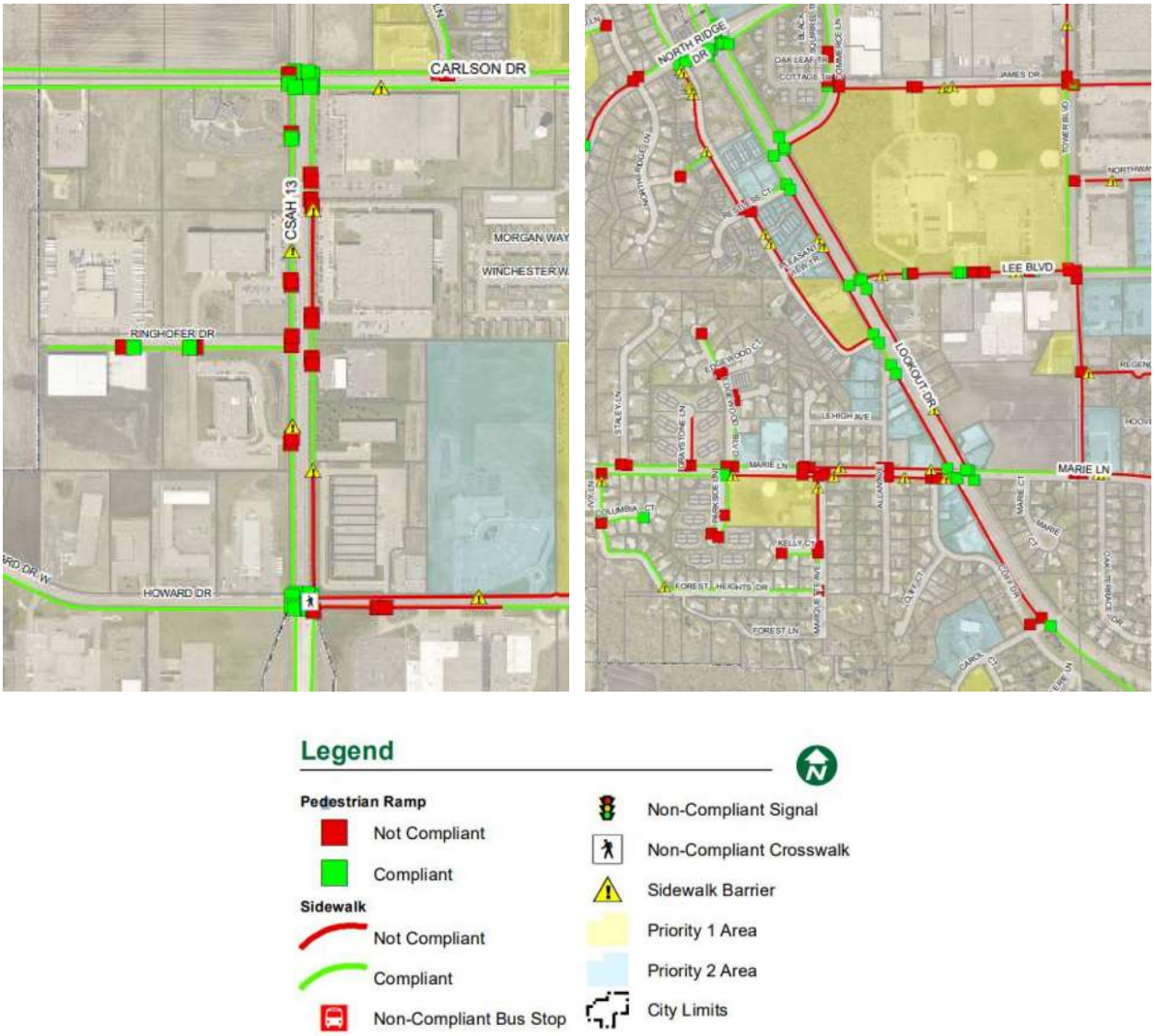
Mankato/North Mankato Area ADA Transition Plan

In 2019, the Mankato/North Mankato Area Planning Organization completed an Americans with Disabilities Act (ADA) Transition Plan for public rights-of-way. The Americans with Disabilities Act is a civil rights law prohibiting discrimination against individuals on the basis of disability and applies to public facilities. For transportation facilities it dictates the design and maintenance requirements for sidewalks and trails, curb ramps, crosswalks, traffic signal push buttons, and bus stops.

The ADA Transition plan identified deficiencies along the transportation elements and prioritized them for improvement based on land use, funding availability, and planned projects. North Mankato maintains 65 miles of sidewalk and trail, 1,000 pedestrian ramps, 14 bus stops, 46 traffic signal push buttons, and 465 crosswalks. Nicollet County contains 10 miles of sidewalk and trail, 160 pedestrian ramps, and 32 crosswalks.

This plan identified multiple deficiencies along Lookout Drive, as shown in **Figure 5**. This includes more than 6,800 feet of non-compliant sidewalk, 19 non-compliant pedestrian ramps, and 11 barriers.

Figure 5: Transportation Deficiencies Identified in ADA Transition Plan

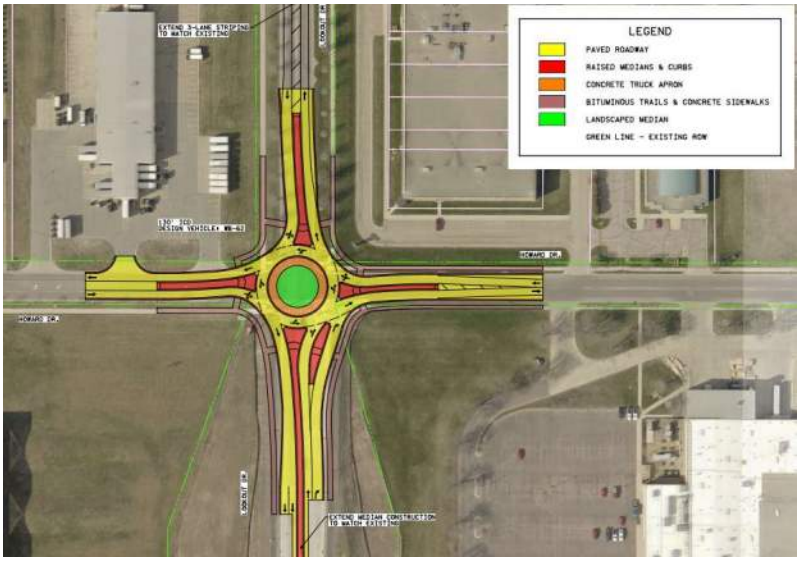


Lookout Drive and Howard Drive Intersection Control Evaluation

In 2018, an intersection control evaluation was completed for the Lookout Drive and Howard Drive intersection. Currently, the intersection is all-way stop controlled. A detailed analysis considered an all-way stop control, roundabout control, and traffic signal control with considerations given to right-of-way, the overall transportation need under current and future projected conditions, pedestrian and bicycle needs, and local acceptance.

Under current conditions, this intersection does not meet the requirements for a traffic signal or an all-way stop. By 2037, it is likely to meet warrants for both a signal or all-way stop control. Ultimately, this evaluation recommended maintaining the existing all-way stop control with a roundabout being the preferred solution in the future if safety issues develop or traffic volumes increase. The roundabout would likely require new right-of-way and would need to address driveway issues on the west leg, as shown in **Figure 6**.

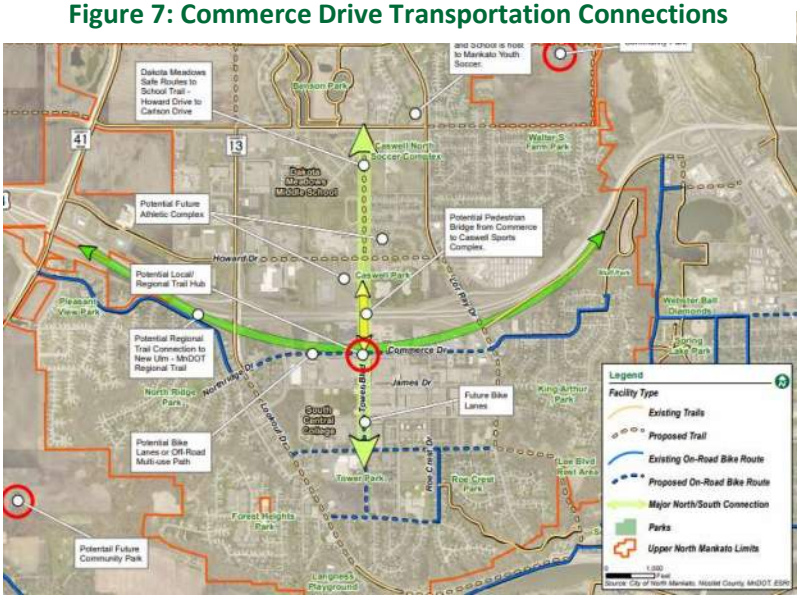
Figure 6: Lookout Drive and Howard Drive Roundabout Layout



Commerce Drive Area Development Plan

In 2018, North Mankato completed the Commerce Drive Area Development Plan to develop a shared vision for the future of the corridor to develop this core business district as a community destination. Of relevance to Lookout Drive, this area development plan proposed on-road bicycle facilities along Commerce Drive that would connect to Rockford Road/Nicollet County 41 on the west, cross Lookout Drive, and connect to Bluff Park on the east. This plan would require careful coordination with Lookout Drive to provide a safe bicycle and pedestrian crossing at Lookout Drive and Commerce Drive.

Figure 7: Commerce Drive Transportation Connections



North Mankato Complete Streets Policy

In 2016, North Mankato adopted a complete street plan and policy that identifies the need and benefit for complete streets. Complete streets refers to the practice of incorporating all modes of transportation into roadway projects. This policy covers pedestrian and ADA compliant elements, bicycle facilities, streetscaping, traffic calming, access management, and transit features. The policy states "the City of North Mankato seeks to establish a Complete Streets policy to incorporate active transportation

into the planning, design and operation of all future City street projects whether new construction, reconstruction, rehabilitation, or pavement maintenance." This corridor study will incorporate complete streets into the alternatives considered to increase accessibility and mobility for people of all ages and abilities.

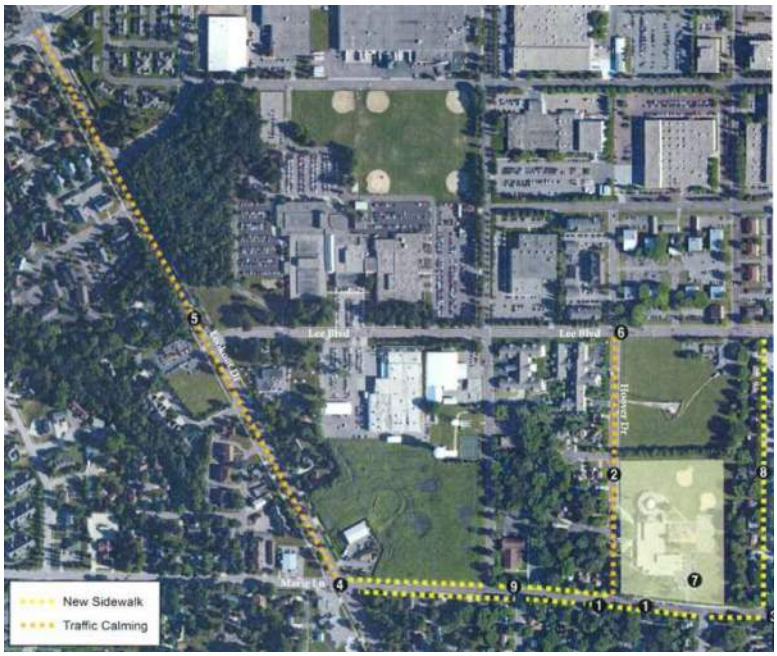
North Mankato Safe Routes to School

In 2015, a Safe Routes to School (SRTS) Plan was completed for four schools in North Mankato, including two schools near the Lookout Drive corridor (Hoover Elementary and Dakota Meadows Middle School). SRTS plans seek to provide the infrastructure and programming necessary to increase opportunities for students to safely walk and bike to school. There are six elements of SRTS: evaluation, engineering, education, encouragement, equity, and enforcement.

Hoover Elementary

Parents of Hoover Elementary students identified high traffic volumes, high speeds, and intersection crossing safety as their primary concerns. Nearly 80 percent of parents said they would allow their child to walk or bike to school if the safety of intersections and crossings were improved. The school arrival and dismissal observations noted the wide crossing at Marie Lane and Lookout Drive as a major barrier.

Figure 8: Hoover Elementary School SRTS Recommended Improvements



The recommended improvements include a shared use path on the east side of Lookout Drive between Commerce Drive and Marie Lane, a shared use path on the north side of Marie Lane between Lookout Drive and Hoover Drive, improved signal timing at Lookout Drive/Marie Lane, traffic calming on Lookout Drive, and the consideration of design revisions on Lookout Drive to improve crossing conditions for bicyclists and pedestrians.

Dakota Meadows Middle School

The most significant roadway-related concerns for parents of Dakota Meadows Middle School students are traffic volumes and speeds along walking routes and intersection/crossing safety.

As it relates to Lookout Drive, the SRTS plan recommended a shared use path on the south side of Howard Drive between Lookout Drive and Lor Ray Drive.

II. Demographics and Land Use Trends

DEMOGRAPHICS

Located in south central Minnesota, the Mankato/North Mankato metropolitan planning area is 75 miles south of Minneapolis-St. Paul at the junction of Highway 14 and Highway 169/60. The area has experienced widespread growth across the metropolitan area and serves southern Minnesota as a hub for health care, education, retail, agriculture, and industry. The area is comprised of Mankato, North Mankato, Eagle Lake and Skyline; Blue Earth and Nicollet counties; and Belgrade, Lime, South Bend, LeRay and Mankato townships.

POPULATION

The Mankato/North Mankato area has seen rapid growth. In 2010, the Metropolitan Statistical Area (MSA) population was 96,740 with an urbanized population of 58,265. The 2010 population estimate represents a 13 percent change from the year 2000 for the MSA. Table 2 illustrates historic population figures referenced from the MAPO 2045 Long Range Transportation Plan along with 2020 census counts referenced from the State Demographer and the US Census Bureau.

Table 2: 1980 - 2019 Population

	1980	1990	2000	2010	2020	Change[1]
Nicollet County	26,929	28,076	29,771	32,727	34,454	5.3%
Blue Earth County	52,314	54,044	55,941	64,013	69,112	8.0%
Mankato MSA[2]	79,243	82,120	85,712	96,740	103,566	7.0%
MAPO Planning Area[3]	46,863	50,622	52,859	62,312	68,135	9.3%

Source: U.S. Decennial Census (1980, 1990, 2000, 2010, 2020)

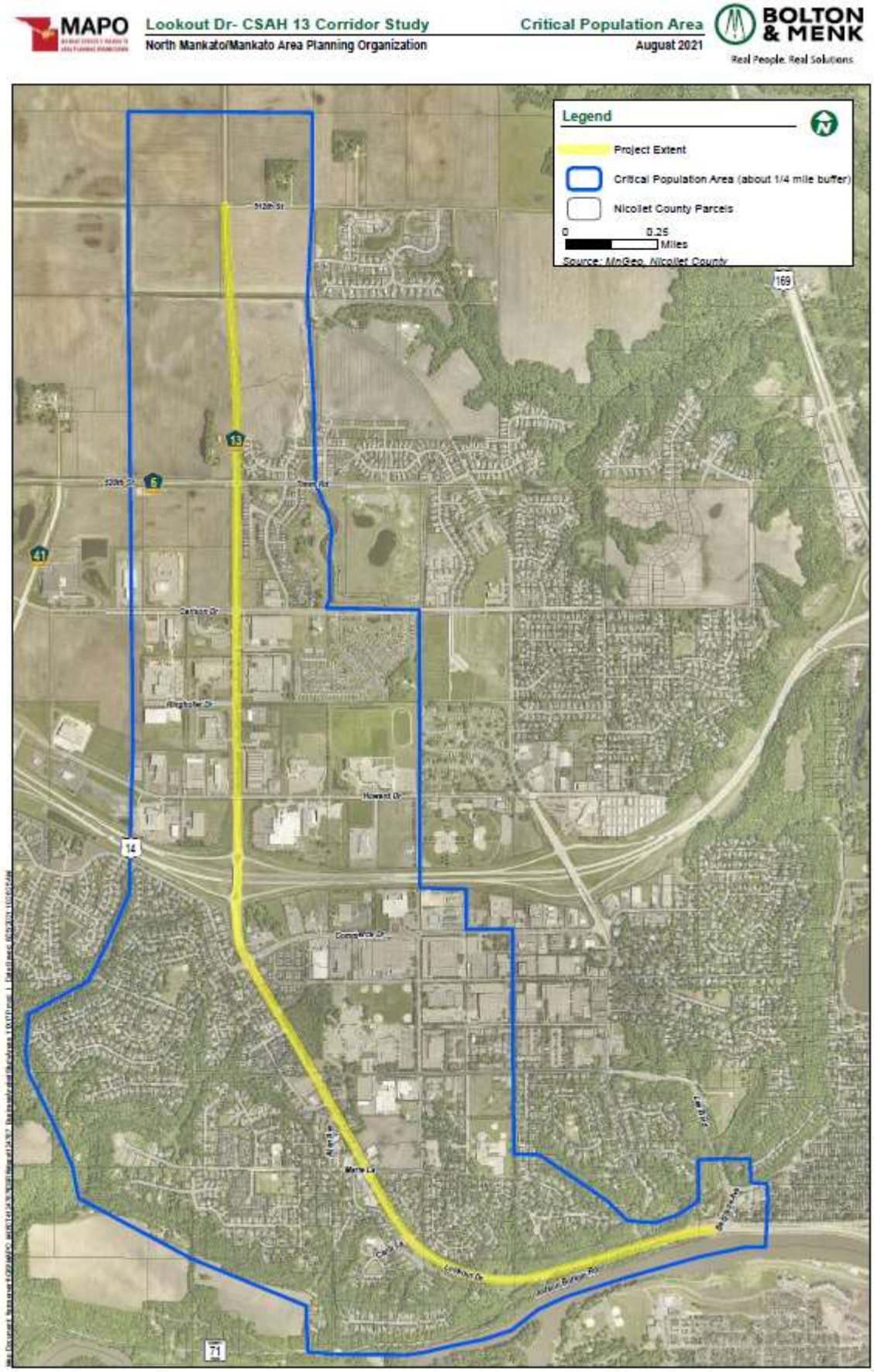
[1] Percent change in population from 2010 to 2020. [2] Mankato-North Mankato MSA boundaries are Blue Earth and Nicollet counties. [3] Total population of member jurisdictions. Only a portion of Blue Earth and Nicollet Counties are included.

Critical Population

A critical population boundary was identified (**Figure 9)** using an approximate one-half mile buffer to better understand characteristics of the population most likely to use the corridor daily and with potential to be the most impacted by roadway improvements. Lookout Drive provides this population with the key connection between major job centers, schools, and recreational opportunities. This boundary also serves as the basis for the environmental justice review as seen in the Environmental Justice Report provided as an attachment to this report. Various demographic metrics were defined for this critical area using ESRI's Business Analyst application. This included an understanding of population, households, income, age, etc. for the area.

- An estimated 4,427 people living in 1,945 households occupy this area.
- This population is primarily white (86.5 percent), with 7.6 percent being Black, 2.8 percent Asian, and 3.7 percent Hispanic.
- Nearly sixty percent of the population has a 2-year, 4-year, or post graduate degree.
- Nearly 32 percent of the population lives in renter occupied housing; of renters, 50 percent spend more than 30 percent of their household income on rent.
- The median household income in this area is $69,454. More than seven percent of the population falls below the poverty line.
- More than 27 percent of the population is under 18.
- Ten percent of the population has no internet access.
- Twenty-three percent of households have at least one person with a disability in the household.

Figure 9: Critical Population Boundary

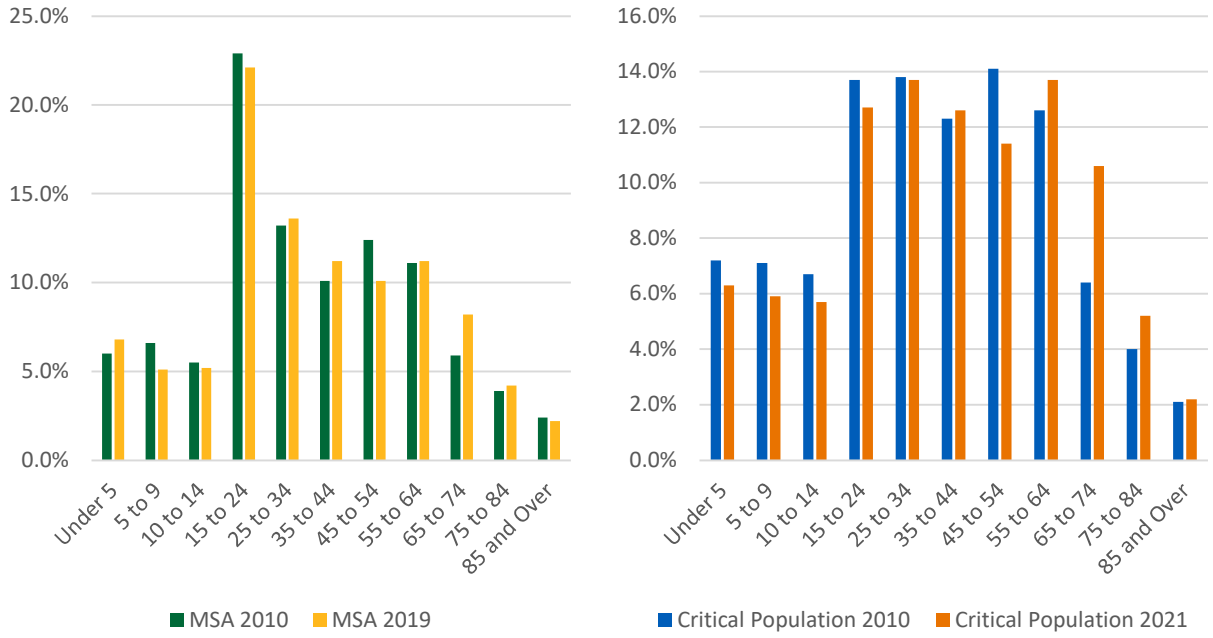


AGE

The population's age distribution is important as it affects travel demand, patterns, and behaviors. The age range for the MSA and the critical population is shown in **Figure 10**. Within the period from 2010 to 2018 in the MSA, the largest population increases occurred in the 35 to 44 and 65 to 74 age ranges. Those aged 20 to 24 represent the largest demographic group, despite a small decline over the past eight years. Those aged 18 to 34 comprise more than 27 percent of the total population.

The age of the population in the critical population boundary is illustrated in **Figure 10** for 2010 and 2021 estimates. This shows that around 50 percent of the study area population is between ages 15 and 64, with the most represented age ranges being 25 to 34 and 55 to 64. In general, the population within the critical boundary tends to be older than the overall MSA.

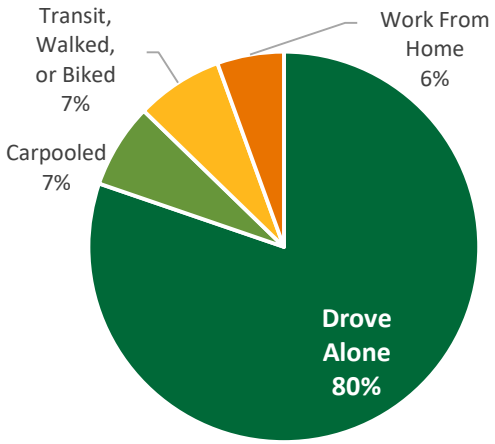
Figure 10: Age by Age Range (MSA – left and Critical Population - Right)



EMPLOYMENT

Most household trips include travel to and from places of employment. Mankato and North Mankato are the major employment centers for the region with a labor shed spanning 16 counties. There is a net inflow of primary jobs in the MAPO market area, meaning there are more jobs in the market than people living in the market area. Around 69 percent of the labor force living in the Mankato/North Mankato metro also work there. Census data from 2018 estimate more than 21,000 people who work in the metro, live outside the metro area.

Figure 11: Commute Mode for Critical



For those who live within the critical boundary, eighty percent drove alone to work. Five percent walked to work and two percent biked to work.

EXISTING LAND USE

Land use and transportation are directly linked. Travel behavior is determined by the location of where people live in relation to where they work, shop, socialize, and recreate. Land use can have many implications on the characteristics of an area and the efficiency of its transportation network. For example, a primarily industrial neighborhood will have peak traffic flows often associated with shift work and must accommodate heavy truck movements whereas a residential neighborhood will have strong peaking and directional characteristics as people leave to and return from work.

Lookout Drive is surrounded by several different land uses, as shown in **Figure 13**. Generally, north of US Highway 14, the corridor is surrounded by industrial on the west side, with industrial and residential on the east side. South of US Highway 14, there is some commercial and multifamily residential on the west side, with institutional and planned industrial on the east side. South of Marie Lane, the land use on both sides of Lookout Drive is primarily single family residential.

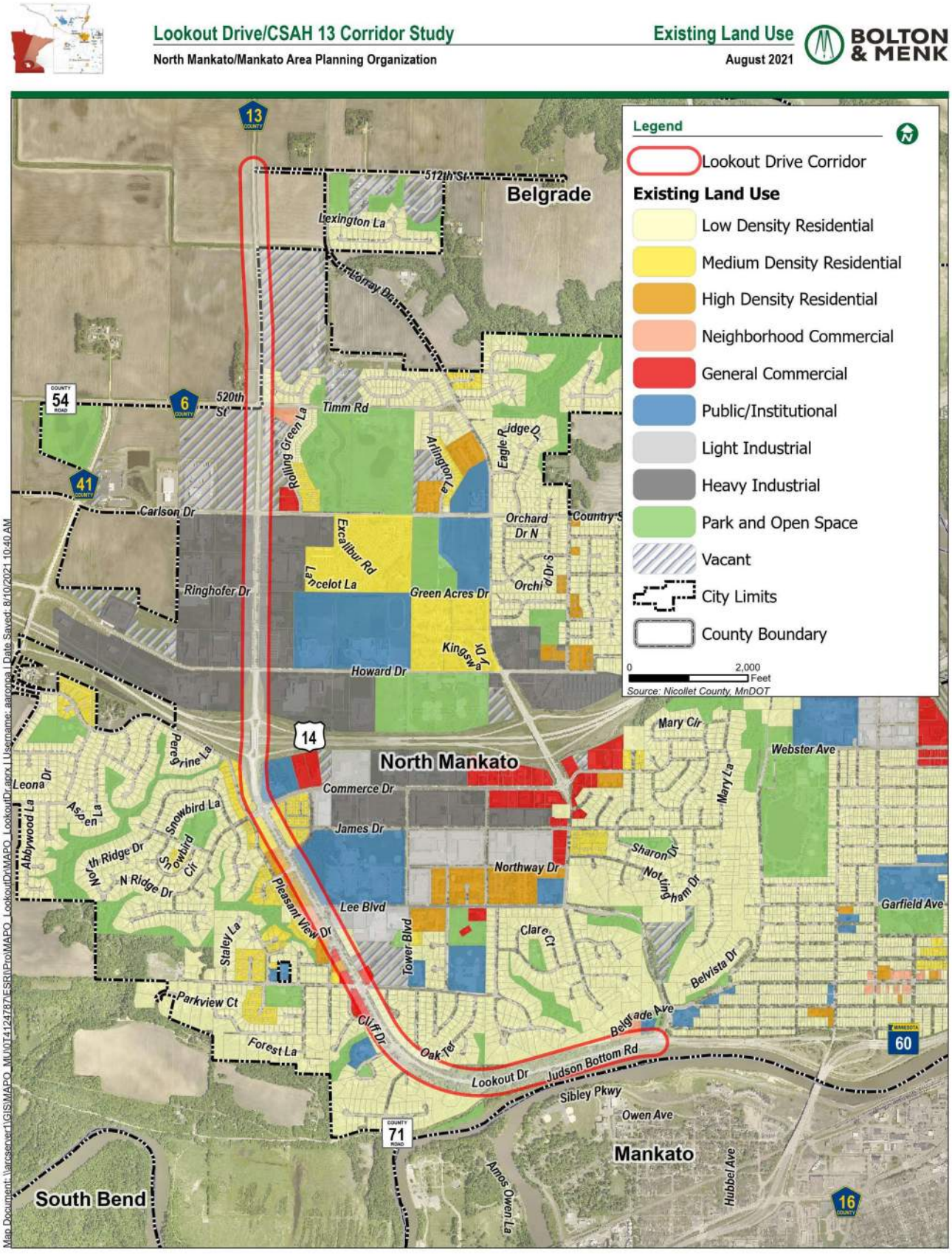
Major Traffic Generators

Some of the Mankato-North Mankato area's largest employers are located on or near the Lookout Drive corridor, including Kato Engineering, Mankato Clinic, Precision Press, South Central College, MICO, Inc. and others. These large industrial and manufacturing companies produce heavy traffic, including truck traffic, on Lookout Drive.

In addition to vehicular traffic generators, there are a variety of large bicycle and pedestrian generators surrounding the corridor. Hoover Elementary and Dakota Meadows Middle schools are located east of Lookout Drive and require students who live within one mile for Kindergarten through 5th Grade and two miles for 6th Grade to 12th Grade, respectively to walk, bike, or be dropped off by a caretaker. Benson Park, Caswell Park, Reserve Park, Casey's, and multiple places of worship are all places people are more likely to walk or bike to.

Figure 12: Children Waiting to Cross Marie Lane

Figure 13: Existing Land Use



III. Existing Network Characteristics

The transportation network characteristics identify major qualities of the physical roadway system of Lookout Drive and its connections.

DEFINING FEATURES

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 highway system. A successful system coordinates and manages mobility, roadway design, and route alignment and 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 local 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 14**. Most travel relies on a network of roads at multiple classification levels.

Figure 14: Access and Mobility for Each

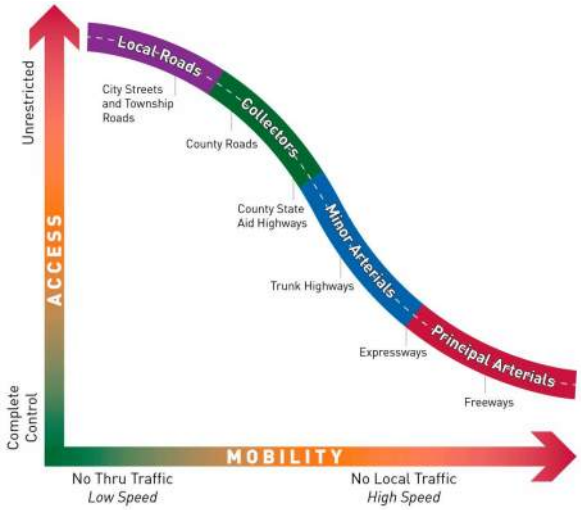


Figure 15 shows the functional classification for Lookout Drive and intersecting roadways. Lookout Drive from 512th Street to CSAH 6/Timm Road is a major collector. From CSAH 6/Timm Road to Lee Boulevard (lower), Lookout Drive is a minor arterial. All alternatives for Lookout Drive must reflect the corridor's functional classification and find the appropriate balance between access and traffic mobility.

ROADWAY DESIGN

Generally, Lookout Drive has five typical cross-sections throughout the study area, each with different lane configurations, widths, pedestrian and bicycle facilities, and curb and gutter/shoulder designs.

- **512th Street to Carlson Drive** is a two-lane rural roadway with 10-foot wide shoulders for a total typical pavement width of approximately 43 feet. Turn lanes are present at primary intersections. There are no dedicated pedestrian or bicycle facilities.
- **Carlson Drive to Howard Drive** is a three-lane urban roadway with curb and gutter, a center left-turn lane, and shoulders for a total approximate width of 54 feet. There is an 8-foot multi-use trail on the west side of Lookout Drive with a 6-foot sidewalk on the east side.
- **Howard Drive to Commerce Drive** is primarily the US 14 interchange, with two through lanes in the northbound and southbound directions and sidewalks on both sides of the roadway.
- **Commerce Drive to Carol Court** is a five-lane urban roadway with curb and gutter and a center left-turn lane for a total approximate width of 66 feet. There are 6-foot sidewalks on both sides of the roadway, except for on the east side between Marie Lane and Carol Court.
- **Carol Court to Lee Boulevard (lower)** is a 2+1+1 configuration with two northbound lanes, one southbound lane, and a center left-turn lane on the west side of this segment. This segment transitions from an urban section with curb and gutter to a rural section with paved

shoulders. The typical width for this segment varies between 48 and 58 feet. There are no dedicated pedestrian or bicycle facilities.

Right-of-Way

Right-of-way (ROW) is the available space owned by the jurisdiction on which the roadway and associated utilities reside. ROW is often a constraining factor in developing alternatives, because acquiring additional ROW can be costly, increase project delivery deadlines, or stop a project altogether. ROW widths vary along the corridor, depending on the location, as shown in Table 3.

Table 3: Estimated ROW

Segment	Approximate Right-of-Way
512th Street to Carlson Drive	120’
Carlson Drive to Howard Drive	120’
Howard Drive to Commerce Drive	> 250’
Commerce Drive to Carol Court	150’
Carol Court to Lee Boulevard	> 250’

Pavement Conditions

Timely pavement rehabilitation has the potential to be six to 14 times more cost-effective than rebuilding a deteriorated road. Poor pavement conditions add nearly $600 to the annual cost of car ownership due to damaged tires, suspension, reduced fuel efficiency, and accelerated vehicle depreciation. While North Mankato and Nicollet County use slightly different pavement evaluation methods, both are useful tools in understanding the current condition of the pavement and future investment needs.

- Nicollet County uses a Ride Quality Index for its pavement evaluation with each segment of pavement receiving a numerical condition rating between 5 for an excellent surface to 0 for a failed surface. Lookout Drive from 512th Street to Ringhofer Drive is in fair condition and Ringhofer Drive to Howard Drive is in poor condition.
- North Mankato uses a visual survey for its pavement evaluation with each segment of pavement receiving a numerical condition rating between 10 for a newly surfaced street in excellent condition to 1 for a failed surface. Lookout Drive from Commerce Drive to Lee Boulevard (lower) is in good condition and received a score of 8. Pavement conditions for City-maintained streets are shown in **Figure 16**.

Figure 15: Functional Classification

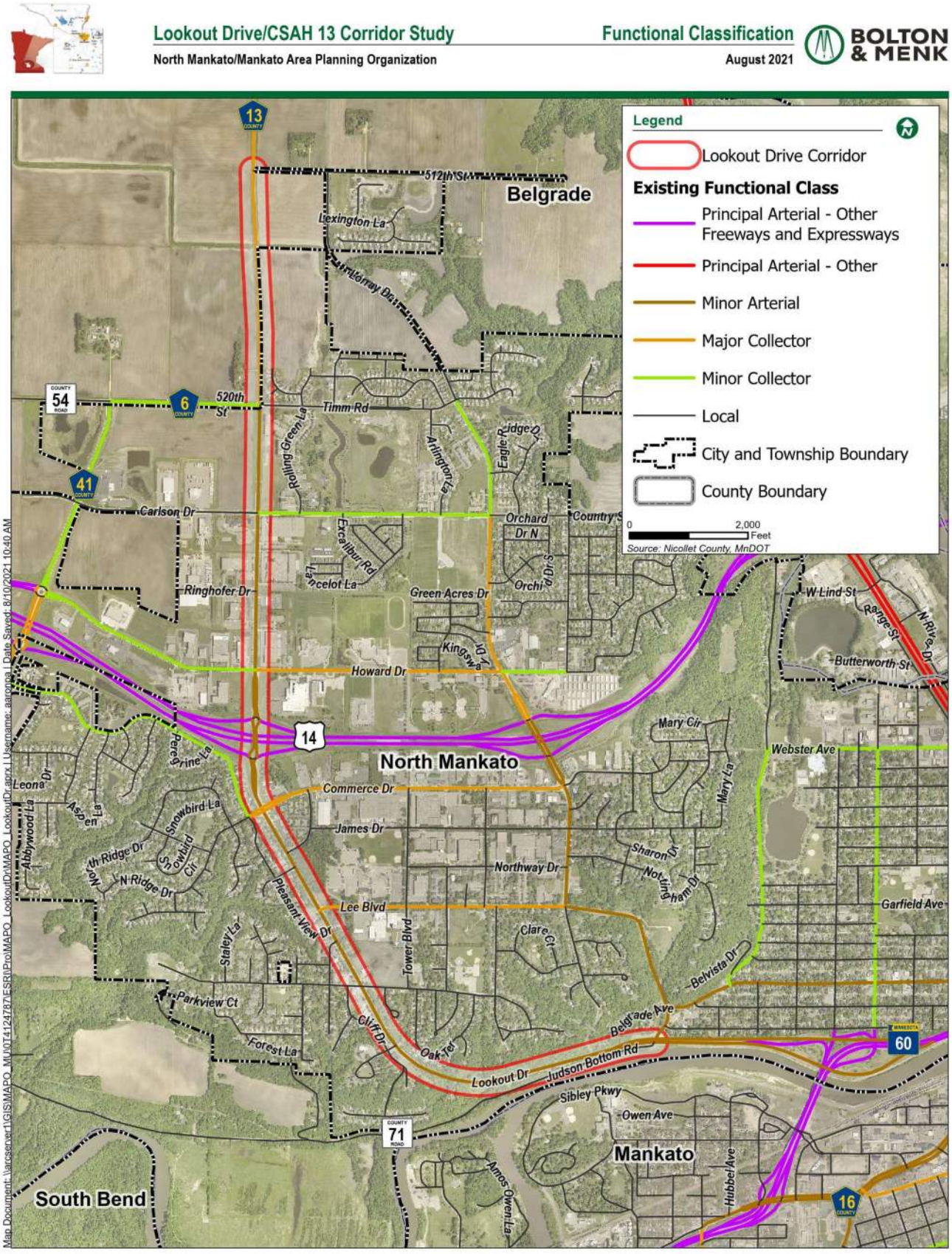
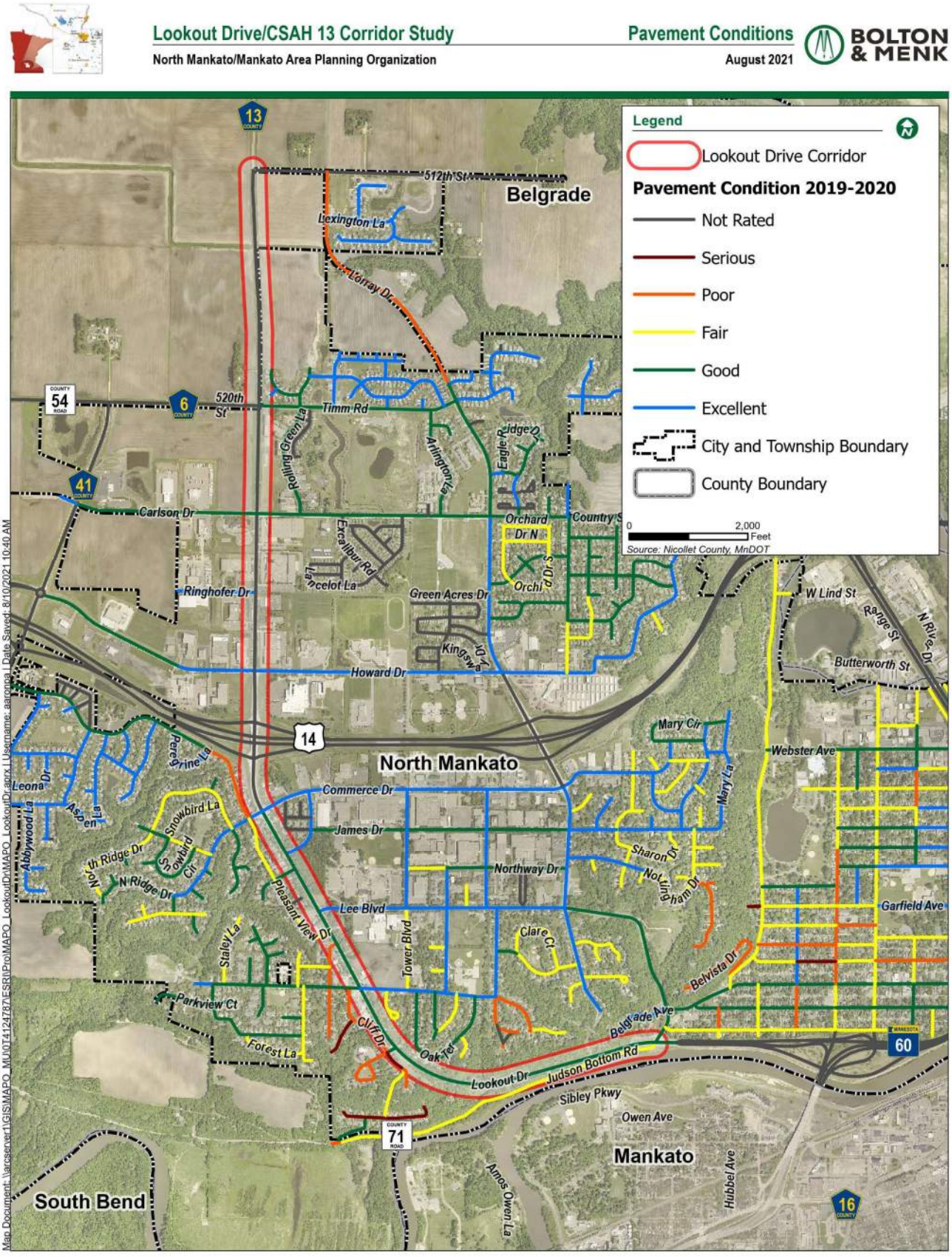


Figure 16: Pavement Conditions



ACCESS ONTO LOOKOUT DRIVE

Access management is the process of balancing the competing needs of traffic movement and property access. Access points introduce conflict and friction into the traffic stream. Research has found that every unsignalized driveway increases the corridor crash rate by approximately two percent. Allowing dense, uncontrolled access spacing results in safety and operational deficiencies for vehicles and reduces bicycle and pedestrian comfort and safety. A context-specific balance between access and mobility is important when developing a safe and efficient roadway network that serves all users. Nicollet County and North Mankato have different access management guidelines established in their zoning ordinances.

- For Nicollet County, private driveways/accesses are not permitted. This guidance applies to Lookout Drive north of Howard Drive.
- For North Mankato, private driveways/access are not permitted on Minor Arterials. This guidance applies to Lookout Drive between Howard Drive and Lee Boulevard (lower).

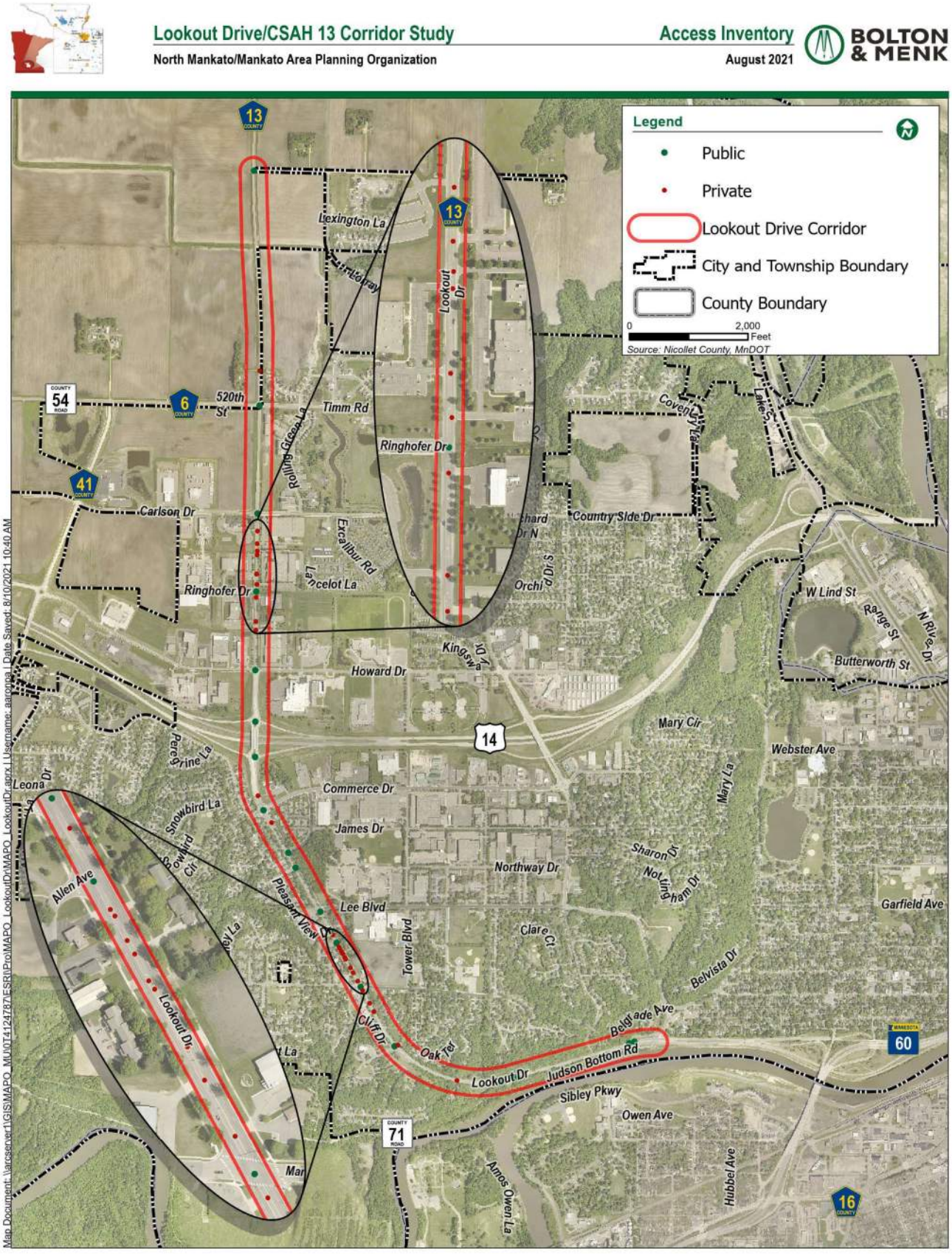
This guidance only applies to future access points from redevelopment or new construction.

Along Lookout Drive, there are 27 private driveways/accesses, as shown in **Figure 17**. Generally, the segment of Lookout Drive north of Howard Drive there are many densely spaced private driveways. In combination with the center left-turn lane and the offset private driveways, this can create challenging driving conditions as drivers must be attentive to vehicles entering and exiting traffic from multiple locations. For the segment of Lookout Drive south of Howard Drive, there are technically no private accesses permitted. For some parcels, primarily residential homes, removing their private driveways would eliminate all feasible access; however, many of the commercial parcels between Lee Boulevard (upper) and Carol Court have multiple driveways on Lookout Drive as well as other roadways like Cliff Drive, Marie Lane, and Allan Avenue. There may be opportunities to remove or consolidate duplicative driveways during future construction projects.

Table 4: Private Accesses by Segment

Segment	Private Accesses	Allowable Access Points per Mile
512th Street to Carlson Drive	1	0
Carlson Drive to Howard Drive	8	0
Howard Drive to Commerce Drive	1	0
Commerce Drive to Carol Court	15	0
Carol Court to Lee Boulevard	2	0

Figure 17: Access Inventory



MULTIMODAL FACILITIES

Enhancing the ability of people to walk and bike involves providing adequate infrastructure and linking urban design, streetscapes, and land use to encourage walking and biking. Designing roadways to accommodate all types of users is commonly termed "complete streets" which come with many benefits:

- Streets designed with sidewalks, raised medians, traffic-calming measures and treatments for travelers with disabilities improves pedestrian safety. Research has shown that sidewalks alone reduce vehicle-pedestrian crashes by 88 percent.
- Multiple studies have found a direct correlation between the availability of walking and biking options and obesity rates. The Centers for Disease Control and Prevention recently named adoption of complete streets policies as a recommended strategy to prevent obesity.
- Complete streets offer inexpensive transportation alternatives to roadways. A recent study found that most families spend far more on transportation than food.
- Research has found that people who live in walkable communities are more likely to be socially engaged and trusting than residents living in less walkable communities.

Existing multimodal facilities are shown in **Figure 20** and discussed in more detail below.

PEDESTRIAN AMENITIES AND FACILITIES

The availability of pedestrian facilities varies throughout the corridor:

- **From CSAH 6/Timm Road to Carlson Drive**, there are no pedestrian facilities.
- **From Carlson Drive to Howard Drive**, there is a sidewalk on the east side and a shared use path on the west side. Facilities are buffered from the roadway with a wide grassy boulevard that includes densely planted trees.
- **From Howard Drive to Commerce Drive**, shared use paths are provided on both sides of the roadway with some areas buffered with a narrow grassy boulevard.
- **From Commerce Drive to Marie Lane**, sidewalks are provided on both sides of the roadway with a wide grassy boulevard and trees.
- **From Marie Lane south to approximately 1,000 feet west of the Scenic Overlook**, a sidewalk is provided on the west side of Lookout Drive, buffered with a grassy boulevard. The sidewalk is wide enough for pedestrians and cyclists to use.
- **From 1,000 feet west of the Scenic Overlook to Lee Boulevard (lower)**, there are no sidewalk facilities provided. However, pedestrians can be seen using the wide shoulders throughout the area.

Crossing Lookout Drive can be challenging. North of US 14, there are no marked crosswalks across Lookout Drive at any intersection or protected crossings. South of US 14, there are five marked crosswalks. Three of these crosswalks are at signal controlled intersections (Commerce Drive, Marie Lane, Lee Boulevard (Lower)) and include pedestrian push buttons and countdown timers. The other two are at uncontrolled locations at Lee Boulevard (upper) and Commerce Lane. For pedestrians crossing multi-lane roadways, multiple threat crashes are possible (shown in

Figure 18: Multiple Threat Crash

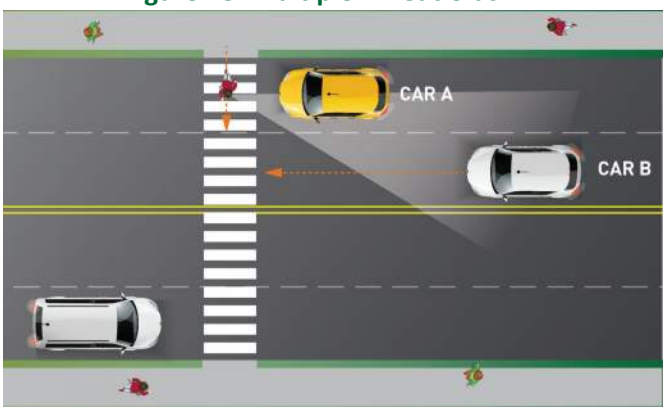


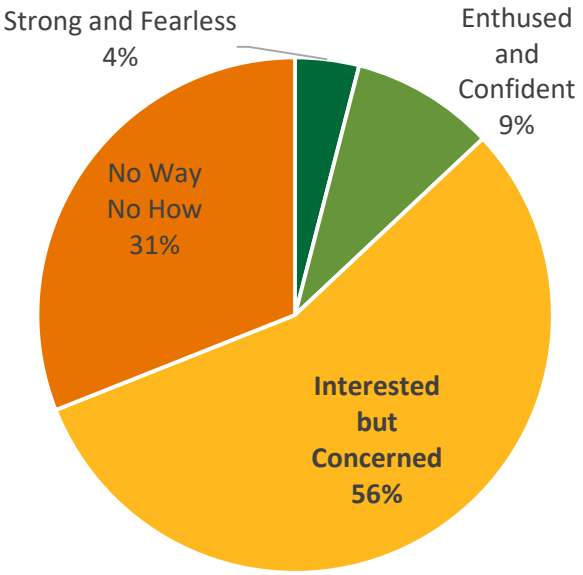
Figure 18). A multiple threat crash occurs when a car (Car A) yields to a pedestrian, but a car (Car B) in the inside lane cannot see the pedestrian and then does not yield.

Bicycle Amenities and Facilities

National research has found that there are generally four levels of interests/abilities when it comes to cycling.

- Strong and Fearless riders are those that are very comfortable without bike lanes. They will ride under most roadway and traffic conditions.
- Enthused and Confident riders will ride their bikes with appropriate infrastructure.
- Interested but Concerned riders are interested in biking more but are not comfortable with the infrastructure or have other barriers to biking.
- No Way No How are unable or uninterested in bicycling and no change to the environment or infrastructure is likely to encourage them to cycle more.

Figure 19: Four Types of Transportation Cyclists



Nearly three-quarters of Strong and Fearless, Enthused and Confident, and Interested but Concerned cyclists had ridden at least once in the last 30 days for transportation or recreation. Improving infrastructure and the environment can help encourage more people to try biking.

Throughout the Lookout Drive study area, there is only a small segment with bicycle facilities appropriate for all ages and abilities: the shared use path from Howard Drive to Lee Boulevard (Upper). Given the significant number of pedestrian and bicycle generators that include schools, places of worship, parks, and employment centers, consideration should be given to expanded facilities that can attract those who may be interested in cycling but desire more separation from traffic.

Transit

Existing Mankato Transit Route 5 serves the city of North Mankato. This route runs along Lookout Drive between Ringhofer Drive and Carlson Drive. There is a transit stop location at Precision Press which departs at :23 and :53 past the hour between 6:05 a.m. and 8:35 a.m. and 3:05 p.m. and 5:05 p.m. Additional stops near Lookout Drive include South Central College, Tower Boulevard and James Boulevard, and Carlson Drive and Rolling Green Lane.

The City of North Mankato has recently completed an analysis that recommended transitioning from a fixed route service to on-demand flex route service. This would eliminate the dedicated stops and offer door-to-door service, like paratransit systems currently operated by North Mankato. There is no timeline for this transition.

Figure 20: Pedestrian, Bicycle, and Transit Facilities

SAFETY

Reviewing historic crash information can help identify existing deficiencies that can be addressed through this study. Crash records from 2016 through 2020 were collected from MnDOT. There were 66 crashes reported during this period, including 15 crashes that resulted in an injury, including the possible injury classification. There were no traffic fatalities reported during the analysis period. The crash density is shown in **Figure 24**.

Reviewing the crash reports found the following general trends:

- 79% of all crashes occurred at intersections; 42% of all crashes occurred at three intersections including Commerce Drive (12), Howard Drive (8), and Lee Boulevard (lower) (8). Of the segment crashes, 36% were caused by deer. A breakdown of the number of crashes by location is shown in **Figure 21**.
- 77% of all crashes resulted in property damage only; there was 1 serious injury crash, 7 minor injury crashes, and 7 possible injury crashes.
- 36% of crashes occurred during the AM peak (7 AM to 9 AM) or PM peak (4:30 PM to 6:30 PM).
- 29% of crashes were rear end crashes, the most common crash type in the study corridor.
- No intersections or corridor segments were above the critical crash rate (a statistical comparison based on similar intersection types and often an indicator that some factor at the location is contributing to crashes).
- Crashes are trending upwards. The highest crash year was 2019 with 17 total crashes, followed by 2020 with 15 total crashes.

Figure 21: Crashes by Location

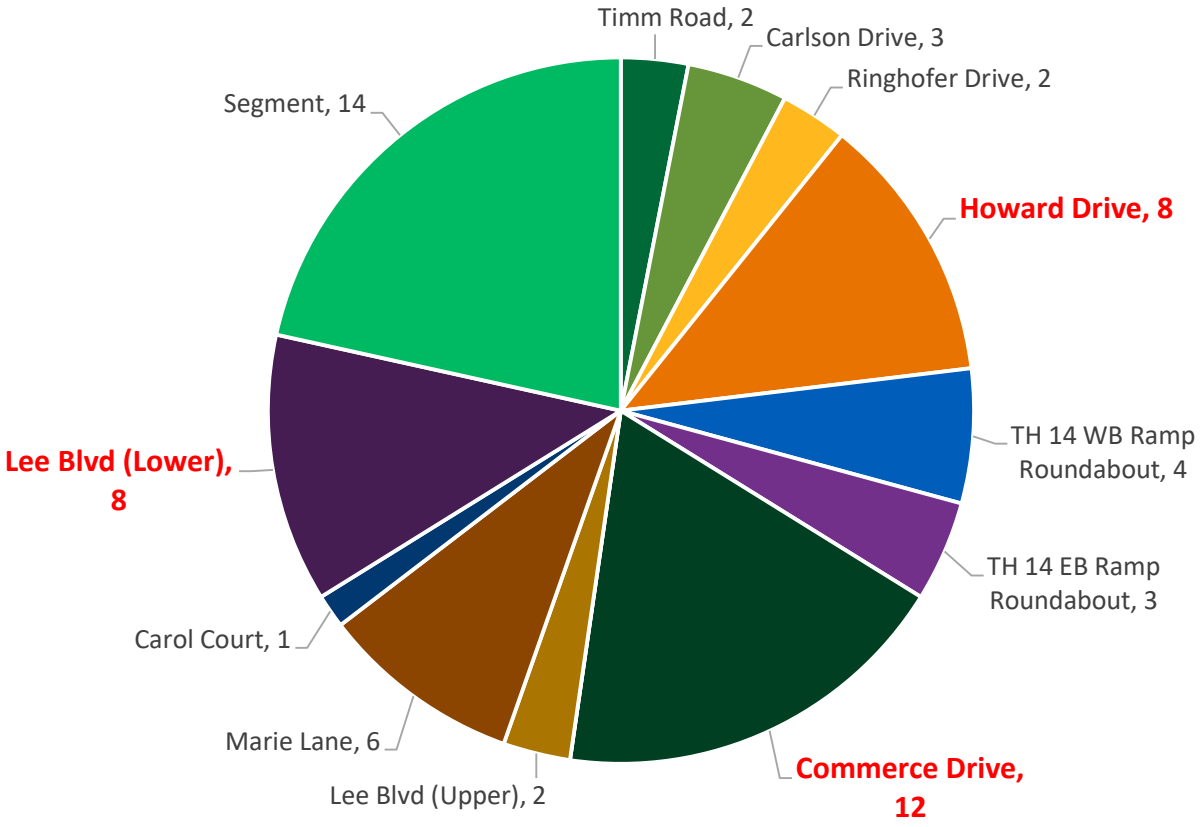


Figure 22: Crashes by Severity

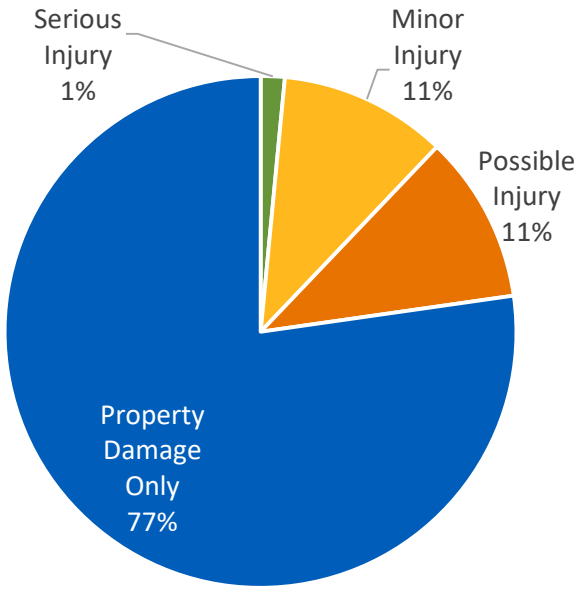
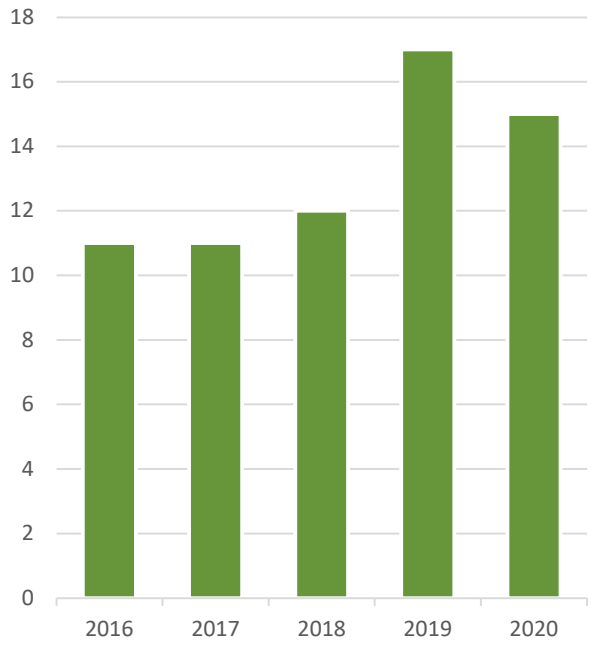


Figure 23: Crashes by Year



TREND ANALYSIS

Lookout Drive and Commerce Drive Intersection

The Lookout Drive and Commerce Drive intersection had the highest number of crashes in the study area. Between 2016 and 2020, there were 12 crashes reported. Of these crashes, five were angle crashes and four were rear end crashes.

- All five angle crashes occurred on the northbound or southbound Lookout Drive approaches and involved left turning vehicles. One crash did occur due to red light running, however the remainder were a result of failure to yield.
- There were no trends for the rear end crashes.
- Five of the 12 crashes occurred during the AM or PM peak hours.

Lookout Drive and Howard Drive Intersection

Between 2016 and 2020, eight crashes occurred at the Lookout Drive and Howard Drive intersection. There were five angle crashes and three rear end crashes. Due to the contributing factors (two distracted driving, three weather/road conditions) there were no discernable crash trends.

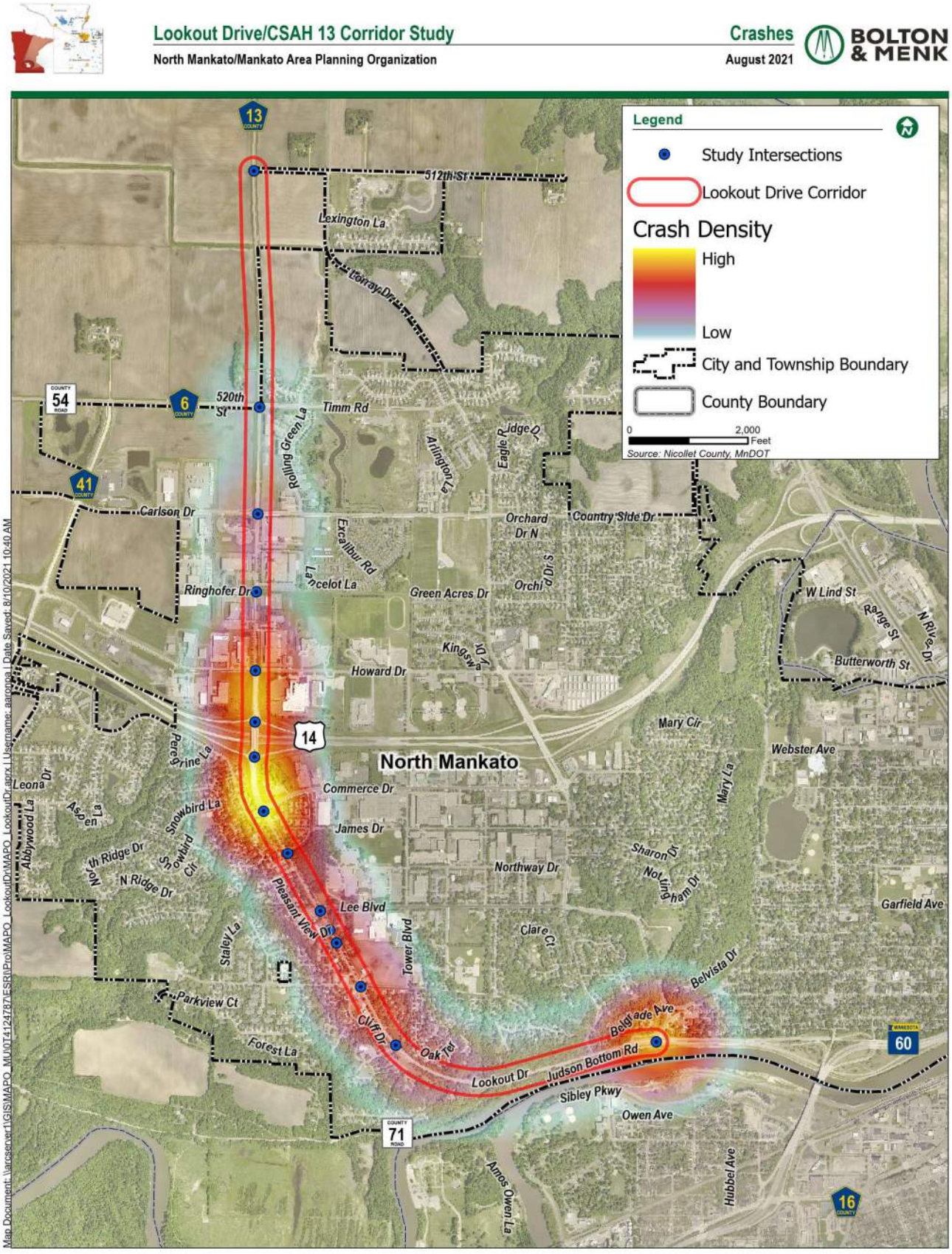
Lookout Drive and Lee Boulevard (Lower) Intersection

Between 2016 and 2020, eight crashes occurred at the Lookout Drive and Lee Boulevard (Lower) intersection. Five were angle crashes and two were rear end crashes. Four of the angle crashes involved eastbound vehicles, including three making a left turn. Each left turn crash occurred during a permitted (but not protected) left turn phase. Current left turn signal heads are traditional five-section heads without flashing yellow arrow.

Bicycle Crash

There was one reported bicycle crash at the intersection with CSAH 6/Timm Road. However, after reviewing the crash report, no actual crash occurred. Instead, it was an incident of two motorcyclists harassing a cyclist, claiming the cyclist was going to cause a crash.

Figure 24: Crash Density



IV. Existing Traffic Conditions

Existing traffic conditions throughout the study area were evaluated to understand potential congestion issues and how such issues may be interrelated with other transportation issues like roadway safety or multimodal accessibility.

TRAFFIC DATA COLLECTION

Given the traffic impacts associated with the ongoing COVID-19 pandemic, multiple datasets were referenced when establishing an existing traffic condition that will be used as the basis for further traffic analyses. These datasets include:

- 2019 average daily traffic data obtained from MnDOT.
- 2020 estimated average daily traffic data obtained from StreetLight Data. Note that these estimates are extrapolated from a sample of vehicle location records, therefore it is recommended that these results are considered illustrative in nature
- 2021 turning movement data at study intersections (13 hours of data - 6 am to 7 pm) which was collected in late June 2021.
- Daily traffic in 2021 was estimated by assuming that the 13-hour period between 6 am and 7 pm consists of 85 percent of daily traffic Based on national data from *NCHRP Report 716: Travel Demand Forecasting: Parameters and Techniques.*
- Note that closures were in place on TH 99 to the north when data was collected, but 2021 traffic data generally matches 2019 traffic data on the north end of the CSAH 13 study area.

2021 Traffic Estimates Compared to 2019 Data

When comparing 2021 traffic data to 2019 traffic data, the general trend is that 2021 traffic volumes are lower than 2019 levels. Several locations (especially south of US 14) carried 10 to 25 percent less traffic in 2021 when compared to 2019, suggesting that travel behavior changes associated with the COVID-19 pandemic are still affecting traffic volumes when compared to pre-pandemic levels.

While traffic volumes appear to be depressed by impacts from COVID-19, there are multiple locations throughout the study area where 2021 traffic volumes are within 10 percent of 2019 conditions, suggesting that traffic was beginning to return to pre-pandemic levels as of summer 2021. This is supported by StreetLight Data daily traffic estimates from 2020, where most locations south of US 14 have 2021 traffic volumes that are between 2019 conditions and 2020 conditions. StreetLight Data estimates for the Twin Cities Metro area further support Minnesota traffic levels returning to pre-pandemic conditions, with traffic on Metro area freeways only being 5 to 10 percent lower than pre-pandemic levels as of late June/early July 2021.

Comparisons between 2021 and 2019 traffic volumes in the study area are shown in **Figure 25**. Comparisons to estimated 2020 traffic volumes are shown in **Figure 26**.

2021 Traffic Data Used for Analysis

Since traffic volumes are still being affected by COVID-19, some adjustments were applied to 2021 traffic data to better reflect a typical condition. Where 2021 counts were lower than 2019 counts, peak hour turning movement data was adjusted up to match 2019 traffic patterns. Where 2021 counts were higher than 2019 counts, the 2021 data was the basis for analysis. Some adjustments were also made to account for school-related traffic. The 2021 daily traffic data that was used as the basis for traffic analysis is shown in **Figure 27**.

Figure 25: Estimated 2021 ADT vs. 2019 MnDOT ADT

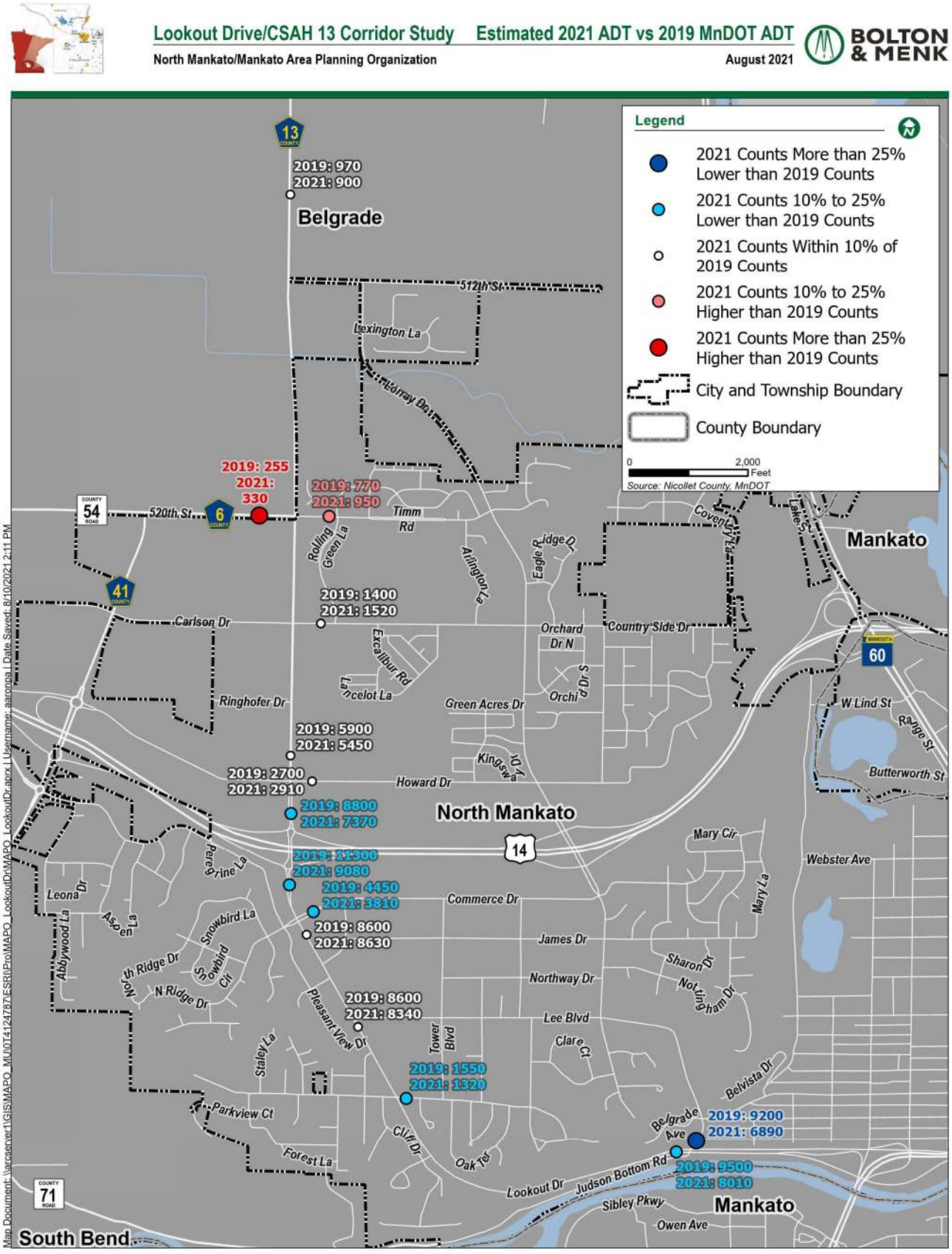


Figure 26: 2020 StreetLight Data ADT Estimates

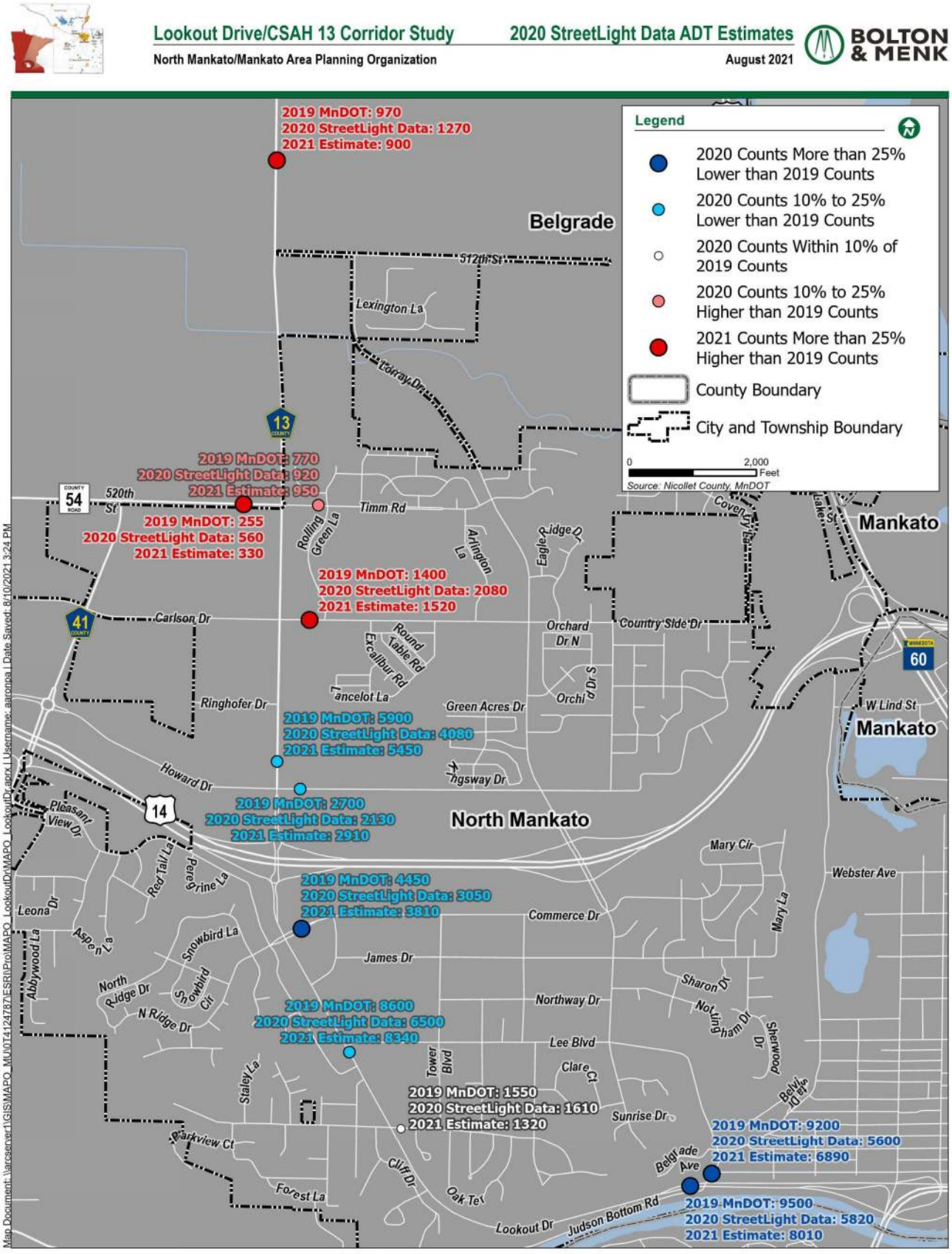
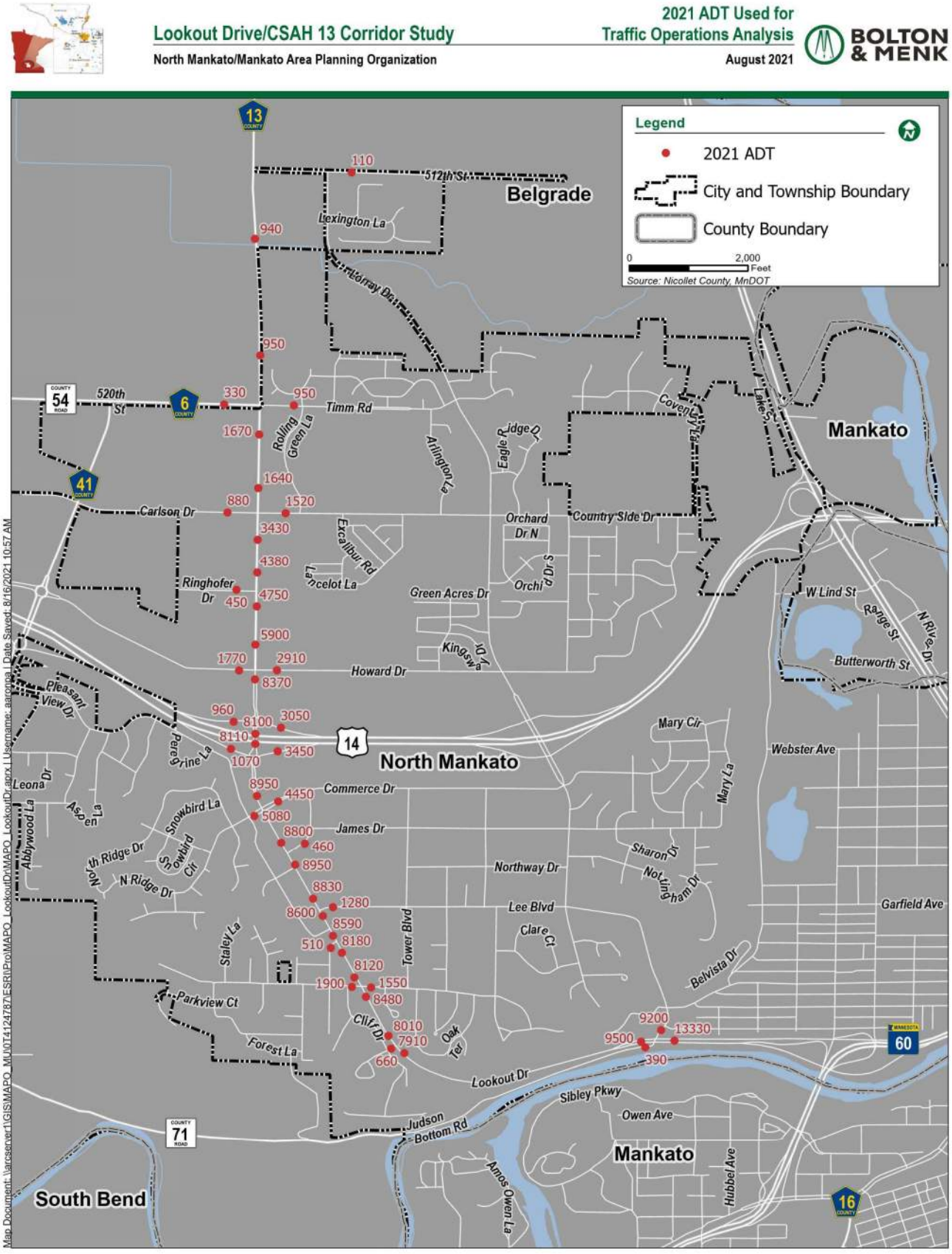


Figure 27: 2021 ADT Used for Traffic Operations Analysis



Origin-Destination Analysis

StreetLight Data origin-destination data was obtained for multiple locations along the Lookout Drive corridor to assess general study area traffic patterns and traffic flows. This analysis was performed for the following locations on the corridor, with results visualized in **Figure 28** through **Figure 31**.

- **North of CSAH 6/Timm Road.** Origin-destination data indicates that around 55 percent of traffic on this segment of Lookout Drive is local to North Mankato. Other notable origins/destinations are the rural areas/townships to the north (25 percent of traffic) and Mankato via TH 14 (15 percent of traffic).
- **North of Howard Drive.** Around 65 percent of traffic on this segment is local to North Mankato. Other notable origins/destinations are Mankato via TH 14 (15 percent of traffic) and Mankato via TH 169 (10 percent of traffic).
- **South of Commerce Drive.** Around 60 percent of traffic on this segment is local to North Mankato. Other notable origins/destinations are Mankato via TH 169 (20 percent of traffic), Mankato via Belgrade Avenue (10 percent of traffic), and Mankato via TH 14 (10 percent of traffic).
- **West of lower Lee Boulevard.** Around 50 percent of traffic on this segment is local to North Mankato. Other notable origins/destinations are Mankato via TH 169 (25 percent of traffic) and Mankato via Belgrade Avenue (15 percent of traffic).

Heavy Vehicle Traffic

Heavy vehicles are those that are larger than personal automobiles. They typically include semi-trucks, construction-related trucks, school buses, etc. Typically, heavy vehicle traffic on urban corridors like Lookout Drive makes up two percent of total daily traffic. However, because Lookout Drive is intersected by a US Highway and serves the North Mankato industrial park, heavy vehicle traffic is a bit higher. On the northern end of the corridor, heavy vehicle traffic ranges from 3.6 percent to 9.8 percent, which is around 100 to 200 heavy vehicles daily. South of US 14, heavy vehicle traffic is lower, between 2.4 percent and 3.6 percent or 100 to 165 heavy vehicles per day.

Figure 28: Origins and Destinations from Lookout Drive North of CSAH 6/Timm Road

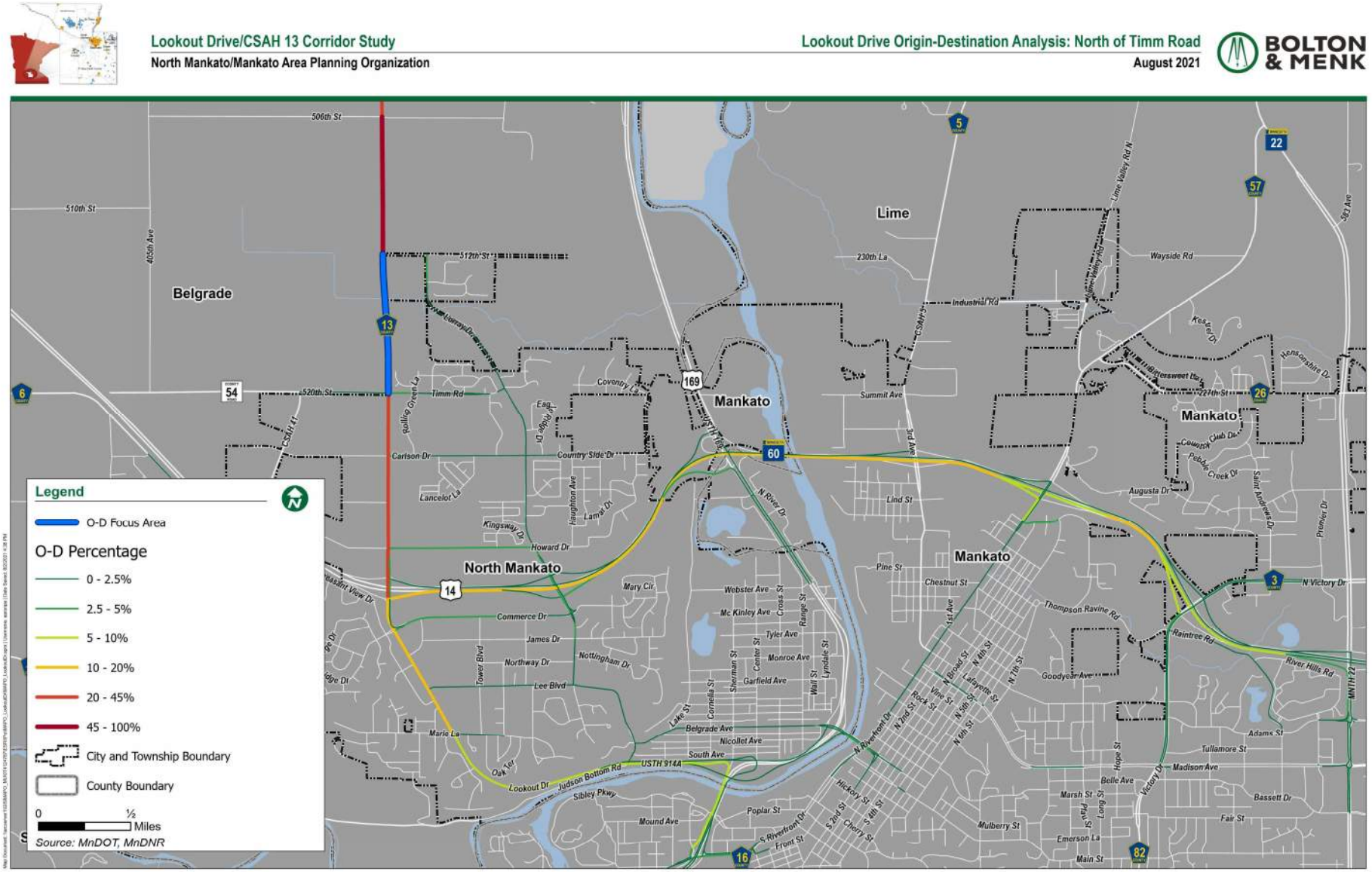


Figure 29: Origins and Destinations from Lookout Drive North of Howard Drive

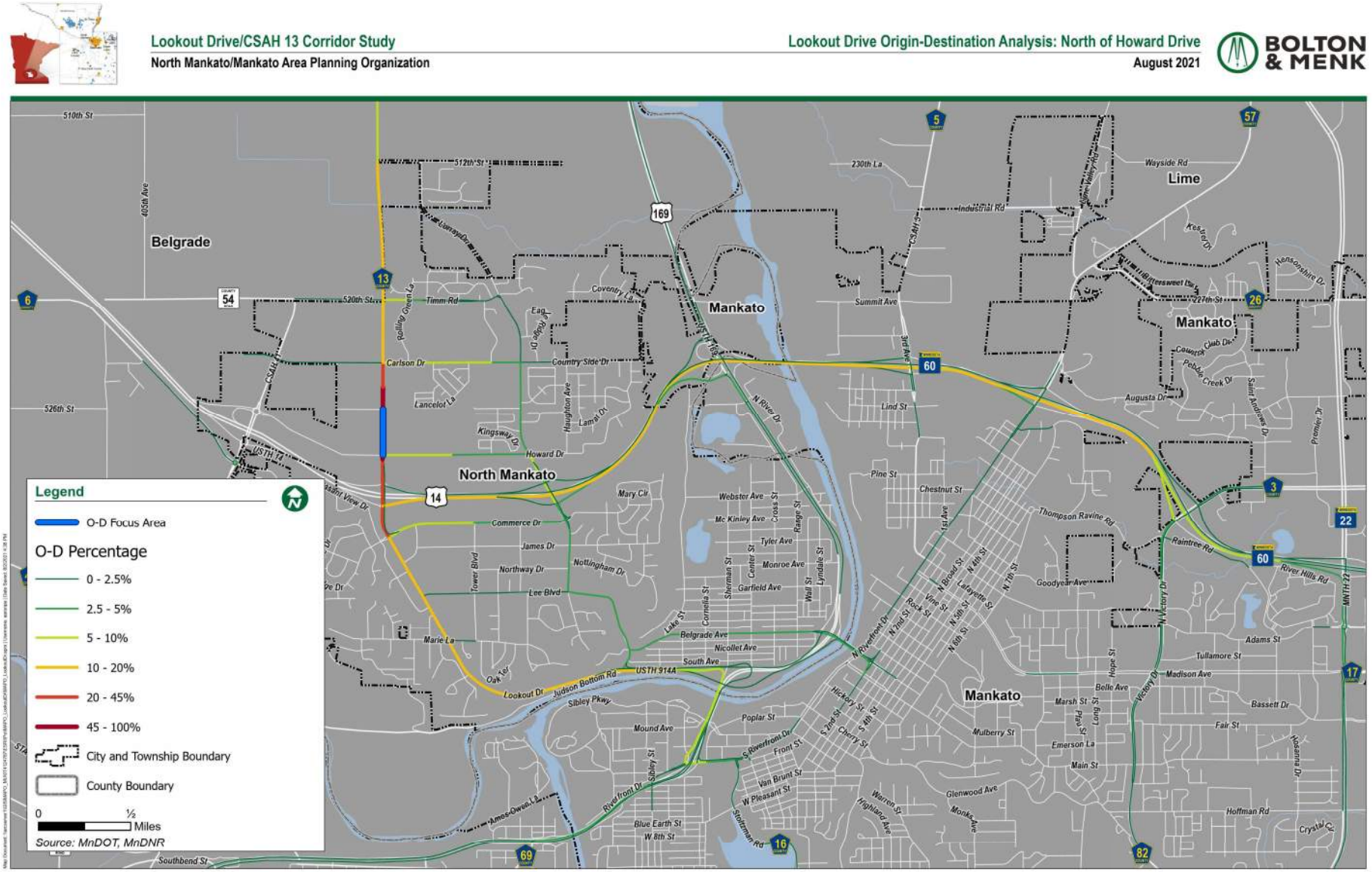


Figure 30: Origins and Destinations from Lookout Drive South of Commerce Drive

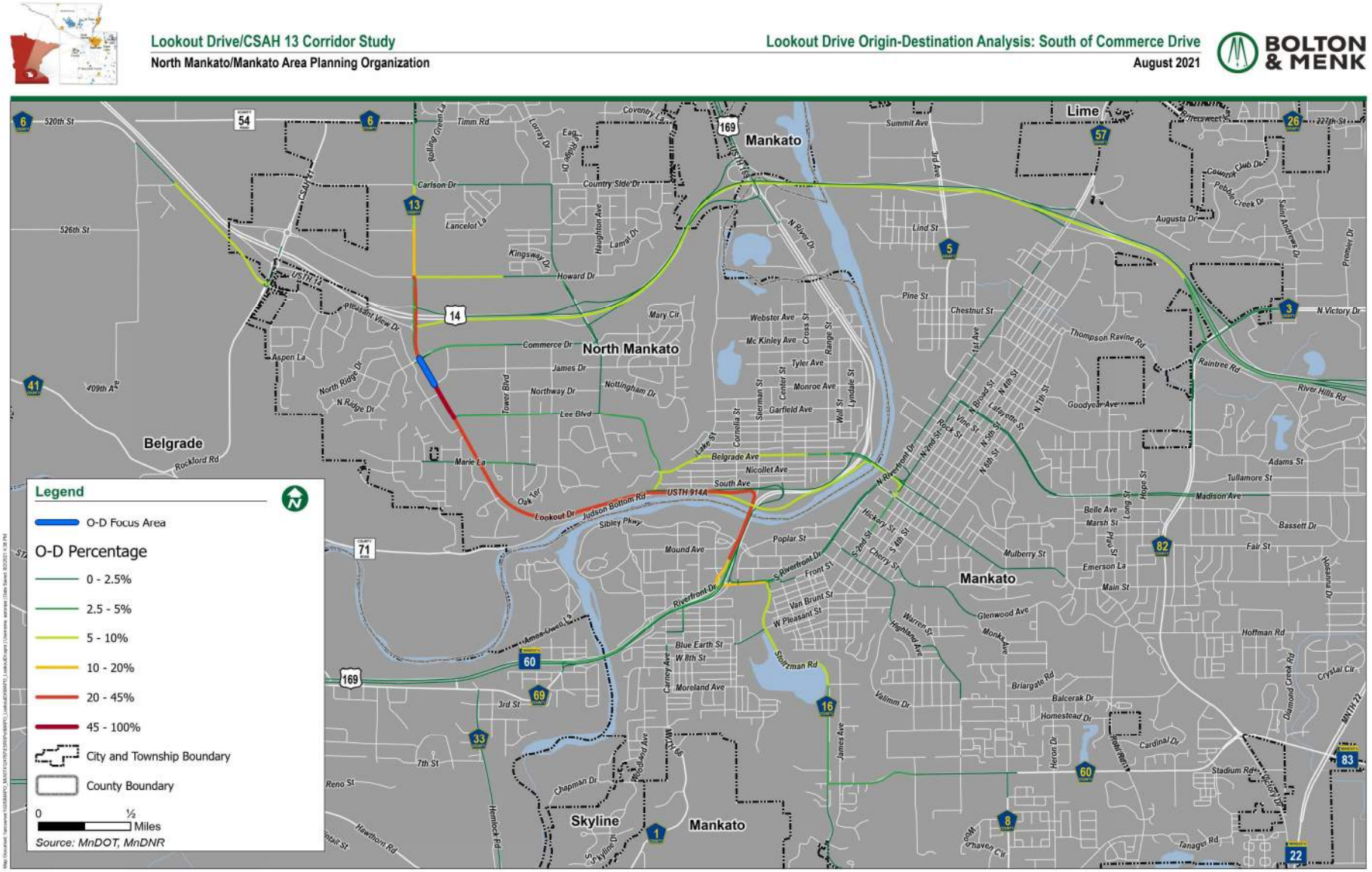
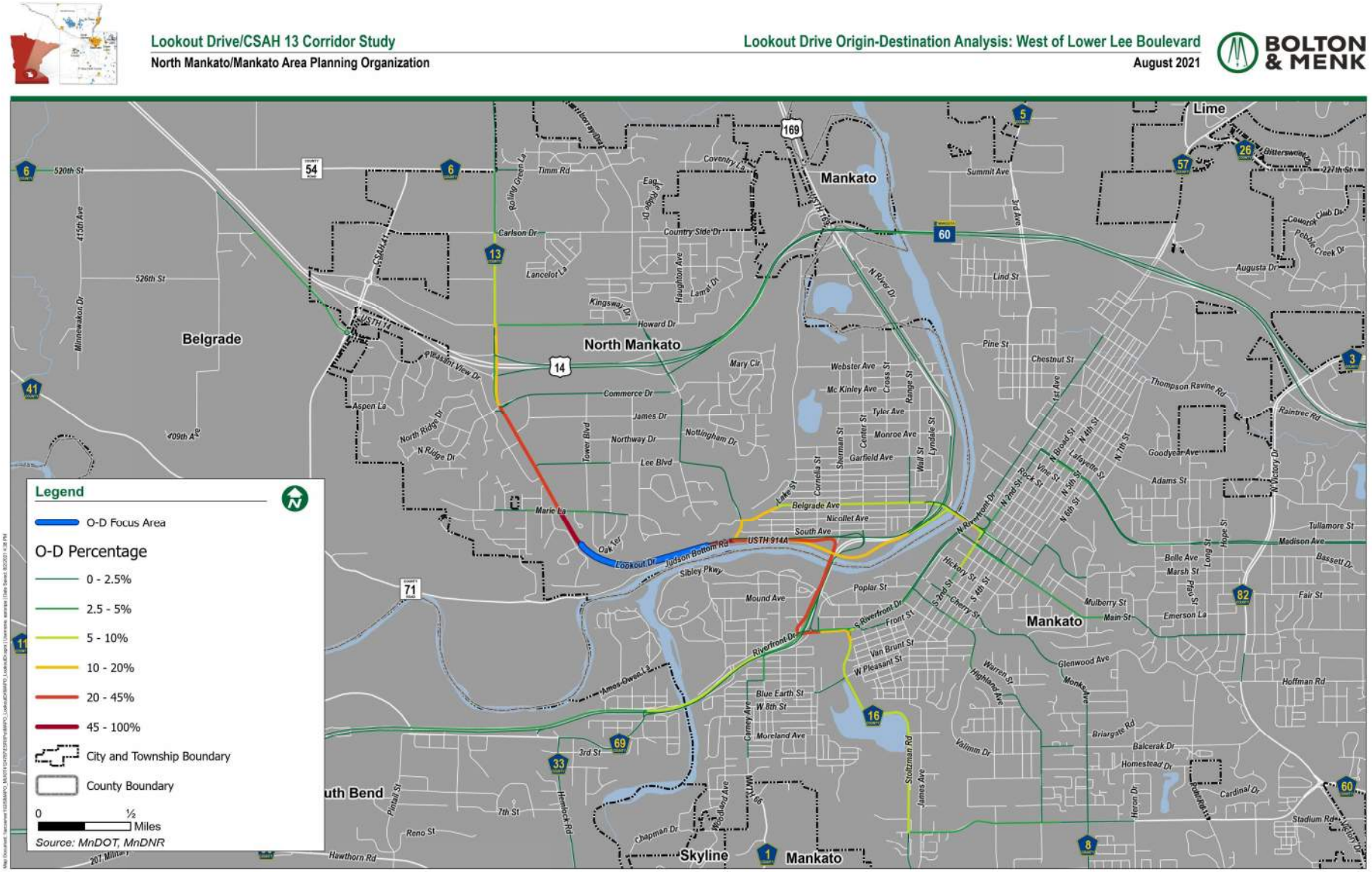


Figure 31: Origins and Destinations from Lookout Drive West of Lee Boulevard (Lower)



TRAFFIC CONTROL

Selecting the appropriate traffic control device requires consideration of traffic safety, patterns and volumes, roadway geometry, lane configurations and multimodal aspects. The Minnesota Manual on Uniform Traffic Control Device (MnMUTCD) provides guidance and standards on the installation of traffic control devices, generally taking into consideration vehicular volumes, pedestrian volumes, and crash frequency thresholds for multiple roadway contexts. Note that meeting warrants for a specific type of traffic control does not require that a traffic control change is made, and typically it is best if multiple warrants are met before a traffic control change is made. However, the analysis highlights the locations that may benefit from traffic control upgrades or removal.

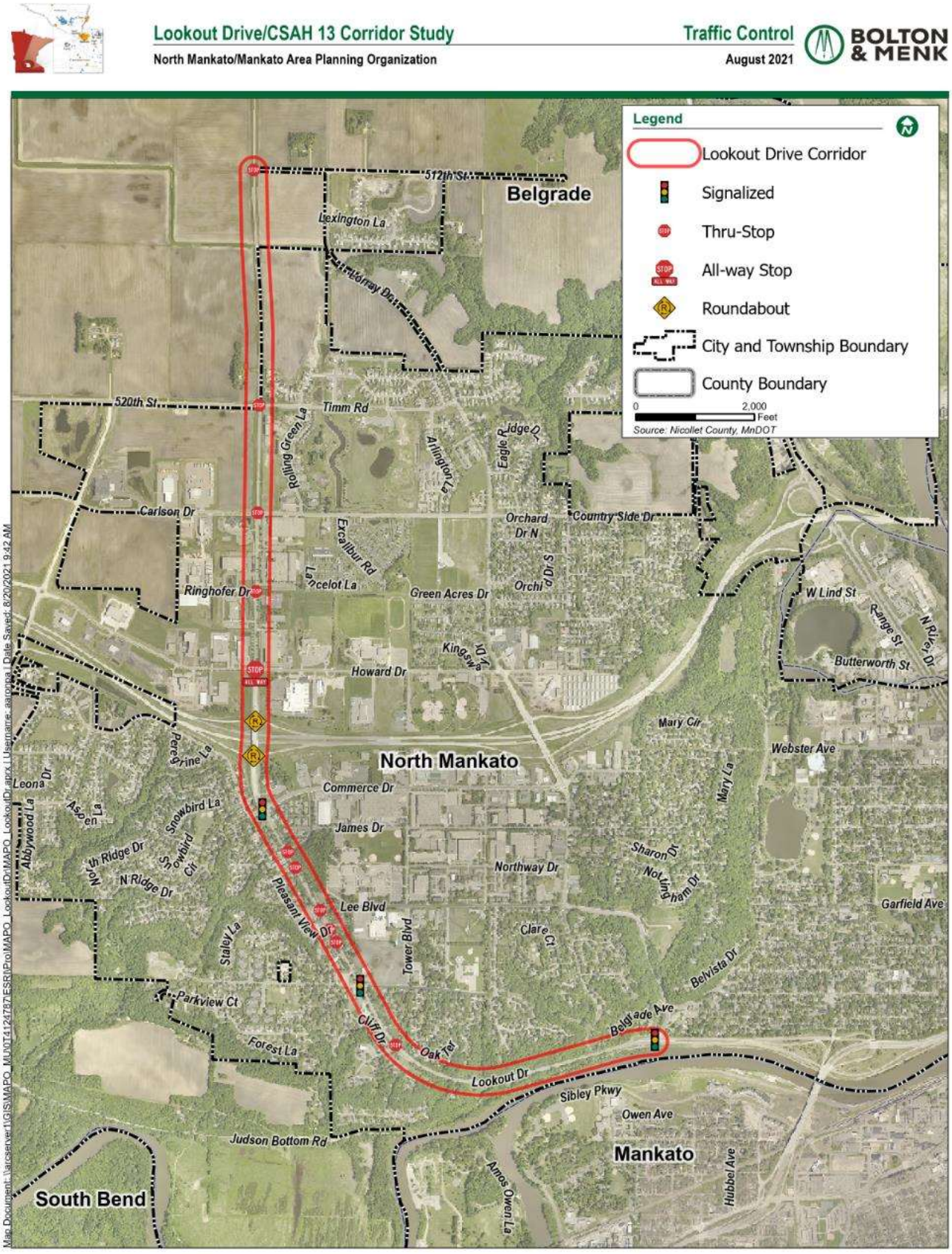
- Research conducted by FHWA found that that removing unwarranted traffic signals may decrease all crash types up to 24 percent, decrease injury crashes up to 53 percent, and decrease rear end crashes up to 20 percent.
- However, research has also found that installing traffic signals where warranted can decrease all crash types up to 34 percent, decrease injury crashes up to 40 percent, and decrease angle crashes up to 67 percent.

There is mixed traffic control across the study area. Traffic control is shown in **Figure 32**.

- **Two-way stop control** at CSAH 6/Timm Road, Carlson Drive, Ringhofer Drive, Commerce Lane, Lee Boulevard (upper), Pleasant View Drive, Allan Avenue, and Carol Court.
- **All-way stop control** at Howard Drive.
- **Roundabout control** at the US 14 east and west ramps.
- **Signal Control** at Commerce Drive, Marie Lane, and Lee Boulevard (lower).

A 2018 analysis recommended maintaining the all-way stop control at Howard Drive unless safety issues or traffic volumes create undesirable conditions. Later phases of this study will evaluate traffic control alternatives for all study intersections.

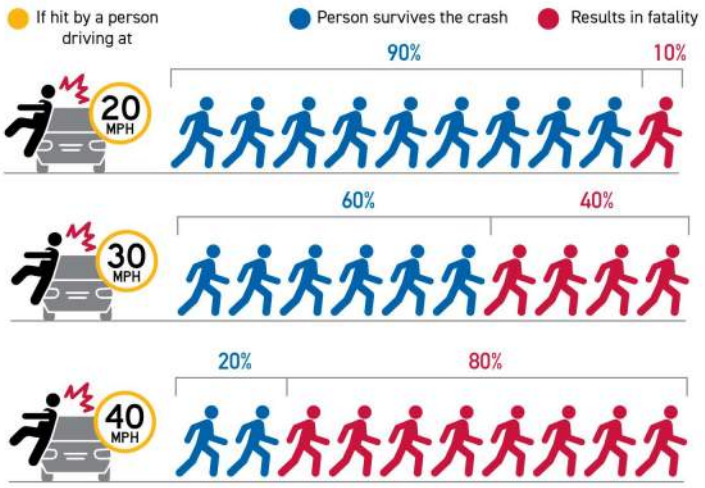
Figure 32: Existing Traffic Control



SPEED

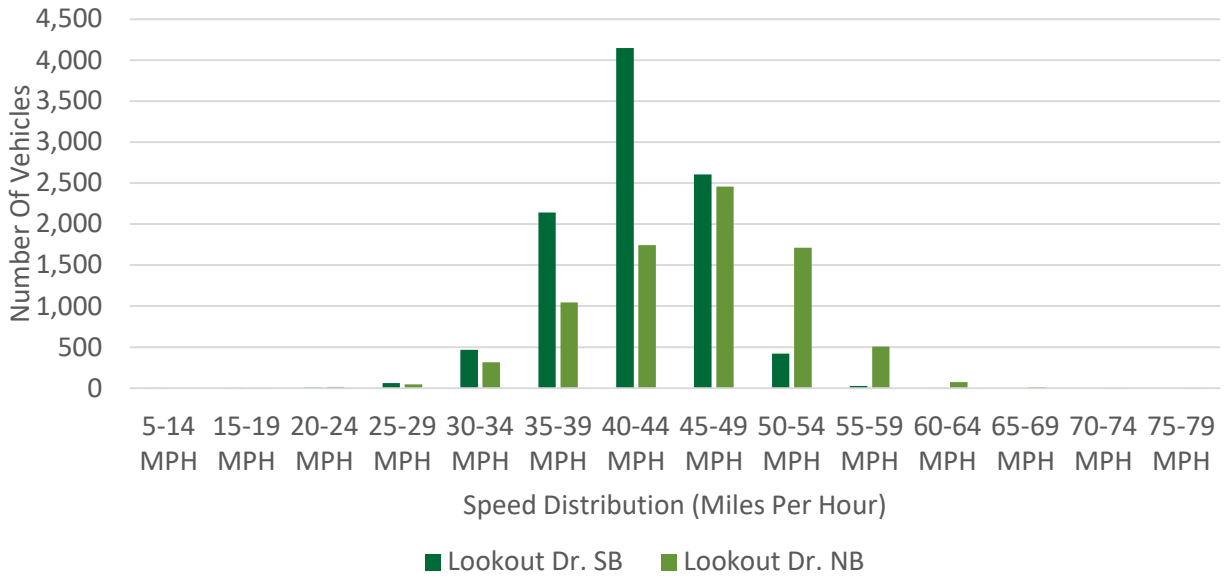
Research has shown that speeds a driver chooses to travel are a function primarily of roadway design, context, and congestion, not necessarily the posted speed limit. Higher speeds contribute to increased severity of vehicular crashes and increases the likelihood that a vehicle-pedestrian crash results in a fatality. At 20 miles per hour, there is a 90 percent chance a pedestrian survives a crash. At 30 miles per hour, there is a 60 percent chance a pedestrian survives a crash. At 40 miles per hour, there is just a 20 percent chance a pedestrian survives a crash. The posted speed on Lookout Drive varies from 55 miles per hour north of Carlson Drive, 45 miles per hour from Carlson Drive to southeast of Carol Court, and 50 miles per hour from southeast of Carol Court to Lee Boulevard (lower) and the end of the study area.

Figure 33: Relationship Between Vehicle Speed and Pedestrian Survivability



In 2016, a formal speed study was completed for Lookout Drive around Commerce Drive, where the posted speed is 45 miles per hour. This study found the median speed was 43 miles per hour for southbound vehicles and 47 miles per hour for northbound vehicles. However, the 85th percentile speed (the speed which 85 percent of vehicles are traveling at or under) was 48 miles per hour for southbound vehicles and 53 miles per hour for northbound vehicles.

Figure 34: Speed Distribution from 2016 Speed Study



Since the 2016 speed study, the City of North Mankato has constructed dynamic speed display signs in the same area. These signs show drivers their speed and collect data for all passing vehicles. Data was provided for a typical week in May that showed the average speed was 40 miles per hour for southbound traffic and 38 miles per hour for northbound traffic, with ranges of 3 miles per hour to 92 miles per hour for southbound vehicles and 3 miles per hour to 76 miles per hour for northbound. Median and 85th percentile data was not provided. Generally, the speeds on Lookout Drive are very close to the posted speed limits. These speeds contribute to the challenge of crossing Lookout Drive by creating smaller gaps in traffic and making gaps harder to judge, especially for young and inexperienced pedestrians.

TRAFFIC OPERATIONS

Vehicular traffic operations were analyzed along the corridor. Intersection capacity analysis was evaluated in terms of delay and level of service (LOS). LOS is a term used to describe the operational performance of transportation infrastructure elements; it assigns a letter grade value that corresponds to specific traffic characteristics within a given system, as shown in Table 5. At intersections, LOS is a function of average vehicle delay, whereas LOS for a roadway section is defined by the average travel speed. LOS A represents free flow traffic whereas LOS F represents gridlock. In accordance with local design standards, this analysis considers LOS E and F as deficient.

Table 5: Vehicle Level of Service Thresholds

Control Delay (Sec/Veh)		Level of Service
Unsignalized	Signalized	
≤ 10	≤ 10	A
10 – 15	10 – 20	B
15 – 25	20 – 35	C
25 – 35	35 – 55	D
35 – 50	55 – 80	E
> 50	> 80	F

The Vissim traffic simulation software was used to complete the traffic operations analysis. Vissim uses microsimulation to simulate the movement of every vehicle through the network and collects detailed information for associated performance measures like delay, queue lengths, travel times, and density. Vissim can also accurately evaluate complex merging, diverging, and weaving interactions and the interactions between vehicles and queue lengths.

Vissim traffic models were developed for the time period between 6 AM to 7 PM with traffic operations being evaluated for each hour within this time period.

EXISTING DAILY OPERATIONS

Under current traffic conditions, all study intersections operate acceptably throughout the day, including during the AM and PM peak hours. The poorest level of service is seen at the stop-controlled Commerce Lane intersection, with minor approach operations at LOS D during the PM peak hour.

Existing intersection levels of service throughout the study area are shown in Table 6.

Table 6: Existing Intersection LOS at Study Intersections

Intersection	Traffic Control	Level of Service												
		6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	Noon	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM
512th Street	TWSC	A	A	A	A	A	A	A	A	A	A	A	A	A
CSAH 6/Timm Road	TWSC	A	A	A	A	A	A	A	A	A	A	A	A	A
Carlson Drive	TWSC	B	C	B	A	A	A	B	B	A	B	B	B	B
Ringhofer Drive	TWSC	A	A	A	A	A	A	A	A	A	A	A	A	A
Howard Drive	AWSC	A	A	A	A	A	A	A	A	A	B	A	A	A
US 14 West Ramps	RAB	A	A	A	A	A	A	A	A	A	A	A	A	A
US 14 East Ramps	RAB	A	A	A	A	A	A	A	A	A	A	A	A	A
Commerce Drive	Signal	A	A	A	A	A	A	A	A	A	A	A	A	A
Commerce Lane	TWSC	B	A	B	B	B	C	B	C	C	C	D	C	C
Lee Boulevard (Upper)	TWSC	A	B	A	A	A	A	B	A	A	B	B	B	B
Allan Avenue	TWSC	B	C	C	B	B	B	C	B	B	B	C	C	C
Marie Lane	Signal	A	A	A	A	A	A	A	A	A	A	A	A	A
Carol Court	TWSC	B	B	B	B	A	B	B	A	B	B	B	B	B
Lee Boulevard (Lower)	Signal	B	B	B	B	B	B	B	B	B	B	C	B	B

TWSC= Two-way stop control
AWSC = All-way stop control
RAB = Roundabout

V. Future Conditions

2045 TRAFFIC PROJECTIONS

Traffic growth through 2045 was estimated based on a review of the 2045 MAPO Long Range Transportation Plan, North Mankato's *Northwest Growth Area Study,* and historic traffic trends.

Daily traffic estimates for 2045 conditions are shown in **Figure 35**, with more detailed discussion related to the traffic projections methodology provided in **Appendix A.**

2045 Daily Operations

Some traffic flow issues are expected to be introduced as traffic increases in the study area, however these are limited to two-way stop-controlled intersections. The only two locations with deficient 2045 operations (LOS E or LOS F) are the intersections at Carlson Drive (significant side-street delays in the AM and PM peak hours) and Commerce Lane (significant side street delays in the PM peak hour only).

Operations are expected to be within acceptable limits at all other study intersections, and operations are expected to be no worse than LOS C at 10 of 14 study intersections. These generally good operations (especially on the Lookout Drive itself) indicate that the few operations issues that are expected by 2045 can be mitigated with spot improvements and no major corridor-wide capacity upgrades are necessary.

Figure 35: 2045 Traffic Projections

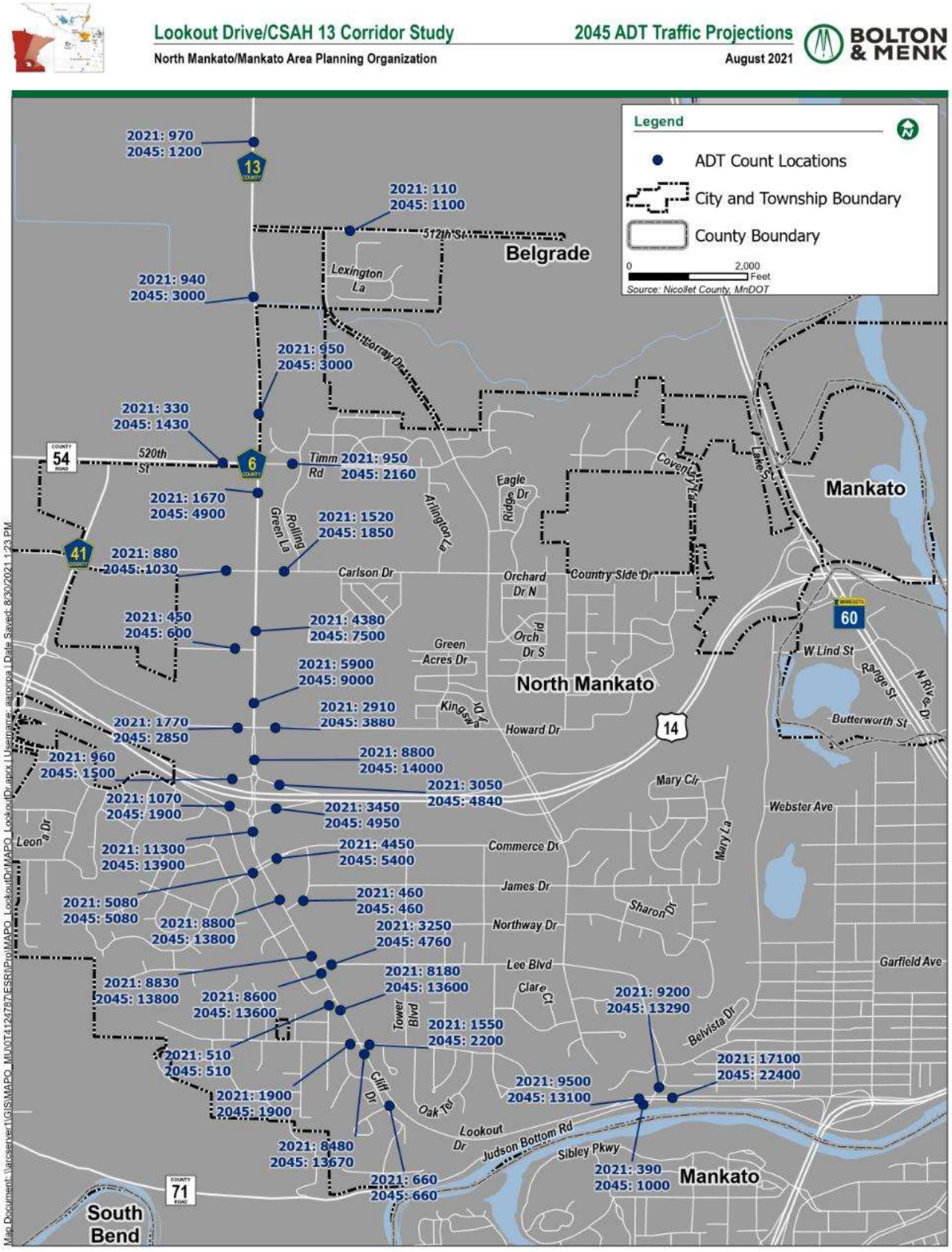


Table 7: 2045 Intersection LOS at Study Intersections

Intersection	Traffic Control	Level of Service												
		6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	Noon	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM
512th Street	TWSC	A	A	A	A	A	A	A	A	A	A	B	A	A
CSAH 6/Timm Road	TWSC	A	B	A	B	A	B	A	A	A	B	B	B	B
Carlson Drive	TWSC	B	F	E	B	B	C	D	C	B	C	E	C	C
Ringhofer Drive	TWSC	A	B	B	A	A	A	B	A	B	B	B	B	B
Howard Drive	AWSC	A	B	B	A	A	A	B	B	A	C	B	B	A
US 14 West Ramps	RAB	A	A	A	A	A	A	A	A	A	A	A	A	A
US 14 East Ramps	RAB	A	A	A	A	A	A	A	A	A	A	B	A	A
Commerce Drive	Signal	A	A	A	A	A	A	A	A	A	A	B	A	A
Commerce Lane	TWSC	B	A	C	C	C	D	C	D	D	D	F	E	E
Lee Boulevard (Upper)	TWSC	B	C	B	B	B	B	C	B	B	C	D	D	D
Allan Avenue	TWSC	B	C	C	C	C	C	C	C	C	C	D	C	C
Marie Lane	Signal	A	A	A	A	A	A	A	A	A	A	A	A	A
Carol Court	TWSC	B	C	C	B	B	C	C	B	C	C	C	C	C
Lee Boulevard (Lower)	Signal	B	B	B	C	B	C	C	C	B	C	C	C	C

TWSC= Two-way stop control
AWSC = All-way stop control
RAB = Roundabout

VI. Transportation Needs Summary

Based on existing and future conditions analysis presented above, corridor needs include:

- Improving and expanding bicycle and pedestrian facilities to improve comfort and safety for non-motorized roadway users. Notable facility gaps are north of Carlson Drive and south of Carol Court.

- Right-sizing roadway capacity to meet anticipated vehicle demand. Roadway capacity analysis shows that acceptable vehicle operations can be provided even if vehicle capacity is reduced between TH 14 and Carol Court.

- Mitigating high vehicle speeds on the corridor. A speed study found that traffic speeds above 50 mph are common in the developed area of Lookout Drive near Commerce Drive.

VII. Roadway Improvement Alternatives

Based on roadway performance under existing and projected traffic conditions, a set of roadway improvement alternatives was developed. Alternatives were developed to address issues related to study area roadway safety, traffic operations, and multimodal accommodations.

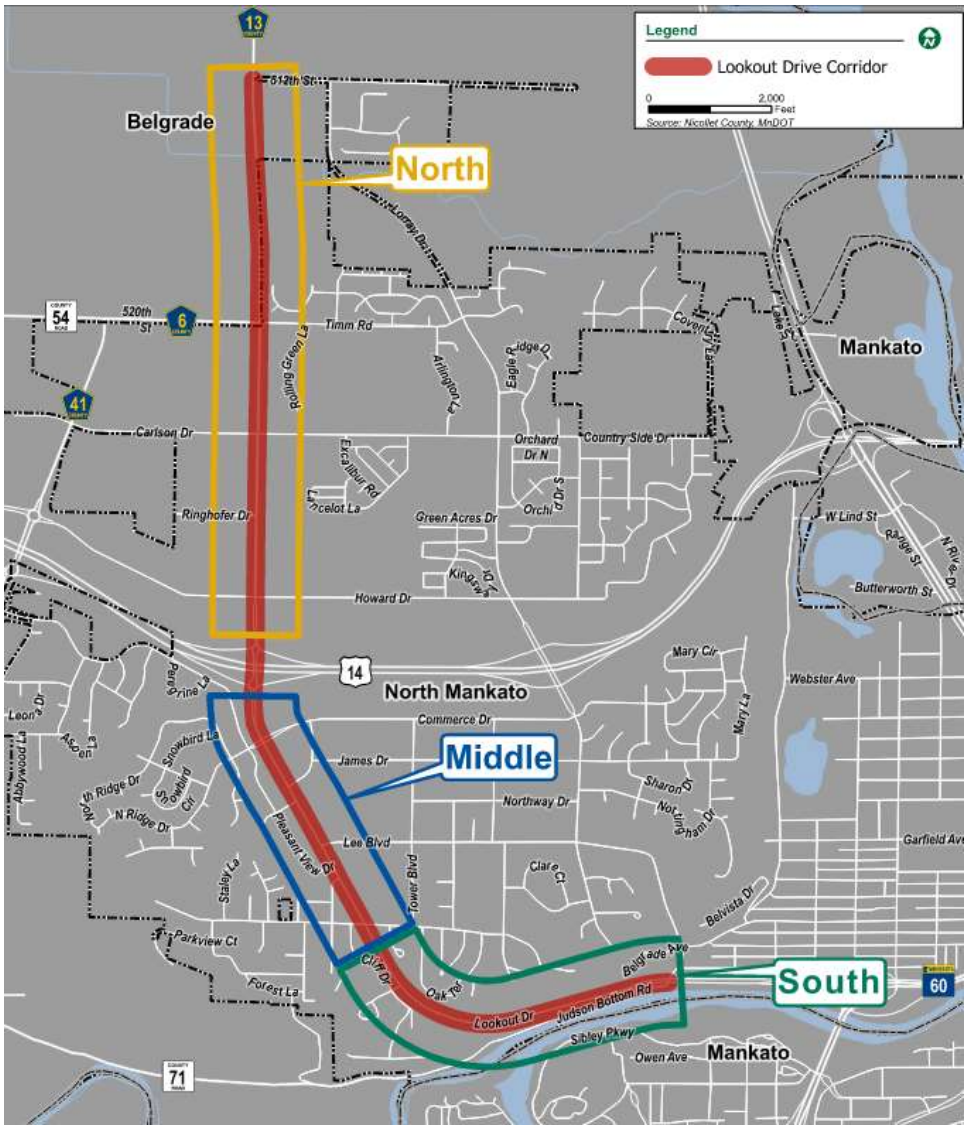
CONCEPT DEVELOPMENT

STUDY AREA SEGMENTATION

The study area was divided into three segments to develop alternatives that best fit the surrounding land use and associated transportation needs. These segments are:

- North Segment: 512th Street to TH 14
- Middle Segment: TH 14 to Marie Lane
- South Segment: Marie Lane to Lower Lee Boulevard

Figure 36: Study Area Segments



TH 14 Interchange

Since the TH 14 interchange was recently reconstructed, no improvements were considered at this location. Traffic analysis completed throughout this study indicates good traffic flow and no safety issues that need to be addressed as part of improvements along Lookout Drive. Analysis also shows that single lane roundabouts at the TH 14 interchange can accommodate 2045 traffic demands.

There should be coordination with MnDOT regarding the future configuration of this interchange to ensure that potential changes to the Lookout Drive cross section are compatible with roundabout lane configurations at the TH 14 interchange.

General Roadway Improvement Philosophy

Alternatives under consideration generally include some type of combination of the following features:

Enhanced bicycle/pedestrian facilities

- The goal was to fill in existing gaps in non-motorized facilities or to enhance the comfort and safety provided by existing facilities

Traffic control changes at select intersections

- Traffic control changes were considered at:
    - Carlson Drive
    - Howard Drive
    - Upper Lee Boulevard
    - Commerce Drive
    - Marie Lane

Access management

- Access management is the proactive management of roadway access points
- High access densities degrade traffic flow and increase crash potential
    - Research shows that each additional access point along a corridor increases crash potential by around four percent
- There are many existing access points (especially private/business accesses) between Carlson Drive and Howard Drive and between Commerce Drive and Carol Court.
- Typical access management improvements include consolidating adjacent access points into a single access, relocating accesses to lower volume side streets, or removing redundant accesses

Traffic calming

- Traffic calming is the reduction of traffic speeds through deliberate engineering decisions
    - Existing vehicle speeds on Lookout Drive are over 45 mph
- Common traffic calming improvements are raised medians, right-sizing the number of lanes to match traffic demand, narrower lane widths, and roundabouts

Public Input

Public input received via a March 2022 virtual open house generally aligned with the roadway improvement philosophy described above. Comments received throughout this process revealed the following:

- Concerns about high traffic speeds
- Concerns about having adequate vehicle traffic capacity
    - Some public input expressed concerns about reducing traffic lanes, although engineering analysis shows that acceptable traffic operations can be provided even with through lane reductions.
    - Multiple alternatives were developed for higher-volume locations – some that reduce the number of through lanes and some that maintain two through lanes in each direction.
- Desire for improved bicycle and pedestrian facilities
- Interest in roundabouts
- Desire to maintain or add green spaces along the corridor

Alternatives Evaluation Methodology

To best ensure a balanced transportation system for all roadway users, alternatives under consideration were evaluated using several different criteria. These criteria are:

- Vehicle mobility
- Vehicle safety
- Multimodal facility comfort and safety
- Environmental/property impacts
- Cost and maintenance

For each of the above criteria, a rating of poor, fair, good, or great was assigned based on a technical review of performance for each criterion. Ratings are based on a combination of research-supported data, local experience, and engineering judgement.

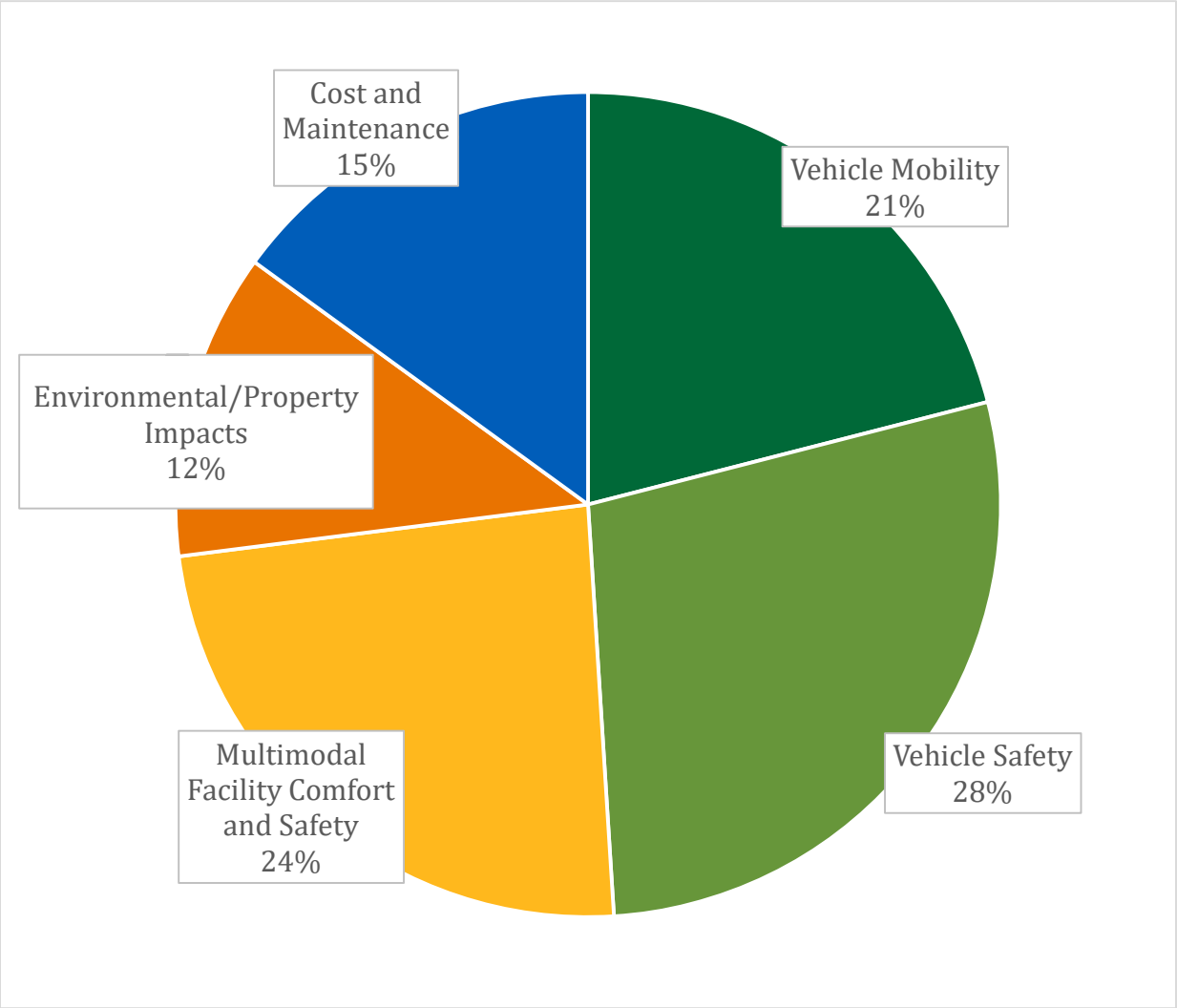
Criteria Weighting

To best address the most significant issues in the area, the Project Management Team (PMT) was asked to participate in an exercise to weight each of the technical criteria described above. Results from the weighting exercise were used to establish overall rankings for alternatives, taking into consideration each of the five technical criteria.

PMT members were asked to allocate 100 points across the five technical criteria, with higher values given to criteria that are deemed higher priorities. For example, if a TAC member allocated 40 points to Vehicle Safety and 15 points to each of the other four criteria, that member believes Vehicle Safety improvements should be weighted higher than other criteria.

Five TAC members participated in this exercise, with the average weights for each criteria summarized in **Figure 37.** Based on PMT feedback, Vehicle Safety and Multimodal Facility Comfort and Safety performance will be weighted the highest and Environmental/Property Impacts and Cost and Maintenance will be weighted the lowest when establishing overall alternative ratings.

Figure 37: PMT Weighting Exercise Results



FUTURE INTERSECTION CONTROL

Alternatives described below assume some traffic control changes at key intersections, however analysis shows that multiple intersection control types are viable. Intersection control decision matrices are provided in **Appendix B** if different traffic control types than those described below are desired. These matrices show anticipated intersection level of services and safety impacts associated with different traffic control types.

Since some alternatives assume through lane reductions on Lookout Drive, two decision matrices were developed: one that assumes through lane reductions on Lookout Drive and another that assumes two through lanes are maintained in each direction between TH 14 and Marie Lane.

NORTH SEGMENT ALTERNATIVES – 512TH STREET TO TH 14

Given the lower development densities, traffic volumes, and associated transportation issues on the north end of the study area, only one alternative was developed. The alternative includes the following changes, and is shown graphically in **Figure 38**.

- Add a two-way left turn lane north of Carlson Drive
- Add a trail and sidewalk north of Carlson Drive
- Convert Howard Drive and Carlson Drive to single lane roundabouts
- Access management
    - Note that access changes are conceptual. Any future access changes associated with a roadway would be vetted through stakeholders as part of a public engagement process. This applies to all alternatives presented in this report.

An overview of how this alternative performs related to all technical criteria is summarized in **Table 8**.

Table 8: Performance Summary for North Segment Alternative 1

North Segment Alternative 1: 3-Lane Section		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Great	• Minimal traffic delays, with peak hour LOS B or better through 2045
Vehicle Safety	Great	• Two-way left turn lanes reduce crash potential, with research showing a 20% reduction in crashes after implementation • Roundabouts at Carlson Drive and Howard Drive would provide traffic calming effect, reducing vehicle speeds • Single lane roundabouts reduce fatal and injury crash potential
Multimodal Facility Comfort and Safety	Great	• Adds non-motorized facilities north of Carlson Drive, expanding the bike/ped network • Traffic calming from Roundabouts provides a more comfortable walking/biking environment, however lack of traffic signals means pedestrians crossing Lookout Drive must wait for acceptable gaps in traffic
Environmental/Property Impacts	Good	• Minor property access impacts • Generally fits within existing right-of-way, with only minor impacts on intersection corners
Cost and Maintenance	Good	• Maintains existing roadway section between Howard Drive and Carlson Drive
Overall	Great	

Figure 38 - North Segment Alternative 1

LAYOUT LEGEND

- PAVEMENT
- CONCRETE
- TRUCK APRON/TRAIL
- LANDSCAPING
- WETLANDS
- PARCEL LINES
- POTENTIAL ACCESS REALIGNMENT

400
SCALE IN FEET

BELGRADE TOWNSHIP 121

CO RD 13

A
A

CLOSE

POTENTIAL ACCESS DEPENDENT ON DEVELOPMENT, ACCESS CONTROL TO BE DETERMINED

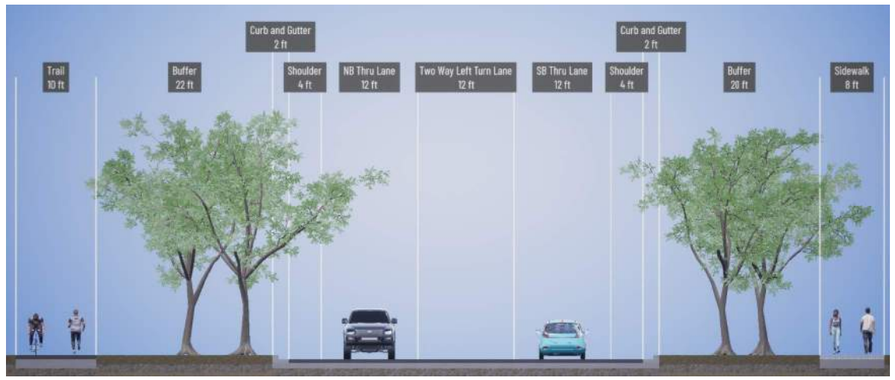
INTERSECTION NEEDS BEYOND WHAT IS SHOWN FULLY DEPENDENT ON DENSITY OF DEVELOPMENT IN AREA

PETER PAN PRESCHOOL & CHILD CARE

BENSON COURTYARD APARTMENTS

520TH ST

MATCHLINE



TYPICAL SECTION A-A

400
SCALE IN FEET

MATCHLINE

ROLLING GREEN LN

REALTOR ASSOCIATION OF SOUTHERN MN

BENSON COURTYARD APARTMENTS

FUN.COM

PRECISION PRESS

RELOCATE DRIVEWAY

CONSOLIDATE/REALIGN EXISTING ACCESS AS OPPORTUNITIES ARISE

BLK ELECTRIC

GO DIGITAL BY DESIGN

THE CHILD'S WORLD, INC

ANGIE'S BOOM-CHICKAPOP PLANT

ABDO PUBLISHING

KAYE CORPORATION

NICOLLET COUNTY HUMAN SERVICES

KATO ENGINEERING, INC

LOOKOUT DR

SEE MIDDLE SEGMENT ALTERNATIVE LAYOUTS

SOUTH CENTRAL SERVICES CO-OP

SYNERGY & LEADERSHIP EXCHANGE

RELOCATE DRIVEWAY

LABEL WORKS

RELOCATE DRIVEWAY

TAYLOR DIGITAL

UPS CUSTOMER CENTER

CLOSE

CAPSTONE

CARLSON DR

HOWARD DR

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North Segment - Alternative 1
North Mankato, MN
Dec 2022

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MIDDLE SEGMENT ALTERNATIVES – TH 14 TO MARIE LANE

Four improvement alternatives were developed for the middle segment:

- Alternative 1A: Road diet with two-way left turn lane (traffic signal option)
- Alternative 1B: Road diet with two-way left turn lane (roundabout option)
- Alternative 2: Road diet with raised median and roundabouts
- Alternative 3: Spot improvements (retrofit)

ALTERNATIVE 1A: ROAD DIET WITH TWO-WAY LEFT TURN LANE (TRAFFIC SIGNAL OPTION)

This alternative would make the following changes, and is shown visually in **Figure 39**.

- Remove one through lane in each travel direction, maintaining the two-way left turn lane
- Maintains existing traffic signals
- Removes channelized right turns at Commerce Drive
- Future traffic signal at Upper Lee Boulevard (when warranted – not warranted today, but expected to be warranted by 2045)
- Access management

An overview of how this alternative performs related to all technical criteria is summarized in **Table 9**.

Table 9: Performance Summary for Middle Segment Alternative 1A

Middle Segment Alternative 1: 3-Lane Section With Traffic Signals		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Good	• Peak hour traffic operations are expected to be generally good, with LOS C or better expected through 2045 at most intersections (other than 2045 PM peak LOS D at Allan Avenue)
Vehicle Safety	Good	• Reduced cross-section width would have a traffic calming effect, reducing vehicle speeds
Multimodal Facility Comfort and Safety	Great	• Traffic calming from reduced number of lanes would create a more comfortable walking/biking environment • Traffic signal at Upper Lee Boulevard adds another controlled crossing location • Removal of channelized right turns at Commerce Drive reduces vehicle turning speeds, enhancing pedestrian safety
Environmental/Property Impacts	Good	• Minor property access impacts • Fits within existing right-of-way
Cost and Maintenance	Fair	• Moves curblines in, reducing roadway footprint • Potential to salvage existing pavement, mill and overlay instead of full reconstruct
Overall	Good	

Alternative 1B: Road Diet With Two-Way Left Turn Lane (Roundabout Option)

This alternative would make the following changes, and is shown visually in **Figure 39**.

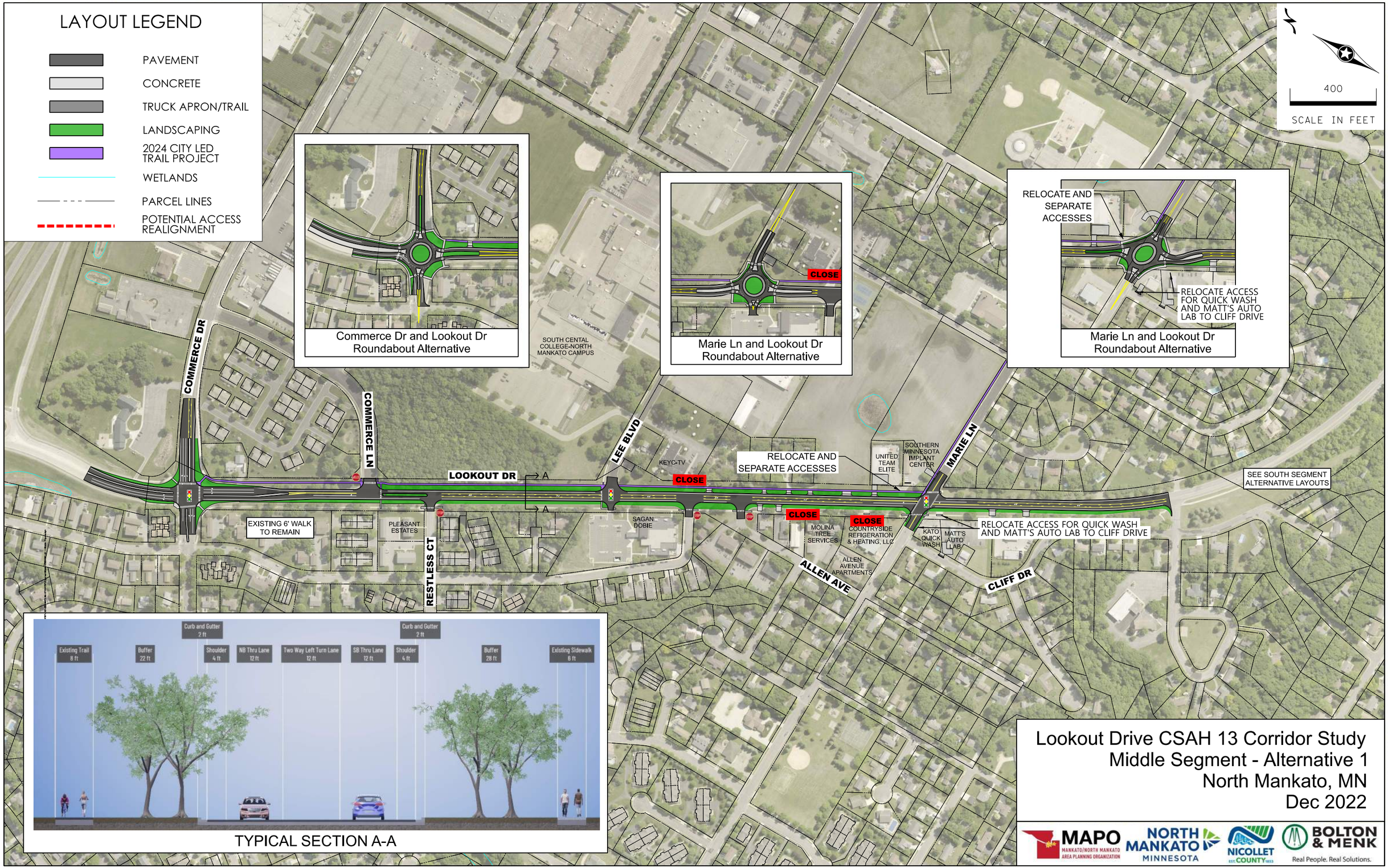
- Remove one through lane in each travel direction, maintaining the two-way left turn lane
- Converts Commerce Drive, Upper Lee Boulevard, and Marie Lane to single lane roundabouts
- Access management

An overview of how this alternative performs related to all technical criteria is summarized in **Table 10.**

Table 10: Performance Summary for Middle Segment Alternative 1B

Middle Segment Alternative 1A: 3-Lane Section With Roundabouts		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Good	• Peak hour traffic operations are expected to be good, with LOS B or better expected through 2045 at most intersections (other than 2045 AM/PM peak LOS C at Carol Court and 2045 PM peak LOS D at Allan Avenue)
Vehicle Safety	Great	• Reduced cross-section width would have a traffic calming effect, reducing vehicle speeds
Multimodal Facility Comfort and Safety	Great	• Traffic calming from reduced number of lanes would create a more comfortable walking/biking environment. Roundabouts would add to traffic calming benefit • Lack of traffic signals means pedestrians crossing Lookout Drive must wait for acceptable gaps in traffic
Environmental/Property Impacts	Good	• Minor property access impacts • Generally fits within existing right-of-way, with only minor impacts on intersection corners
Cost and Maintenance	Fair	• Moves curblines in, reducing roadway footprint • Roadway realignments required at roundabouts
Overall	Good	

Figure 39 - Middle Segment Alternatives 1A and 1B



ALTERNATIVE 2: ROAD DIET WITH RAISED MEDIAN AND ROUNDABOUT

This alternative would make the following changes, and is shown visually in **Figure 40**.

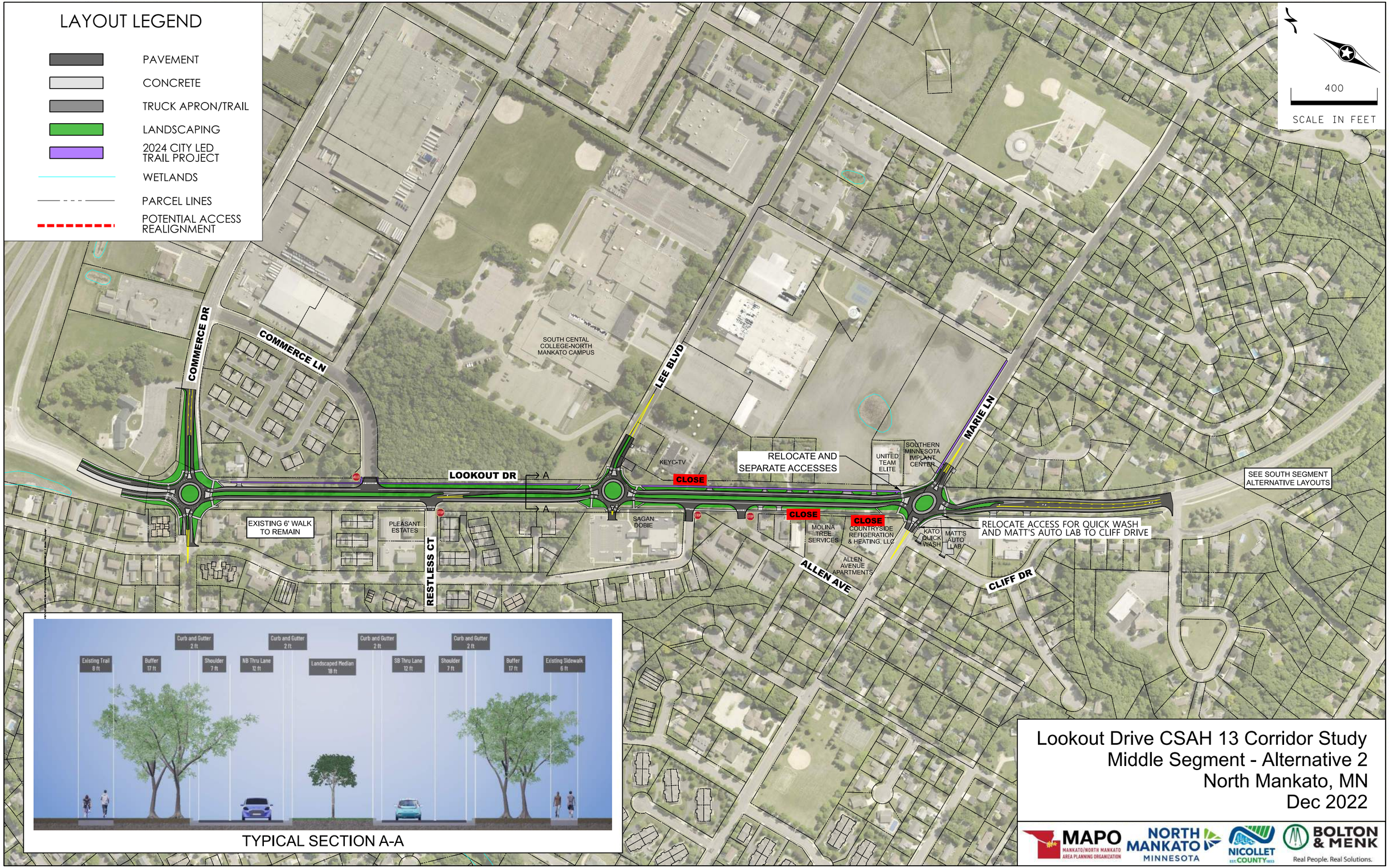
- Convert to one through lane in each travel direction with raised median
    - Raised median converts the following public roadway access points to right-in/right-out accesses
        - Commerce Lane, Restless Court, Pleasant View Drive, Allan Avenue
- Converts Commerce Drive, Upper Lee Boulevard, and Marie Lane to single lane roundabouts
- Access management

An overview of how this alternative performs related to all technical criteria is summarized in **Table 11.**

Table 11: Performance Summary for Middle Segment Alternative 2

Middle Segment Alternative 2: 2-Lane Section With Roundabouts		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Great	• Peak hour traffic operations are expected to be good, with LOS B or better expected through 2045 at most intersections (other than 2045 AM/PM peak LOS C at Carol Court)
Vehicle Safety	Great	• Reduced cross-section width with raised median would have a traffic calming effect, reducing vehicle speeds • Single lane roundabouts reduce fatal and injury crash potential • Most access points become right-in/right-out with raised median, greatly reducing potential conflicts
Multimodal Facility Comfort and Safety	Great	• Median offers pedestrian refuge • Traffic calming from reduced number of lanes would create a more comfortable walking/biking environment. Roundabouts would add to traffic calming benefit • Lack of traffic signals means pedestrians crossing Lookout Drive must wait for acceptable
Environmental/Property Impacts	Fair	• Raised median has more property access impacts than other options • Generally fits within existing right-of-way, with only minor impacts on intersection corners
Cost and Maintenance	Fair	• Moves curblines in, reducing roadway footprint • Roadway realignments required at roundabouts • Wide landscaped median changes maintenance requirements
Overall	Good	

Figure 40 - Middle Segment Alternative 2



Alternative 3: Spot Improvements/Retrofit

This alternative is a lower impact improvement than other middle segment alternatives. This would make the following changes, and is shown visually in **Figure 41**.

- Maintains existing typical roadway section
- Adds median refuge islands at Upper Lee Boulevard and Marie Lane
- Access management

An overview of how this alternative performs related to all technical criteria is summarized in **Table 12.**

Table 12: Performance Summary for Middle Segment Alternative 3

Middle Segment Alternative 3: Retrofit		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Good	• Peak hour traffic operations are expected to be good, with LOS C or better expected through 2045 on the entire segment
Vehicle Safety	Fair	• Short median segments at Upper Lee Boulevard and Marie Lane can have some traffic calming impact, but these would be less impactful than a continuous median
Multimodal Facility Comfort and Safety	Good	• Median refuges at Upper Lee Boulevard and Marie Lane simplify pedestrian crossing maneuvers across Lookout Drive • Traffic signal at Upper Lee Boulevard adds another controlled crossing location
Environmental/Property Impacts	Good	• Minor property access impacts • Fits within existing right-of-way
Cost and Maintenance	Great	• Spot improvements minimize reconstruction requirements
Overall	Good	

Discarded Middle Segment Alternatives

Commerce Drive Intersection Spot Improvements

Consideration was given to spot improvements at Commerce Drive that would remove the existing channelizing islands at the intersection of Lookout Drive and Commerce Drive. After consultation with the Project Management Team, this concept was not carried forward since the channelizing islands were a recent investment.

Pedestrian Grade Separations

Preliminary alternatives analysis considered the provision of a grade separated pedestrian crossing across Lookout Drive. This concept was not carried forward due to a lack of concentrated pedestrian demand at a single location, and also because most other concepts improve pedestrian crossing conditions by reducing the roadway cross section width and/or adding refuge islands.

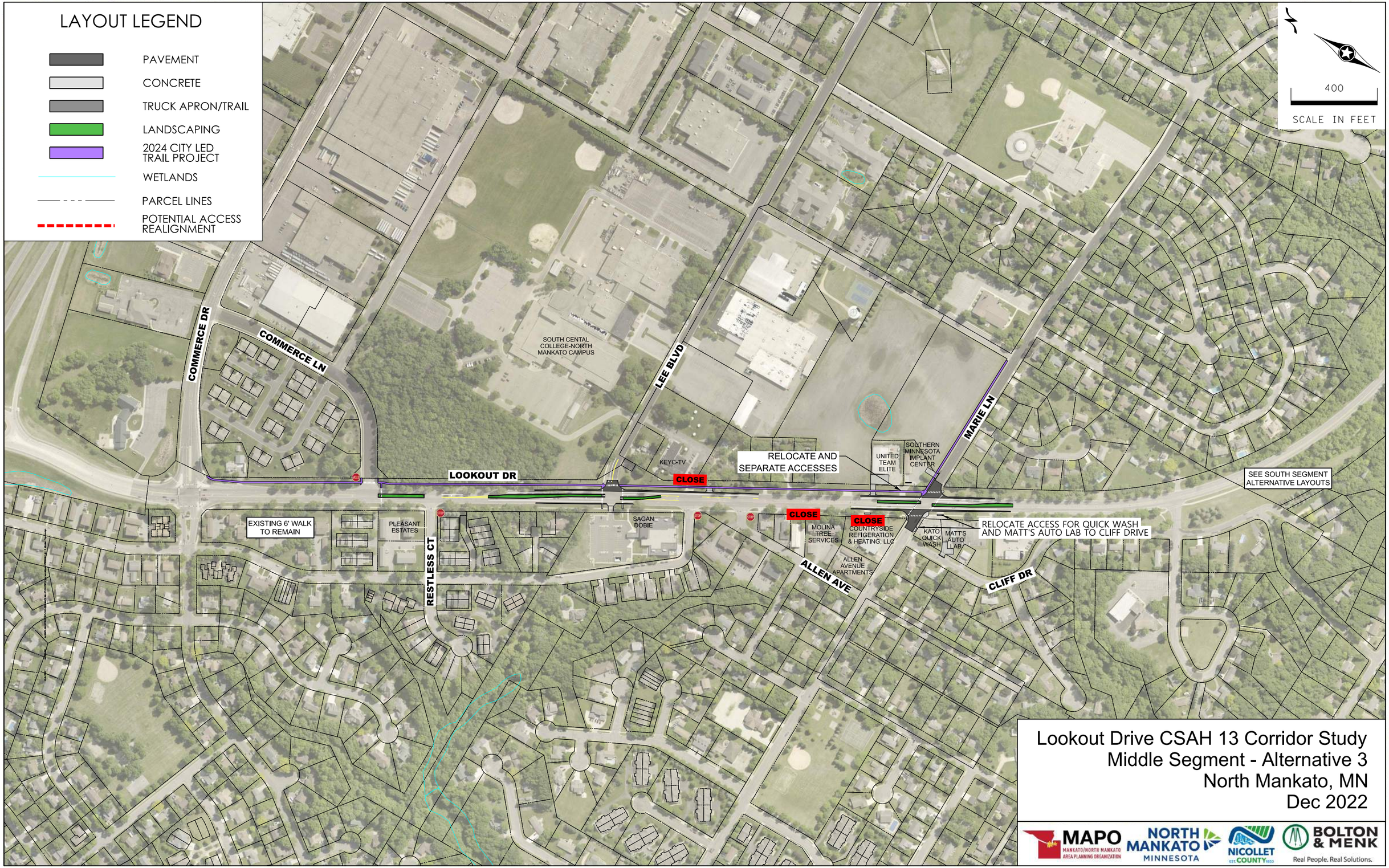
Summary of Middle Segment Alternatives

A ranked summary of all middle segment alternatives is shown in **Table 13.**

Table 13: Summary of Middle Segment Alternatives

Category	Middle Segment				Weight
	Alternative 1	Alternative 1A	Alternative 2	Alternative 3	
Vehicle Mobility	Good	Good	Great	Good	21
Vehicle Safety	Good	Great	Great	Fair	28
Multimodal Facility Comfort and Safety	Great	Great	Great	Good	24
Environmental/Property Impacts	Good	Good	Fair	Good	12
Cost and Maintenance	Fair	Fair	Fair	Great	15
Overall	**Good**	**Good**	**Good**	**Good**	100
Rank (For Segment)	3rd (of 4)	2nd (of 4)	1st (of 4)	4th (of 4)	

Figure 41 - Middle Segment Alternative 3



SOUTH SEGMENT ALTERNATIVES – MARIE LANE TO LOWER LEE BOULEVARD

Two alternatives were developed for the south segment:

- Alternative 1: Remove truck climbing lane and add shared use path
- Alternative 2: Maintain truck climbing lane and add sidewalk

ALTERNATIVE 1: REMOVE TRUCK CLIMBING LANE AND ADD SHARED USE PATH

This alternative would remove the existing northbound truck climbing lane, reallocating this space to add a 10 foot wide shared use path that is separated from travel lanes with a guardrail. This alternative is shown visually in **Figure 42,** and a technical summary is provided in **Table 14**.

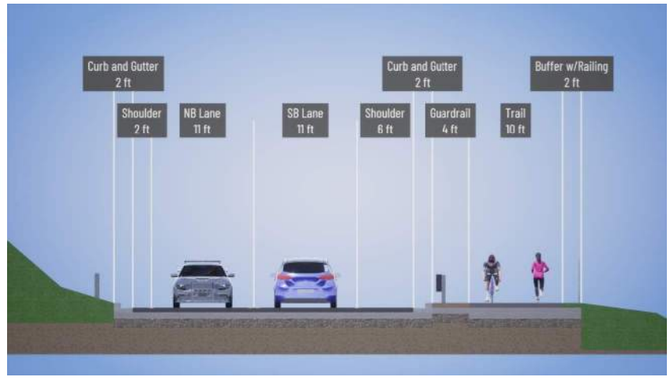
Table 14: Performance Summary for South Segment Alternative 1

South Segment Alternative 1: Multi Use Trail		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Good	• Peak hour traffic operations are expected to be generally good, with LOS C or better expected through 2045
Vehicle Safety	Good	• Minimal changes
Multimodal Facility Comfort and Safety	Great	• Trail is behind a curb and barrier, improving user comfort • Trail is wide enough to accommodate bicyclists
Environmental/Property Impacts	Great	• Fits within existing right-of-way
Cost and Maintenance	Good	• Room for snow storage on both sides of the roadway • Wider trail can accommodate larger and more efficient snow removal vehicles
Overall	Good	

Figure 42 - South Segment Alternative 1

LAYOUT LEGEND

- PAVEMENT
- CONCRETE
- TRAIL
- LANDSCAPING
- WETLANDS
- PARCEL LINES
- GUARDRAIL
- RAILING



TYPICAL SECTION A-A

N

400

SCALE IN FEET

MARIE LN

LEE BLVD

BELGRADE AVE

TAYLOR LIBRARY

NORTH MANKATO CITY HALL AND FIRE STATION

LIFE FAMILY CHURCH

SOUTH AVE

SEE MIDDLE SEGMENT ALTERNATIVE FIGURES

CAROL CT

CLIFF DR

LOOKOUT DR

A

A

SCENIC OVERLOOK

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Alternative 2: Maintain Truck Climbing Lane and Add Sidewalk

This alternative would add a guardrail separated sidewalk (five feet in width) while maintaining the existing northbound truck climbing lane. This alternative is shown visually in **Figure 43**, and a technical summary is provided in **Table 15**.

Table 15: Performance Summary for South Segment Alternative 2

South Segment Alternative 2: Maintain Climbing Lane		
Category	**Performance**	**Key Factors**
Vehicle Mobility	Good	• Peak hour traffic operations are expected to be generally good, with LOS C or better expected through 2045
Vehicle Safety	Good	• Minimal changes
Multimodal Facility Comfort and Safety	Poor	• Available width can only accommodate a sidewalk (not a shared use path) • Insufficient roadway width to accommodate a shoulder for bikes
Environmental/Property Impacts	Great	• Fits within existing right-of-way
Cost and Maintenance	Fair	• Less room for snow storage adjacent to northbound travel lanes • Potential snow removal challenges on 5 ft sidewalk
Overall	Fair	

Discarded South Segment Alternatives

Roadway Widening to Add Shared Use Path

Preliminary alternatives analysis considered expanding the south segment roadway footprint to add bike and pedestrian facilities. This concept was discarded since the Project Management Team believes this is infeasible due to project cost and constructability constraints.

Summary of South Segment Alternatives

A ranked summary of the south segment alternatives is provided in **Table 16**.

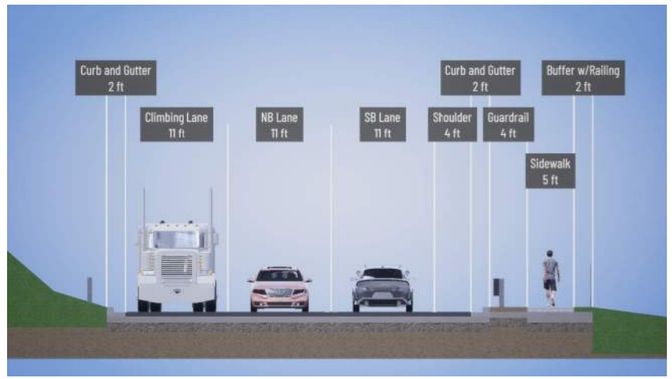
Table 16: Summary of South Segment Alternatives

Category	South Segment		Weight
	Alternative 1	Alternative 2	
Vehicle Mobility	Good	Good	21
Vehicle Safety	Good	Good	28
Multimodal Facility Comfort and Safety	Great	Poor	24
Environmental/Property Impacts	Great	Great	12
Cost and Maintenance	Good	Fair	15
Overall	**Good**	**Fair**	100
Rank (For Segment)	1st (of 2)	2nd (of 2)	

Figure 43 - South Segment Alternative 2

LAYOUT LEGEND

- PAVEMENT
- CONCRETE
- TRAIL
- LANDSCAPING
- WETLANDS
- PARCEL LINES
- GUARDRAIL
- RAILING



TYPICAL SECTION A-A

N

400

SCALE IN FEET

MARIE LN

LEE BLVD

BELGRADE AVE

TAYLOR LIBRARY

NORTH MANKATO CITY HALL AND FIRE STATION

LIFE FAMILY CHURCH

SOUTH AVE

SEE MIDDLE SEGMENT ALTERNATIVE FIGURES

CAROL CT

CLIFF DR

LOOKOUT DR

A

A

SCENIC OVERLOOK

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STAKEHOLDER REVIEW OF ALTERNATIVES

PUBLIC FEEDBACK

The public was given an opportunity to review and comment on proposed roadway improvement alternatives for the study area throughout August of 2022. A virtual open house was accessible between August 8th and August 19th, and an in-person event was held at the North Mankato Farmers Market on August 8th.

Comments received throughout the August 2022 engagement process revealed the following:

- **Overall Feedback**
  - 94 percent of survey responses were from study area residents
  - 15 percent of survey responses were from study area business users

- **North Segment**
  - 77 percent of survey responses were favorable or neutral toward the proposed improvements in North Segment Alternative 1 (three-lane section with multimodal improvements)
  - 23 percent of responses were unfavorable toward the Alternative 1 improvements
  - Feedback for the North Segment is also summarized in **Figure 44**

- **Middle Segment**
  - Roundabout alternatives were viewed more favorably than traffic signal alternatives
    - Roundabout alternatives
      - Alternative 1B (three-lane section with roundabouts): 67 percent of responses were favorable or neutral; 33 percent were unfavorable
      - Alternative 2 (two-lane median-divided section with roundabouts): 67 percent of responses were favorable or neutral, 33 percent were unfavorable
    - Traffic signal alternatives
      - Alternative 1A (three-lane section with traffic signals): 50 percent of responses were favorable or neutral; 50 percent were unfavorable
      - Alternative 3 (spot improvements/retrofit): 56 percent of responses were favorable or neutral; 44 percent were unfavorable
  - Feedback for the Middle Segment is also summarized in **Figure 45**

- **South Segment**
  - Feedback was generally in favor of removing the northbound truck climbing lane and adding a shared use path
    - Alternative 1 (remove truck climbing lane): 79 percent of responses were favorable or neutral; 21 percent were unfavorable
    - Alternative 2 (maintain truck climbing lane): 65 percent of responses were favorable or neutral; 35 percent were unfavorable
  - Feedback for the South Segment is also summarized in **Figure 46**

Figure 44: North Segment Feedback Summary

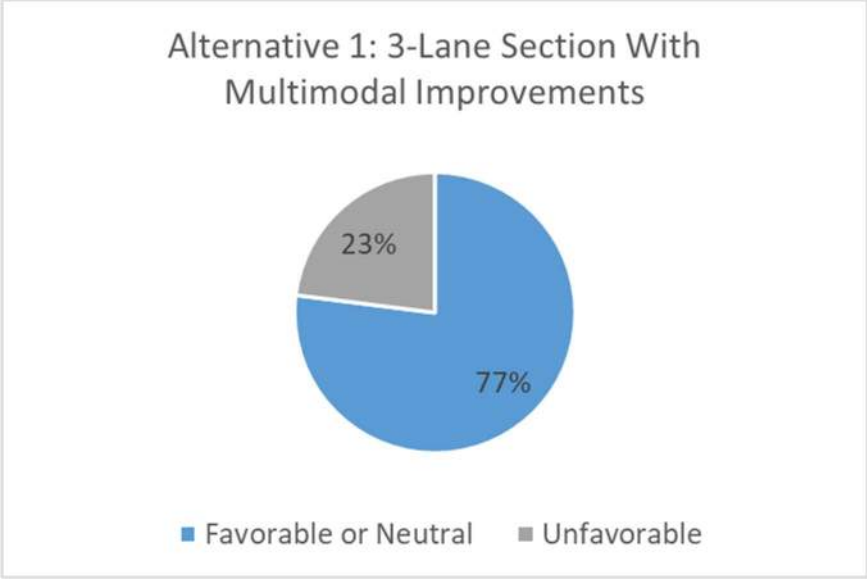
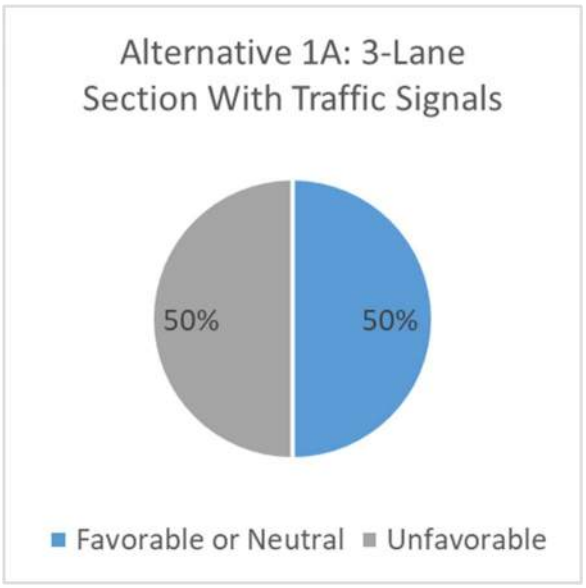
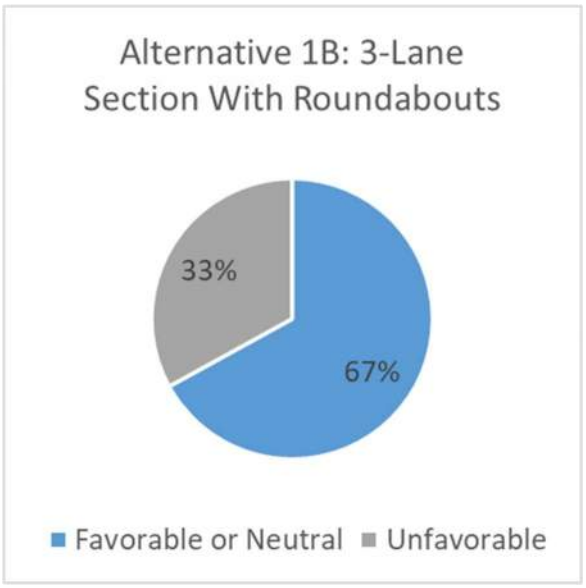
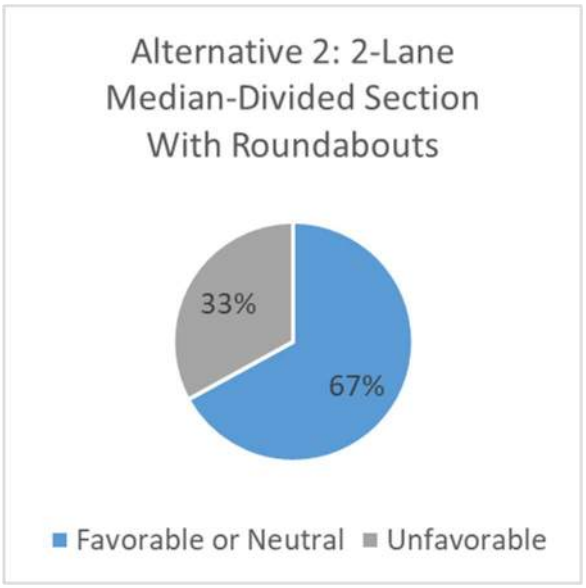


Figure 45: Middle Segment Feedback Summary







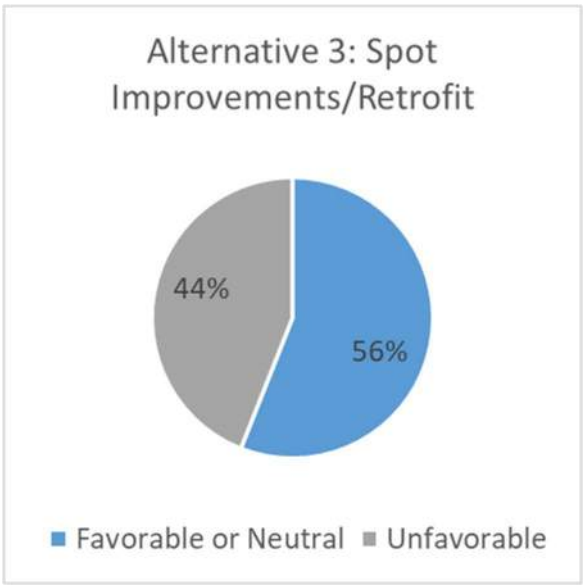
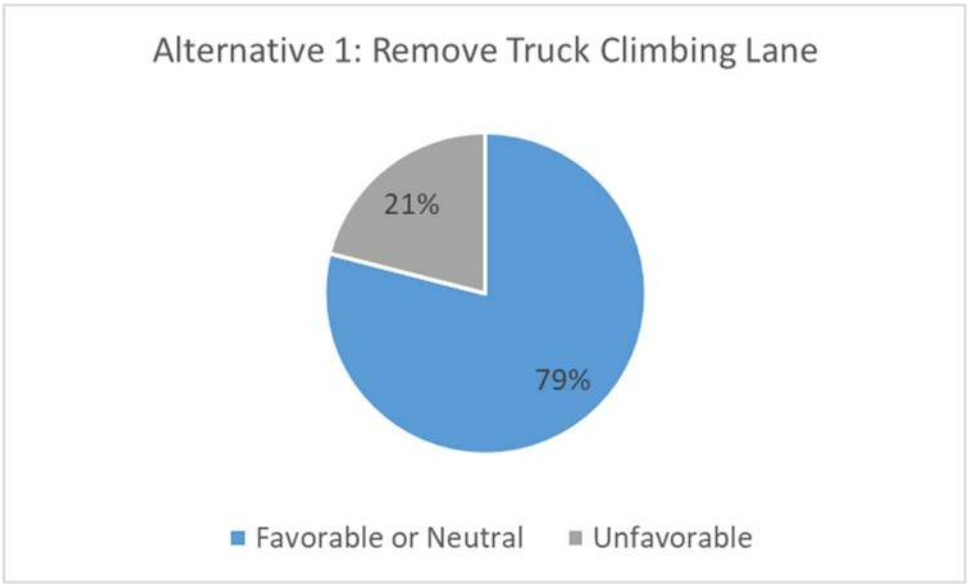
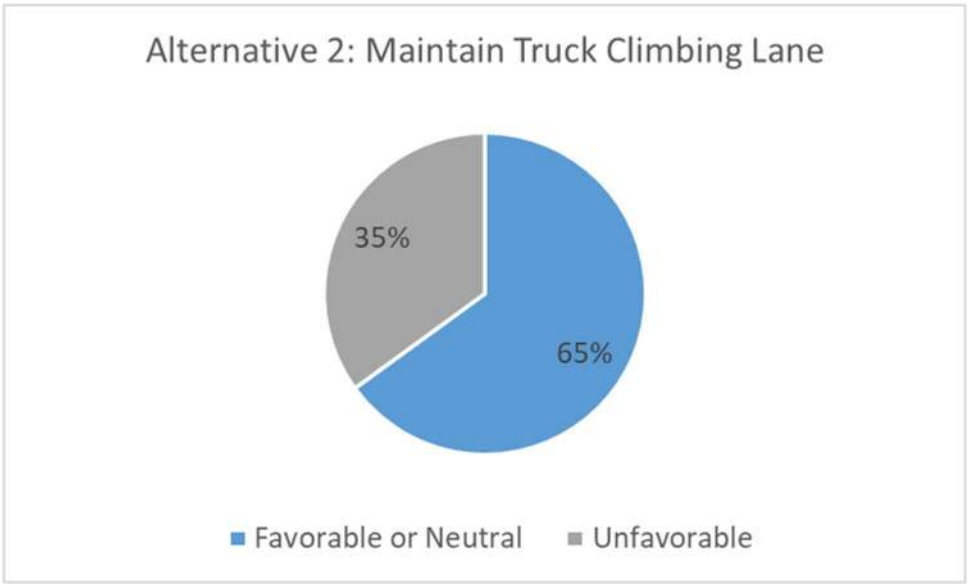


Figure 46: South Segment Feedback Summary





ELECTED OFFICIALS FEEDBACK

Elected officials were also given an opportunity to review study area improvement alternatives, with key feedback summarized below:

- **Nicollet County Board**
  - Improvements should emphasize roadway safety
  - Improvements at Marie Lane are desired given the proximity to Hoover Elementary
  - Improvements at Upper Lee Boulevard are desired given the proximity to Mankato Clinic
  - In favor of removing truck climbing lane on South Segment

- **North Mankato City Council**
  - Improvements should be phased over time
  - Pedestrian-related improvements at Marie Lane are desired

- **MAPO Policy Board**
  - Improvements should be phased over time
  - Supportive of roundabouts
  - Supportive of raised median on Middle Segment

VIII. Recommendations & Implementation Plan

PREFERRED ALTERNATIVES

Preferred alternatives for each segment of Lookout Drive were established, taking into consideration technical analysis results and stakeholder feedback.

- **North Segment Preferred Alternative:** Alternative 1: 3-lane Section with Multimodal Improvements
- **Middle Segment Preferred Alternative:** Alternative 2: 2-lane Median-Divided Section with Roundabouts
- **South Segment Preferred Alternative:** Alternative 1: Remove Truck Climbing Lane

IMPLEMENTATION VISION

Based on technical analysis and stakeholder feedback presented throughout this corridor study, an implementation vision was established to guide the programming of short-term and longer-term projects for the Lookout Drive corridor. Improvement timelines were categorized as follows:

- **Short-Term Improvements**: Projects that should be implemented in the next five years
- **Longer-Term Improvements**: Projects that should be implemented five to 20 years from now
- **Opportunity Driven Improvements**: No specific timeline has been established for these projects, however these should be implemented in conjunction with other roadway projects, as appropriate

When establishing the ideal timeline for various improvements, consideration was given to the magnitude of existing transportation issues, the remaining life of pavement and utilities within the public right-of-way, and other programmed improvements along the corridor.

SHORT-TERM IMPROVEMENTS (0 TO 5 YEARS)

North Segment

- **Implement North Segment Alternative 1**
    - Features
        - Add two-way left turn lane
        - Convert intersections at Howard Drive and Carlson Drive to single-lane roundabouts
        - Add shared-use path and sidewalk north of Carlson Drive
    - Project Rationale
        - Shared-use path addresses existing bike/pedestrian facility gap
        - Opportunity to improve pavement qualities (existing qualities are fair to poor)
        - Opportunity to address watermain corrosion
    - Priorities
        - If funding/programming challenges occur, the following should be prioritized:
            - Sidewalk and shared use path north of Carlson Drive
            - Conversion to an urban three-lane section north of Carlson Drive
            - ADA improvements on the existing sidewalk and shared use path between Howard Drive to Carlson Drive

        - Roundabouts at Howard Drive and Carlson Drive can be constructed as part of a later project if the other elements listed above are implemented as part of an earlier project. Building roundabouts prior to adding other features would however result in the removal of relatively new pavement and other features near the intersections.
        - If funding allows, it is recommended that all recommended features are constructed at the same time

    - Potential Funding Sources
        - Roadway and Multimodal Improvements:
            - Local Road Improvement Program (state dollars) – *construction costs only*
            - Local Partnership Program (state dollars) – *construction cost and a small amount of project development costs*
            - Transportation Economic Development Infrastructure (TEDI) (state dollars) – *can be used on local utilities that allow for industrial/commercial development.*
            - Transportation Economic Development (TED) (state dollars) – *only the south leg of the proposed Lookout Drive/Howard Drive roundabout intersection within MnDOT TH right-of-way is eligible. Can be paired with a TEDI request.*
            - Surface Transportation Block Grant (federal dollars) – *construction costs only*
            - Highway Safety Improvement Program (HSIP) (federal dollars) – *proactive application.*
            - Congressionally Directed or Community Designated Spending Request (federal dollars) – *can be used for project development fees, right-of-way, local utilities, and roadway and trail construction.*
        - City and County funding sources like MnDOT State Aid, levies/property taxes, or wheelage taxes

- **Implement spot ADA improvements identified in the 2019 MAPO ADA Transition Plan**
    - Potential Funding Sources
        - All the previous Roadway and Multimodal Improvements sources can reconstruct pedestrian and bicycle facilities as part of a roadway reconstruction project.
        - Multimodal Improvements Only (can be packaged with roadway funding sources):
            - MnDOT Active Transportation Program (state dollars) – *can be used for project development and construction fees.*
            - Transportation Alternatives Program (TAP) (federal dollars) – *construction costs only*
            - MnDOT Safe Routes to School (SRTS) Program (state dollars) – *can be used for planning and construction fees.*
        - City and County funding sources like MnDOT State Aid, levies/property taxes, or wheelage taxes

Middle Segment

- **Construct shared use path on east side of Lookout Drive between Marie Lane and Commerce Drive**
    - This is programmed as a 2024 Safe Routes to School Project

- **Implement spot ADA improvements identified in the 2019 MAPO ADA Transition Plan**
- **Pedestrian-Related Signal Improvements at Marie Lane**
    - Any combination of the below features should be considered for use during school pedestrian traffic peaks
        - Leading pedestrian interval
        - Dynamic No Right Turn on Red signs
        - Protected-only left turn phasing
    - Project Rationale
        - These improvements improve crossing comfort and safety at a key study area school crossing
- **Traffic Calming Improvements**
    - Consider raised medians on the following segments of Lookout Drive
        - Between Commerce Lane and Restless Court
        - Between Restless Court and Upper Lee Boulevard
    - Project Rationale
        - Mitigates existing speeding issues on Lookout Drive
        - Provides a median refuge for pedestrians crossing Lookout Drive
    - Potential Funding Sources
        - Spot ADA Improvements Only (sources can be packaged with roadway funding sources):
            - MnDOT Active Transportation Program (state dollars) – *can be used for project development and construction fees.*
            - Transportation Alternatives Program (TAP) (federal dollars) – *construction costs only*
            - MnDOT Safe Routes to School (SRTS) Program (state dollars) – *can be used for planning and construction fees.*
        - Both spot ADA improvements, pedestrian related signal improvements at Marie Lane, and traffic calming improvements:
            - Local Road Improvement Program (state dollars) – *construction costs only*
            - Surface Transportation Block Grant (federal dollars) – *construction costs only*
            - Highway Safety Improvement Program (HSIP) (federal dollars) – *proactive application.*
        - City funding sources like MnDOT State Aid or levies/property taxes

South Segment

- No improvements are recommended in the next five years

LONGER-TERM IMPROVEMENTS (5 TO 20 YEARS)

North Segment

- All recommendations from this study should be implemented in the short-term, if possible

Middle Segment

- **Implement Middle Segment Alternative 2**
    - Features
        - Raised median
        - Single lane roundabouts at Commerce Drive, Upper Lee Boulevard, and Marie Lane
        - Longer-term recommendations for the middle segment are intended to reduce vehicle speeds on Lookout Drive, and speed limit revisions can be considered as part of roadway design changes. It is recommended that speed limit changes are only implemented in conjunction with design changes. Research throughout the country has found that speed limit changes without roadway design changes will not significantly impact vehicle speeds.
        - Speed limit adjustments can be made by following any of the below processes:
            - Local authorities can request MnDOT authorization of a revised speed limit based on results of an engineering and traffic investigation if they believe the existing speed limit is greater than (or less than) what is reasonable or safe (see Minnesota Statute § 169.14, subdivision 5)
            - The speed limit can be reduced to 30 mph if the roadway meets the definition of an “urban district” (see Minnesota Statute § 169.14, subdivision 5b). Minnesota Statute §169.011, subdivision 90 defines an urban area as “territory contiguous to and including any city street or town road that is built up with structures devoted to business, industry, or dwelling houses situated at intervals of less than 100 feet for a distance of a quarter of a mile or more”. This would require a City Council resolution designating the roadway as an urban district.
            - A city may establish speed limits for streets under city jurisdiction if city-wide speed limits are established in a consistent and understandable manner. Procedures must be developed to set speed limits based on safety, engineering, and traffic analysis, and must consider national speed limit guidance, local crash patterns, and methods to effectively communicate the change to the public (see Minnesota Statute § 169.14, subdivision 5h). When establishing speed limits using this process, it is common for cities to develop a formal speed limit policy.
    - Project Rationale
        - Traffic calming from raised median and roundabouts mitigates existing speeding issues along the corridor
        - Existing pavement has around 10 years of service life remaining
        - Opportunity to address Watermain corrosion

- Priorities
  - If funding/programming challenges occur, the roundabout at Upper Lee Boulevard should be prioritized over other features of Middle Segment Alternative 2.
    - This intersection is expected to have the poorest future intersection level of service if no changes are made compared to the Commerce Drive or Marie Lane intersections.
    - Additionally, this intersection is in in the middle of this roadway segment, therefore corridor traffic calming benefits are expected to be higher here than if a lone roundabout was constructed at Commerce Drive or at Marie Lane

- Potential Funding Sources
  - Roadway and Multimodal Improvements:
    - Local Road Improvement Program (state dollars) – *construction costs only*
    - Local Partnership Program (state dollars) – *construction cost and a small amount of project development costs*
    - Transportation Economic Development Infrastructure (TEDI) (state dollars) – *can be used on local utilities that allow for industrial/commercial development.*
    - Transportation Economic Development (TED) (state dollars) – *only the south leg of the proposed Lookout Drive/Howard Drive roundabout intersection within MnDOT TH right-of-way is eligible. Can be paired with a TEDI request.*
    - Surface Transportation Block Grant (federal dollars) – *construction costs only*
    - Highway Safety Improvement Program (HSIP) (federal dollars) – *proactive application.*
    - Congressionally Directed or Community Designated Spending Request (federal dollars) – *can be used for project development fees, right-of-way, local utilities, and roadway and trail construction.*
  - All the previous Roadway and Multimodal Improvements sources can reconstruct pedestrian and bicycle facilities as part of a roadway reconstruction project.
  - Multimodal Improvements Only (can be packaged with roadway funding sources):
    - MnDOT Active Transportation Program (state dollars) – *can be used for project development and construction fees.*
    - Transportation Alternatives Program (TAP) (federal dollars) – *construction costs only*
    - MnDOT Safe Routes to School (SRTS) Program (state dollars) – *can be used for planning and construction fees.*
  - City funding sources like MnDOT State Aid or levies/property taxes

- **Coordinate with MnDOT to establish the future configuration of existing roundabouts at the TH 14 interchange**
    - Proposed cross-section changes would not require multi-lane roundabouts at TH 14 interchange
    - Traffic operations analysis shows that single lane roundabouts can accommodate 2045 traffic demands

South Segment

- **Implement South Segment Alternative 1**
    - Features
        - Remove northbound truck climbing lane
        - Add 10 foot wide shared use path
    - Project Rationale
        - Shared use path addresses existing bike/pedestrian facility gap
        - Existing pavement has around 10 years of service remaining
    - Potential Funding Sources
        - Roadway and Multimodal Improvements:
            - Local Road Improvement Program (state dollars) – *construction costs only*
        - The previous Roadway and Multimodal Improvements source can reconstruct pedestrian and bicycle facilities as part of a roadway reconstruction project.
        - Multimodal Improvements Only (can be packaged with roadway funding sources):
            - MnDOT Active Transportation Program (state dollars) – *can be used for project development and construction fees.*
            - Transportation Alternatives Program (TAP) (federal dollars) – *construction costs only*
            - Department of Natural Resources (DNR) Local Trails (state dollars) – *construction costs only*
        - City funding sources like MnDOT State Aid or levies/property taxes

Opportunity Driven Improvements

North Segment

- **Access management improvements**
    - See **Figure 38** for access management improvements that can be incorporated into future roadway projects, property development/redevelopment, or completed as stand-alone projects

- Monitor traffic patterns at Timm Road intersection for potential traffic control upgrades as development occurs

Middle Segment

- **Access management improvements**
    - See **Figure 40** for access management improvements that can be incorporated into future roadway projects, property development/redevelopment, or completed as stand-alone projects

CONCLUSIONS AND IMPLEMENTATION SUMMARY

Analysis completed throughout this corridor study shows that traffic flow and safety are generally good along the Lookout Drive corridor, however there are improvements that can be made in the short and long term to best provide safe and efficient facilities for all roadway users into the future.

Recommended improvements focus on the following:

- Reallocation of roadway space to improve bicycle and pedestrian facilities
- Vehicle speed reduction through traffic calming improvements

A matrix summarizing the proposed implementation vision is provided in **Table 17**.

Table 17: Implementation Vision

Segment	Short Term Improvements: 0 to 5 Years	Longer Term Improvements: 5 to 20 Years	Opportunity Driven Improvements: Implement as Funding is Available
North Segment: 512th Street to Howard Drive	**Implement North Segment Alternative 1** -Add two-way left turn lane* -Add shared-use path and sidewalk north of Carlson Drive* -Convert intersections at Howard Drive and Carlson Drive to single lane roundabouts **Implement spot ADA improvements identified in 2019 MAPO ADA Transition Plan*** **Prioritize these improvements if funding is limited*	-	**Monitor traffic patterns at Timm Road intersection for potential traffic control upgrades as development occurs** **Access management improvements**
Middle Segment: Commerce Drive to Marie Lane	**Construct shared use path on east side of Lookout Drive between Marie Lane and Commerce Drive** (Safe Routes to School project - 2024) **Implement spot ADA improvements identified in 2019 MAPO ADA Transition Plan** **Pedestrian-Related Signal Improvements at Marie Lane** -Install Accessible Pedestrian Signals (APS) -Leading pedestrian interval -Dynamic No Right Turn on Red signs -Protected-only left turn phasing -Pedestrian-related phasing improvements listed above should be used during school peaks **Traffic Calming Improvements** -Consider raised medians on segments between Commerce Lane and Restless Court and between Restless Court and Upper Lee Boulevard	**Implement Middle Segment Alternative 2** -Raised median -Single lane roundabouts at Commerce Drive, Upper Lee Boulevard, and Marie Lane -Upper Lee Boulevard roundabout should be prioritized if funding/programming challenge occur for other features of Alternative 2 **Coordinate with MnDOT to establish future configuration of existing roundabouts at TH 14 interchange**	**Access management improvements**
South Segment: Marie Lane to Lower Lee Boulevard	-	**Implement South Segment Alternative 1:** -Remove northbound truck climbing lane -Add 10' shared use path	-

Appendix A

Traffic Forecasting Memorandum

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MEMORANDUM

Date: 8/30/2021

To: Lookout Drive Corridor Study Project Management Team

From: Kevin Mackey PE, PTOE

Subject: 2045 Traffic Projections for Lookout Drive Corridor Study
Mankato Area Planning Organization
Project No.: 0T4124787

Background
This memorandum has been prepared to document 2045 traffic projections for use in transportation analyses in the Lookout Drive Corridor Study.

Data Sources
Traffic projections were generally based on the following traffic data:

- Historic average daily traffic data obtained from MnDOT
  - Generally covering the time period between 1995 and 2019
- 2045 traffic forecasts from the current MAPO Long Range Transportation Plan (2020)
- Development assumptions from the City of North Mankato's *Northwest Growth Area Study* (2020)

Discussion
The initial step of developing traffic forecasts was comparing 2045 forecasts documented in the current long range transportation plan (LRTP) to 2045 conditions if historic traffic growth trends continue into the future. A map showing a comparison between these two datasets is provided in **Attachment A**.

Key takeaways for this analysis include:

- Lookout Drive North of TH 14
  - **LRTP forecasts** – LRTP forecasts show a range between 1,250 ADT north of 512th Street to 10,700 ADT north of TH 14
  - **Trend analysis –** If historic traffic growth rates continue through 2045, it is expected daily traffic volumes would range between 1,200 ADT north of 512th Street to 14,400 ADT north of TH 14
- Lookout Drive South of TH 14
  - **LRTP forecasts –** LRTP forecasts show between 13,100 ADT west of Lower Lee Boulevard to 13,900 ADT south of TH 14
  - **Trend analysis** – If historic growth rates continue, 2045 forecasts range between 12,500 ADT west of Lower Lee Boulevard to 13,200 ADT south of TH 14

A comparison between the trend analysis dataset and the LRTP dataset generally shows close agreement, with a maximum study area ADT around 14,000.

Development Potential on North End of Study Area
Much of the area north of TH 14 and west of Lookout Drive is currently undeveloped, however the City of North Mankato has established a development vision for this area. The *Northwest Growth Area Study* assumes that this area will generally be commercial and industrial in nature, with some residential development between Lookout Drive and CSAH 41. An excerpt from the *Northwest Growth Area Study* that illustrates the development concept is provided in **Attachment B**.

Using the development concept described above, development-related traffic growth on Lookout Drive was estimated using the following assumptions:

- Around half of residential traffic will use Lookout Drive, with the remaining traffic using CSAH 41.
- Around 10 percent of commercial and industrial traffic will use Lookout Drive. Around 80 percent of future commercial and industrial development is assumed to be west of CSAH 41, making CSAH 41 a more logical route choice when accessing these areas.

Based on these assumptions, it is assumed the new development has the potential to add around 2,500 vehicles per day to Lookout Drive north of TH 14.

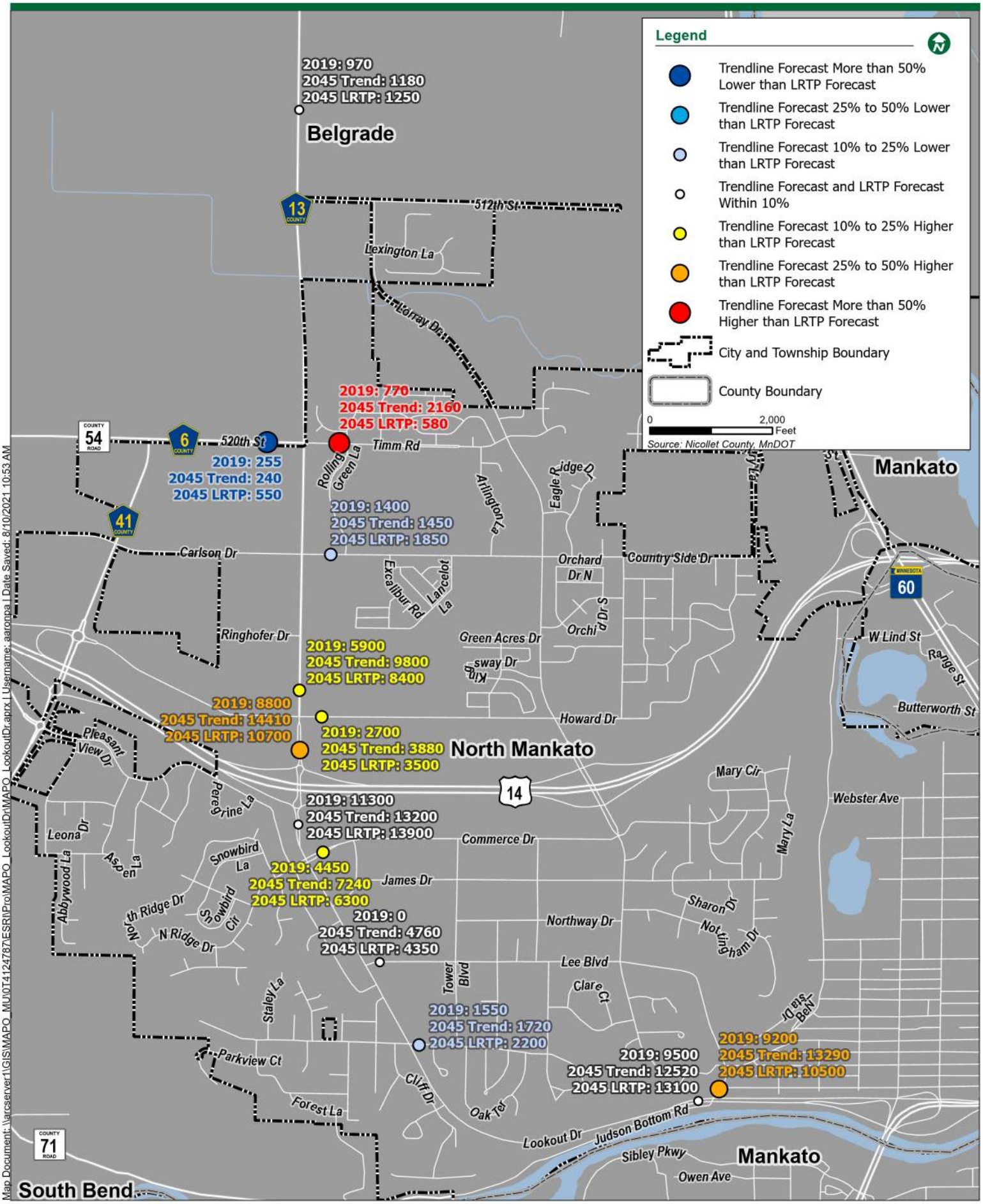
Recommended 2045 Traffic Projections
We recommend basing 2045 traffic analyses on the forecasts shown in **Attachment C**. The general concepts that were applied when determining these values are:

- Utilize the higher traffic growth when comparing LRTP forecasts to trendline forecasts
    - Several project goals could be met with a reallocation of driving lane space for other purposes, therefore a slightly conservative traffic estimate can best ensure that vehicle operations are not disproportionately impacted if roadway space is reallocated
- North of Howard Drive, also add traffic associated with development in northwest North Mankato to Lookout Drive
    - South of Howard Drive, it is assumed traffic growth rates associated with both the LRTP forecasts and the trendline forecasts will account for traffic growth associated with the development in northwest North Mankato

Lookout Drive/CSAH 13 Corridor Study — **2045 Trendline ADT vs 2045 LRTP ADT**

North Mankato/Mankato Area Planning Organization — August 2021

BOLTON & MENK



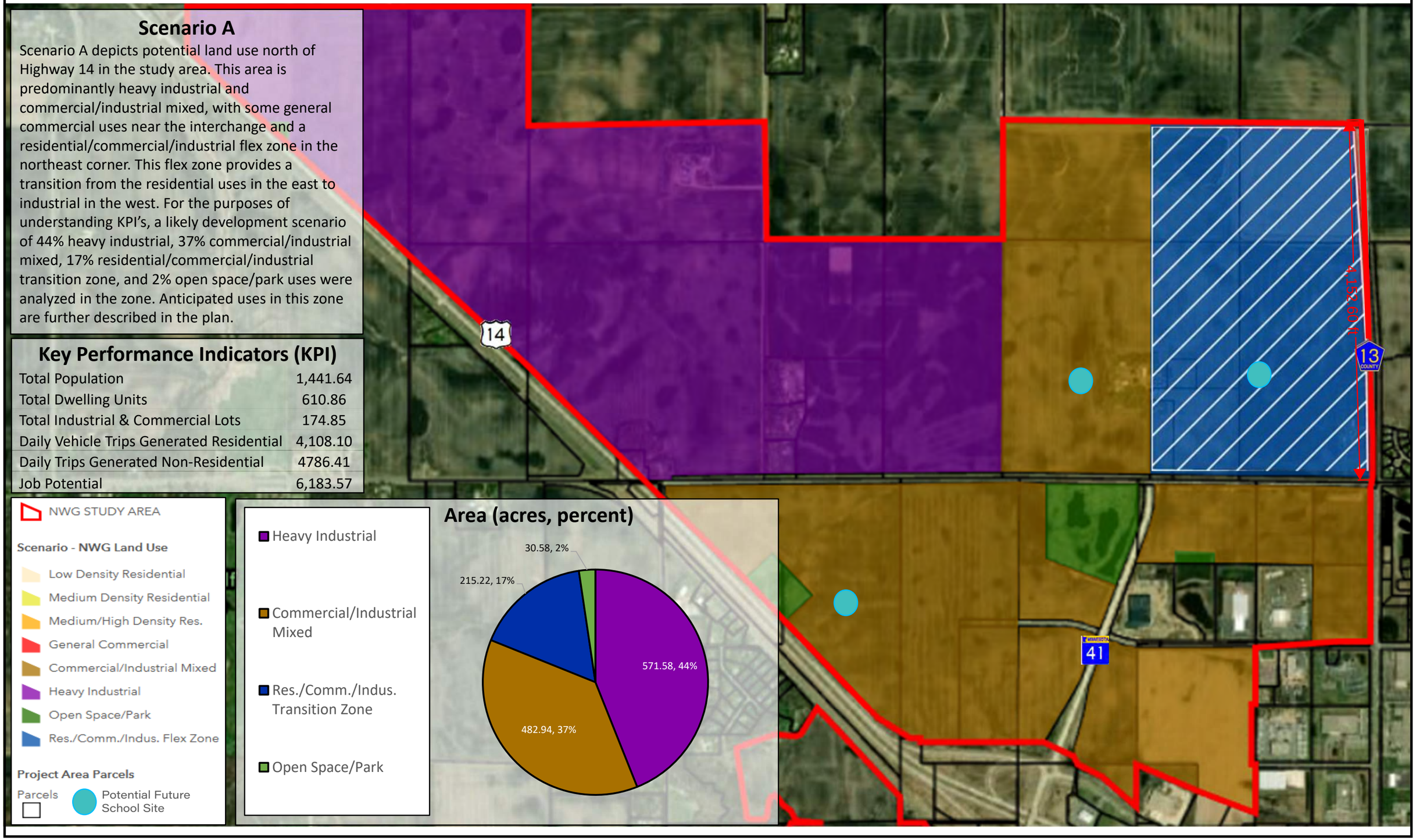
Land Use Scenario A – North of Highway 14

Scenario A

Scenario A depicts potential land use north of Highway 14 in the study area. This area is predominantly heavy industrial and commercial/industrial mixed, with some general commercial uses near the interchange and a residential/commercial/industrial flex zone in the northeast corner. This flex zone provides a transition from the residential uses in the east to industrial in the west. For the purposes of understanding KPI's, a likely development scenario of 44% heavy industrial, 37% commercial/industrial mixed, 17% residential/commercial/industrial transition zone, and 2% open space/park uses were analyzed in the zone. Anticipated uses in this zone are further described in the plan.

Key Performance Indicators (KPI)

Total Population	1,441.64
Total Dwelling Units	610.86
Total Industrial & Commercial Lots	174.85
Daily Vehicle Trips Generated Residential	4,108.10
Daily Trips Generated Non-Residential	4786.41
Job Potential	6,183.57



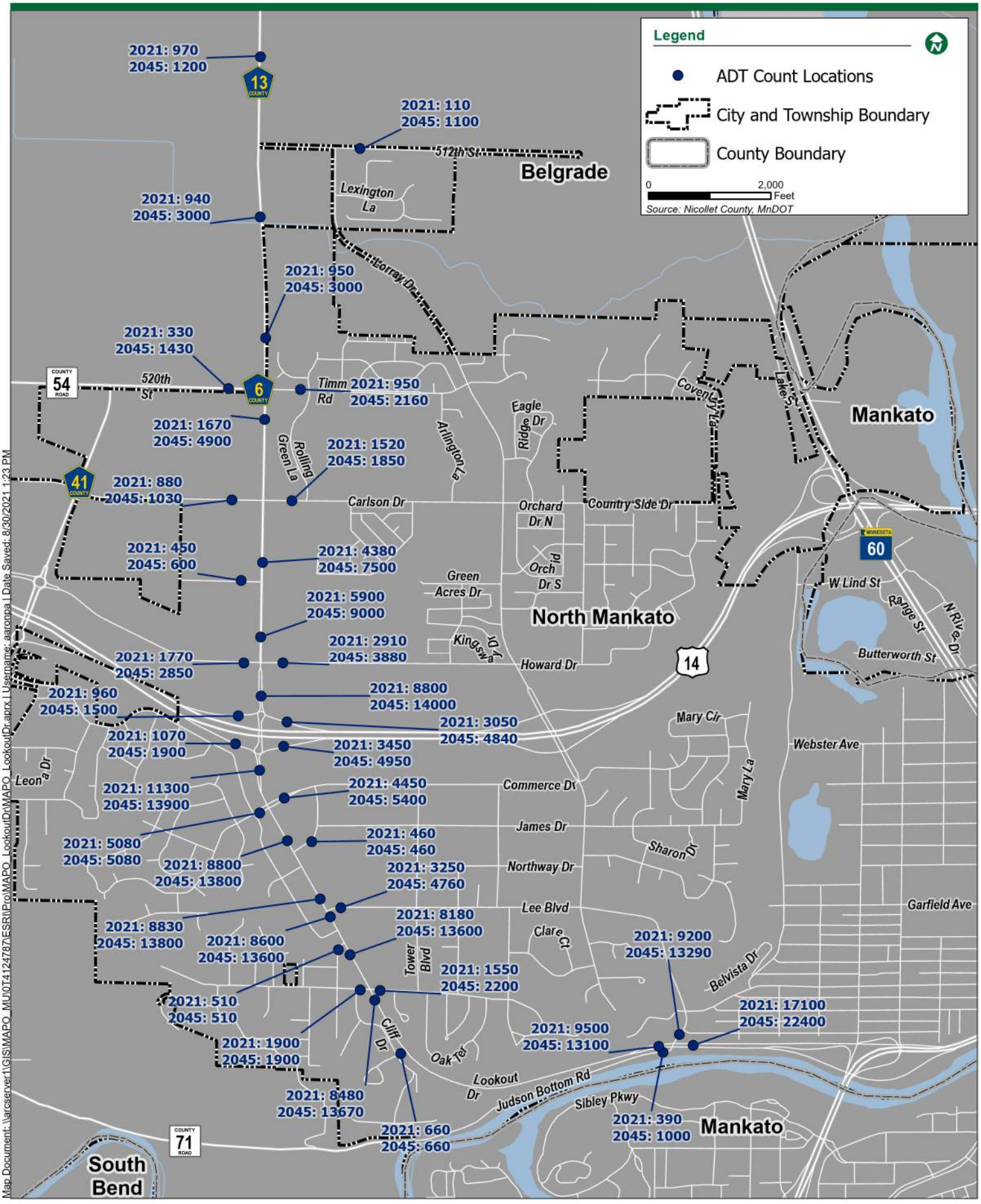
Lookout Drive/CSAH 13 Corridor Study

2045 ADT Traffic Projections

North Mankato/Mankato Area Planning Organization

August 2021

BOLTON & MENK



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Appendix B

Intersection Control Decision Matrices

With Lane Reductions Between TH 14 and Marie Lane (One Through Lane in Each Direction)

Intersection	Existing Traffic Control	No Build				Traffic Signal						Roundabout***			
		Traffic Operations		2016-2020 Crash Rate		Signal Warrants Met		Traffic Operations		Crash Reduction+		Traffic Operations		Crash Reduction++	
		2021 Existing LOS	2045 No Build LOS	All Severities	Fatal/Injury	Existing Traffic	2045 Traffic	2021 LOS	2045 LOS	All Severities	Fatal/Injury	2021 LOS	2045 LOS	All Severities	Fatal/Injury
Timm Road/CSAH 6	TWSC	AM: LOS A PM: LOS A	AM: LOS B PM: LOS B	Above Statewide Average	Below Statewide Average	None	None	Not Warranted	Not Warranted	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-72%	-88%
Carlson Drive	TWSC	AM: LOS C PM: LOS B	AM: LOS F PM: LOS E	Above Statewide Average	Below Statewide Average	None	None	Not Warranted	Not Warranted	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-72%	-88%
Commerce Drive	Signal	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	Above Statewide Average	Below Statewide Average	4-Hour*	8-Hour 4-Hour Peak Hour	AM: LOS B PM: LOS B	AM: LOS B PM: LOS C	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	-35%	-74%
Upper Lee Boulevard	TWSC	AM: LOS A PM: LOS B	AM: LOS C PM: LOS D	Above Statewide Average	Below Statewide Average	None	8-Hour 4-Hour Peak Hour	Not Warranted	AM: LOS C PM: LOS C	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	-72%	-88%
Marie Lane	Signal	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	Below Statewide Average	Below Statewide Average	None	None**	Not Warranted	AM: LOS B PM: LOS C	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-35%	-74%
Lower Lee Boulevard	Signal	AM: LOS B PM: LOS C	AM: LOS C PM: LOS C	Below Statewide Average	Above Statewide Average	8-Hour 4-Hour Peak Hour	8-Hour 4-Hour Peak Hour	AM: LOS B PM: LOS C	AM: LOS B PM: LOS C	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS C	-35%	-74%

*Met if 50% of minor approach right turns are included in analysis
**Met at 60% of typical warrant thresholds
***Single lane roundabouts at all locations; Assumes WB right turn bypass at Lower Lee Blvd
+Source: Srinivasan et al, "Safety Evaluation of Signal Installation With and Without Left Turn Lanes on Turn Lane Roads in Rural and Suburban Areas" (2014)
++Source: Persaud, et al, "Observational Before-After Study of the Safety Effect of US Roundabout Conversions Using the Empirical Bayes Method" (2001)

Maintain Two Through Lanes in Each Direction Between TH 14 and Marie Lane

Intersection	Existing Traffic Control	No Build				Traffic Signal						Roundabout***			
		Traffic Operations		2016-2020 Crash Rate		Signal Warrants Met		Traffic Operations		Crash Reduction		Traffic Operations		Crash Reduction	
		2021 Existing LOS	2045 No Build LOS	All Severities	Fatal/Injury	Existing Traffic	2045 Traffic	2021 LOS	2045 LOS	All Severities	Fatal/Injury	2021 LOS	2045 LOS	All Severities	Fatal/Injury
Timm Road/CSAH 6	TWSC	AM: LOS A PM: LOS A	AM: LOS B PM: LOS B	Above Statewide Average	Below Statewide Average	None	None	Not Warranted	Not Warranted	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-72%	-88%
Carlson Drive	TWSC	AM: LOS C PM: LOS B	AM: LOS F PM: LOS E	Above Statewide Average	Below Statewide Average	None	None	Not Warranted	Not Warranted	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-72%	-88%
Commerce Drive	Signal	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	Above Statewide Average	Below Statewide Average	4-Hour*	8-Hour 4-Hour Peak Hour	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	-35%	-74%
Upper Lee Boulevard	TWSC	AM: LOS A PM: LOS B	AM: LOS C PM: LOS D	Above Statewide Average	Below Statewide Average	None	8-Hour 4-Hour Peak Hour	Not Warranted	AM: LOS B PM: LOS B	-36%	-36%	AM: LOS A PM: LOS A	AM: LOS A PM: LOS B	-72%	-88%
Marie Lane	Signal	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	Below Statewide Average	Below Statewide Average	None	None**	Not Warranted	AM: LOS A PM: LOS A	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS A	-35%	-74%
Lower Lee Boulevard	Signal	AM: LOS B PM: LOS C	AM: LOS C PM: LOS C	Below Statewide Average	Above Statewide Average	8-Hour 4-Hour Peak Hour	8-Hour 4-Hour Peak Hour	AM: LOS B PM: LOS C	AM: LOS C PM: LOS C	No Change	No Change	AM: LOS A PM: LOS A	AM: LOS A PM: LOS C	-35%	-74%

*Met if 50% of minor approach right turns are included in analysis
**Met at 60% of typical warrant thresholds
***Single lane roundabouts at all locations; Assumes WB right turn bypass at Lower Lee Blvd
[+]Source: Srinivasan et al, "Safety Evaluation of Signal Installation With and Without Left Turn Lanes on Turn Lane Roads in Rural and Suburban Areas" (2014)
[++]Source: Persaud, et al, "Observational Before-After Study of the Safety Effect of US Roundabout Conversions Using the Empirical Bayes Method" (2001)