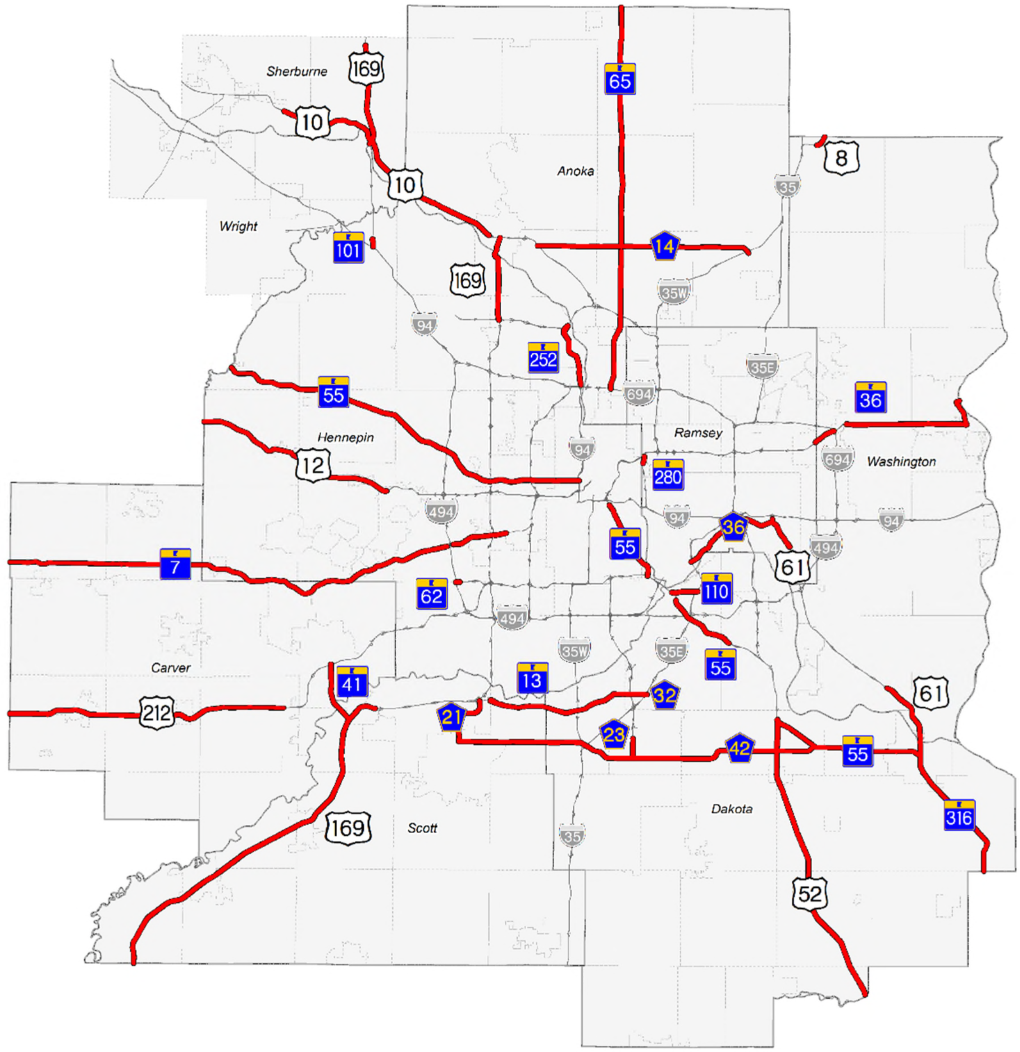
PRINCIPAL ARTERIAL

INTERSECTION CONVERSION STUDY



Principal Arterial Intersection Conversion Study

Final Report

February 2017

Metropolitan Council Contract No. 15P102

Description

This Final Report provides an Executive Summary, background information, and the results of the Study. The main outcome of the work was to identify priorities for upgrades to non-freeway principal arterial intersections. The Study identified 91 intersections for detailed evaluation; it prioritized each as High-, Medium-, or Low-Priority for grade separation projects (new interchanges or similar). This report also provides guidance and tools for future transportation planning, with reference to the results.

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ACKNOWLEDGEMENTS

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Consultant Support

Technical support and staffing to complete the study, under contract with the Metropolitan Council and MnDOT, was led by Bolton & Menk, Inc. with assistance from Stonebrooke Engineering, Inc. (Doug Abere, Bolton & Menk, Consultant Team Project Manager).

Note: This document (PDF file) is set up for 2-sided printing with blank pages inserted where appropriate.

Final Report

Prepared by Bolton & Menk, Inc. with Stonebrooke Engineering

Contents

Tables

Figures

Attachments (separate volumes/files as applicable)

1. Detailed Phase II Data Tables
2. County Maps of Study Results
3. Analysis of Principal Arterial Intersections with Freeway Ramps
4. Intersection Solution Sets and Cost Ranges
5. Phase I Technical Memorandum

List of Acronyms

AADT	Annual Average Daily Traffic
CH	County Highway
CMSP	Congestion Management Safety Plan
CSAH	County State Aid Highway
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ICE	Intersection Control Evaluation
MnSHIP	Minnesota State Highway Investment Plan
PA	Principal Arterial
PMT	Project Management Team
STIP	State Transportation Improvement Program
TED	Transportation Economic Development
TH	Trunk Highway

TPP	Transportation Policy Plan
TSC	Technical Screening Committee
VMT	Vehicle Miles Traveled
VPD	Vehicles per Day

Executive Summary

The Principal Arterial Intersection Conversion Study considered needs at intersections on non-freeway principal arterials throughout the Minneapolis-St. Paul metropolitan area, specifically to set priorities for grade separations. Principal arterials are the region's highest type of roadway and are intended to provide reliably safe and high-speed travel over significant distances. While most principal arterials are limited-access freeways, the system also includes about 300 miles of non-freeway segments with at-grade intersections. In many cases, these intersections limit the highway's ability to best provide for long-term safety and mobility. This first-of-its-kind study helped set project priorities for these important at-grade intersections. The Study did not address interchange needs on existing freeways; it focused only on priorities for the possible conversion of non-freeway segments.

This first-of-its-kind study helped set project priorities for important at-grade intersections in the Minneapolis-St. Paul metropolitan area. It did not address interchange needs on existing freeways.

In total, more than 370 intersections were initially considered. Of those, 91 intersections were selected for more detailed study and were prioritized as low, medium, or high priority for grade-separation projects (new interchanges or similar designs). The Study also recognized the importance of considering lower-cost/high-benefit at-grade treatments that could improve intersection safety and performance without grade separations.

The Metropolitan Council and the Minnesota Department of Transportation (MnDOT) Metro District led the Study. This Executive Summary briefly reviews of the Study's process, results, and its proposed role in future transportation planning and decision-making.

Study Scope and Process

The Study was organized to address needs in eight metro-area counties. These included the seven counties typically addressed by the Metropolitan Council (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties) plus the southeast portion of Sherburne County in MnDOT District 3. [1]

The Study process included two phases:

- **Initial Screening (Phase I)** – The Phase I screening identified more than 270 intersections that were not prioritized by the Study for grade separation or similar investments. The Phase I screening advanced intersections to Phase II that had justifications based on the data (volume and safety), had supportive local plans and context, or exhibited both characteristics. Some Phase I intersections, even with high volumes, did not advance because of local preference and context.

[1] The southeast portion of Sherburne County (the City of Elk River) is closest to the rest of the metropolitan area. This area is included in the study because it is part of the U.S. Census defined Metropolitan Statistical Area (MSA) and has strong connectivity with the region. The urbanized portion of Wright County was also considered, but it did not have any non-freeway Principal Arterials

- **Detailed Analysis and Screening** (**Phase II)** – Phase II was a more detailed analytical process which established the priorities for 91 at-grade intersections identified in Phase I. For each Phase II intersection, this work ultimately identified grade-separation investment priorities as High, Medium, and Low and placed intersections and corridors into context for possible additional studies and solutions. The Phase II analysis scored the 91 intersections based on technical and contextual criteria using the following steps:
    - **Capacity Analysis** – The team completed a high-level technical capacity analysis for each intersection based on site-specific traffic and conditions (specific peak-hour turning movements and intersection capacity)
    - **Other Weighted Criteria** – With input from the Study's Technical Steering Committee, the team established and weighted other general criteria for scoring intersections, based on:
        - **Mobility and reliability**, considering volume and general performance (40% weight)
        - **Safety**, including crash frequency and severity (30% weight)
        - **Corridor context**, including functional class of intersecting roads, land use compatibility, proximity to existing grade separations, prior planning for interchanges, and service to freight, transit, and bicycle needs (30% weight)

The final Phase II scoring analysis combined representative capacity analysis scores with the weighted criteria scores to derive composite scores for each intersection. The composite scores and data were carefully reviewed to develop the Study's final results, identifying intersections with High-, Medium-, and Low-Priority for possible grade separations.

Study Results and Intersection Priorities

Overview

Figure ES-1 is an overview of the Study results based on grade-separation priorities for the 91 Phase II intersections (it also highlights the full extent of the corridors evaluated in the Study). For the 91 prioritized intersections, the results provide high-level guidance for the "right-sizing" of potential projects as follows:

- **34 High-Priority Intersections** – The High-Priority intersections often exhibit needs that can justify high-capacity at-grade improvements or grade separations. These intersection locations (and the corridors they are within) should be addressed in more detail to determine the right-sized investments.

- **27 Medium-Priority Intersections** – The Medium-Priority intersections typically do not need grade-separation projects based on current demand. However, additional studies at these locations could show needs for high-capacity at-grade improvements or limited/emerging needs for grade-separation elements (for example, a bridge which may serve only one movement).

- **30 Low-Priority Intersections** – These locations generally do not need major changes or projects based on current demand and any problems can most likely be addressed with at-grade projects.

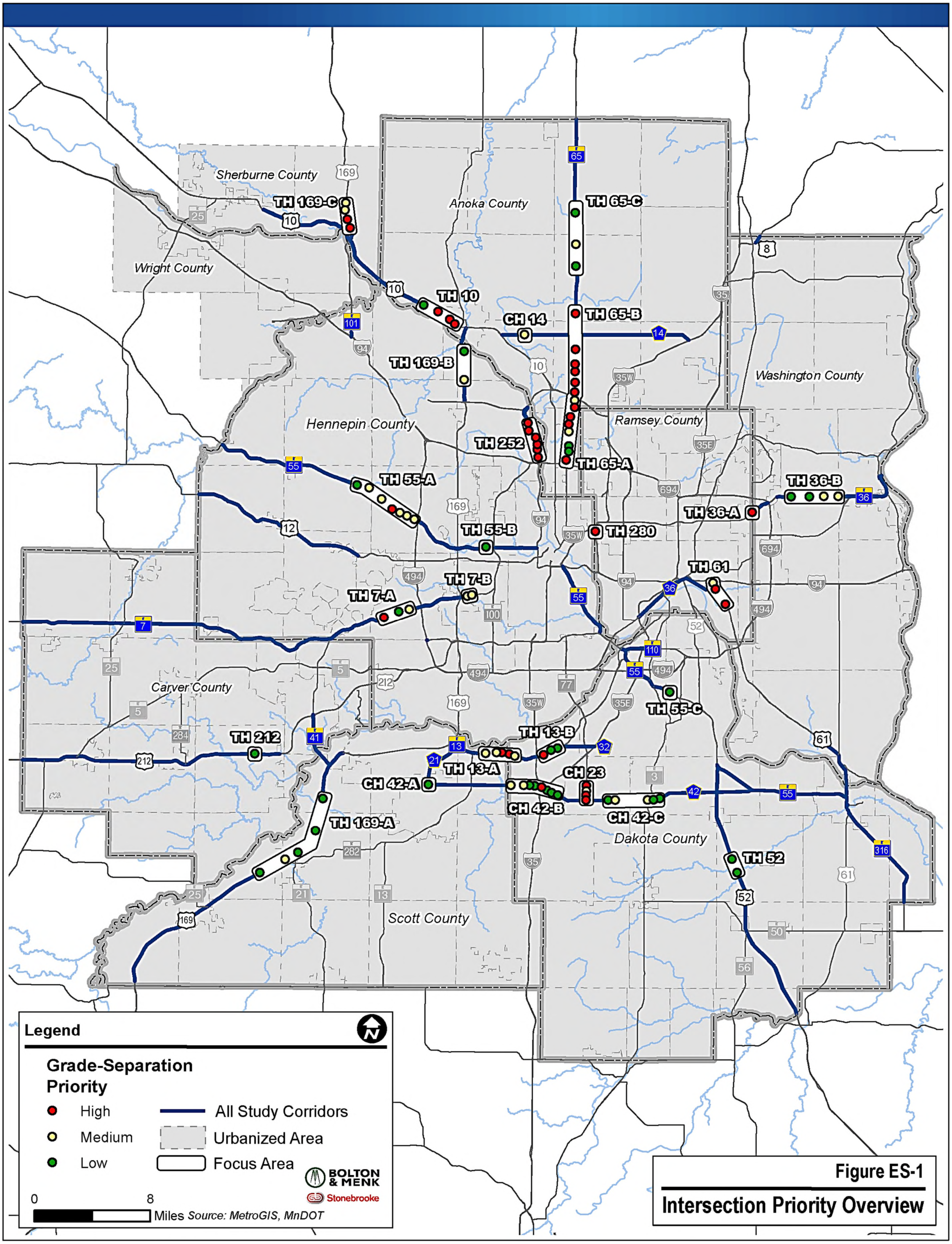


Figure ES-1

Intersection Priority Overview

Figure ES-1 shows that the 91 prioritized intersections were also organized into 26 Focus Areas, which are locations and corridors with one or more intersection. As the Study concluded, the Focus Areas established the basis for future corridor studies to support development of projects and funding.

Focus Area Summary

The body of the Final Report provides many details on Study results with reference to the 26 Focus Areas shown in Figure ES-1. The Focus Areas provide the best means to review and understand the Study's results based on the 91 intersection locations and their priorities. Observations on the Focus Areas include:

- **The Focus Areas and Intersection Priorities Provide Guidance for Additional Studies** – For all Phase II Focus Areas, the results of this Study can provide the basis for additional studies. Intersections and corridors with High- and Medium-Priority outcomes are more likely to merit in-depth studies for potential intersection or interchange projects than Low-Priority locations. In some cases, the Focus Areas served to reinforce needs identified in prior studies. For example, two north-metro Focus Areas that have been long-planned for intersection or interchange projects include only High-Priority intersections (see Figure ES-1):
    - Anoka County TH 65-B (93rd Lane to Bunker Lake Blvd.) – Six high-priority intersections; 5.5 miles
    - Hennepin County TH 252 (66th Ave. to 85th Ave.) – Six high-priority intersections; 2.5 miles
- **There are Opportunities to Coordinate Corridor-Wide Intersection Improvements** – Several Focus Areas suggest opportunities to coordinate intersection improvements along corridors, including the possible consolidation or closure of intersections at some locations. While the Study recognized these opportunities, it did not develop site-specific design concepts nor develop scores for the consolidation or closure of intersections. Note as well the discussion of "right-sizing" below, which was addressed in this Study through guidance on the appropriate scaling of intersection or interchange designs.

The 26 Focus Areas are presented in detail within the Final Report. Several of them suggest opportunities to coordinate intersection improvements along corridors, including the consolidation or closure of intersections at some locations.

Role of the Study in Future Planning

The "pace" of major intersection conversion projects has been about 16 projects in 10 years (less than half of the 34 High-Priority intersections identified in this Study). This confirms the expected need for selectivity and value in future projects. The key inputs from this Study for future planning will be to:

- **Incorporate Study Findings into Transportation Policy and Investment Plans** – The Study serves as a key input for updates to the Transportation Policy Plan (TPP), the State Highway Investment Plan (MnSHIP), and related Council and MnDOT funding programs. The results will be used to establish regional priorities for the conversion of at-grade intersections into interchanges or other grade-separated designs.

- **Support Project Funding Decisions** – The Council's semi-annual Regional Solicitation and MnDOT programs, such as the Transportation Economic Development (TED) program and the Safety and Mobility (SaM) Interchange Program, regularly fund numerous highway mobility projects. The Council and MnDOT intend to use the intersection priorities in the Study and related information as inputs on selection of projects for funding.

- **Provide a Reference for Local Planning** – The Study may be used as a basis for local transportation and corridor planning. It may also be referenced to support general transportation planning and strategies used by counties and cities in local transportation or comprehensive plans.

- **Guide the Right-Sizing of Proposed Projects** – The right-sizing of proposed projects is expected to be an important factor as projects on non-freeway principal arterials are reviewed for funding. ***Figure ES-2*** illustrates how the Study's intersection priorities are proposed for review in project funding evaluations and decisions. The intersection priorities are proposed for review in funding decisions when principal arterial intersections evaluated in Phase II are seeking competitive funds such as federal funds through the semi-annual Regional Solicitation. For those cases, the Study's intersection priorities will bring a measurable weight into project funding decisions. Still, most project funding criteria will be unchanged, with reviews based on program intent, other technical justifications, and sound project planning.

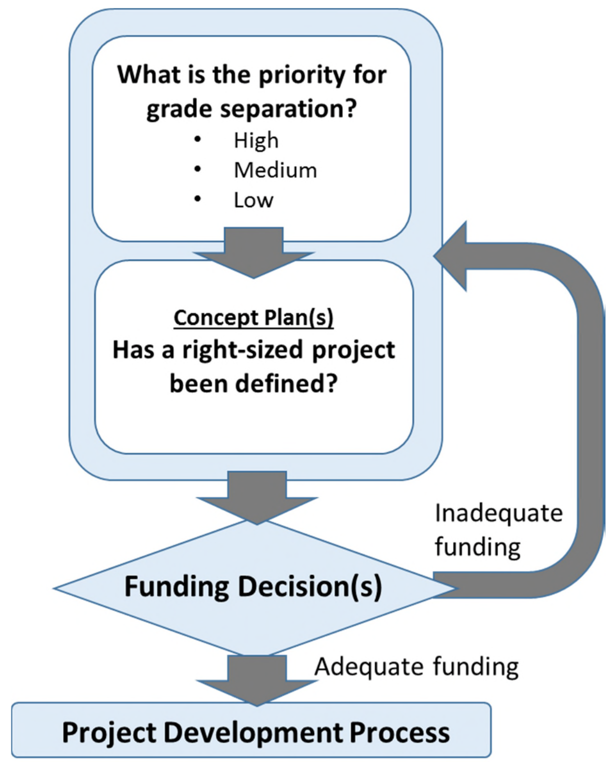


Figure ES-2. Study's Input to Funding Decisions

The investment philosophy shown in ***Figure ES-3*** (next page) is consistent with the 2040 TPP and is supported by both the Council and MnDOT Metro District. This diagram recommends that development of intersection improvement design alternatives consider a progression of investment decisions along with the technical data and context at the intersection and throughout the corridor. This recommended progression in project decision-making is intended to guide right-sizing so that more projects and benefits can become reality sooner. The regional investment philosophy now supported by the Council and MnDOT Metro generally states, "Expansion needs far exceed fiscal realities. Since the region cannot build its way out of congestion, it needs to be strategic when making investments to ensure the right-sizing of projects." This Study is part of the region's emphasis on improved targeting for transportation investments.

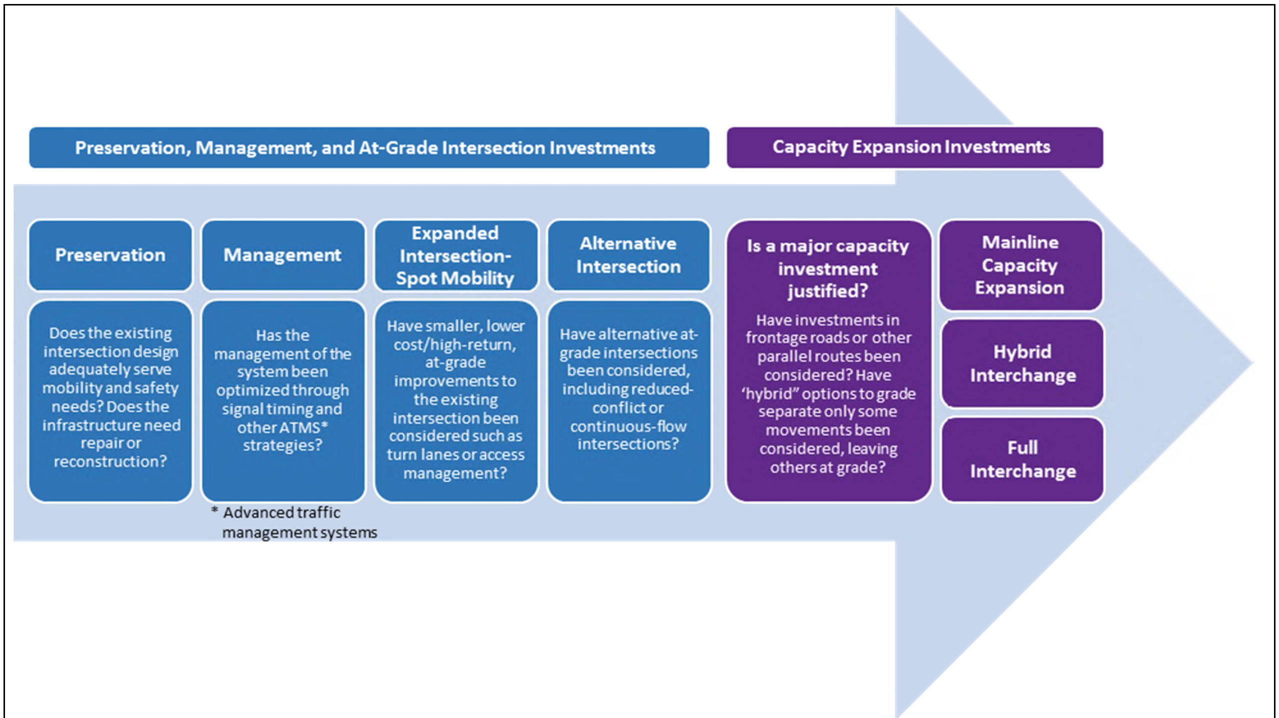


Figure ES-3. Progression of Intersection Investment Decisions

- **Provide a Transportation Policy Reference** – The transportation planning framework in this Study provides high-level guidance for possible legislative priorities, whether from a highway system perspective (broad state and regional needs) or from an individual project funding perspective as outlined above (the Study's Focus Areas). Staff representing the Metropolitan Council, MnDOT, and other agencies should find opportunities to present the Study's background and results to support legislative topics, whether programmatic or project-specific.

Updating the Study's Analysis and Intersection Priorities

The Study emphasized current needs, but also recognized the potential for growth and change. The technical team for the Study implemented a repeatable process that can be periodically updated in whole or in part. After discussing the frequency of such updates with the Study's Steering Committee, the Metropolitan Council and MnDOT project management team recommended that intersection priorities be updated every 4 to 8 years (with reference to the 4-year TPP update cycle).

1 Introduction

1.1 Need for the Intersection Conversion Study

Principal arterials are the highest functional classification highways in the Minneapolis-St. Paul (Twin Cities) metropolitan area. Their purpose within the roadway hierarchy is to optimize mobility – to provide reliably safe and high-speed travel over significant distances. While principal arterials make up less than five percent of the region's roadways (by mileage), they carry approximately 50 percent of its vehicle miles traveled (VMT). The majority of metro-area principal arterials are limited-access freeways, which provide the greatest mobility and safety characteristics of all roadway types. However, there are approximately 300 miles of non-freeway principal arterial highways with at-grade intersections (traffic signals or stop-controlled) which must balance mobility, safety, and access to destinations – typically within footprints that are smaller than freeways.

Non-freeway principal arterials typically operate with a mobility advantage for through traffic; but this mobility objective becomes more challenging with at-grade intersections as total volumes and crossing volumes increase. Such intersections may limit the ability to best provide for long-term mobility and safety. This sometimes leads to proposals for new interchanges or "grade-separation" projects. These types of projects have regularly been completed and have resulted in mobility and safety improvements and the conversion of non-freeway arterials into either:

- Extensions of metro-area freeways, or
- Limited segments along principal arterials that operate like freeways but still include at-grade intersections off each end of the converted segment.

Non-freeway principal arterial highways in the Twin Cities metro were the focus of the study. These roadways serve critical mobility functions and their at-grade intersections need region-wide prioritization to guide investments and help set visions.

The demand to develop additional projects is high, as are the potential benefits. However, there is also a need to prioritize intersection conversions on a region-wide basis, to more strategically guide investments and help set long-term corridor visions.[2] Specifically, this first-of-its-kind study led by the Metropolitan Council and MnDOT's Metro District recognized that many needed intersection conversion projects cannot be delivered in the foreseeable future due to expected funding constraints. Illustrating this point, MnDOT's *Minnesota State Highway Investment Plan* (MnSHIP) identifies 20-year highway investment needs at \$30 billion,[3] and corresponding anticipated revenues at \$18 billion, leaving a 20-year \$12-billion gap (40 percent).

[2] While regional prioritizations have been applied to managed lane (MnPASS) investments and to transit, a similar approach has not been used to prioritize new grade-separation projects.
[3] http://www.dot.state.mn.us/planning/mnship/ (December 2013). The \$30-billion figure covers a full range of statewide transportation infrastructure needs including maintenance, vehicle mobility improvements, non-motorized accommodations, regional and community priorities, and others. The MnSHIP supports 10-Year MnDOT Work Plans by district and will be periodically updated to reflect new funding cycles.

The main objective of the Intersection Study was to set priorities for potential grade-separation projects (high, medium, or low) based on system problems, needs, and context. The types of intersection improvements to be undertaken is another dimension of this study. This aspect of the work reflects current transportation planning and engineering practice, which may find cost-effective intersection mobility investments that do not require complete grade separations (full-movement interchanges). Recent and emerging project development and design approaches show that lower-cost, high-benefit intersection projects are often possible without grade separations or by combining at-grade and grade-separated design elements. Therefore, the Study guides intersections that warrant strategic investments toward the "right solutions", whether interchanges, innovative high-capacity arterials ("superstreets"), or hybrid combinations, typically along corridors with some at-grade intersections and some grade separations. In addition, the Study recognized the context of specific corridors and intersections and helped align locally and regionally driven investments on non-freeway principal arterials.

Recent and emerging project development approaches show that lower-cost high-benefit intersection projects are often possible. The study recognized the context of specific corridors and intersections and helped align locally and regionally driven investments.

Given the current and anticipated funding climate, there is broad recognition of the need to ensure transportation investments reflect sound analysis, effective local/regional collaboration, and strategic prioritization to target system needs and maximize the value of investments. The *Principal Arterial Intersection Conversion Study* was identified as a work program item in the Metropolitan Council's *2040 Transportation Policy Plan*.

1.2 Study Organization, Approach, and Outcomes

To optimize the allocation of resources, the Study was organized into two analytical phases (see ***Figure 1***):

- **Initial Screening (Phase I)** – To identify intersections that will not be prioritized for grade-separation or similar investments at this time
- **Detailed Analysis and Screening (Phase II)** – To identify grade-separation investment priorities as High, Medium, and Low, and to place locations into context in terms of solutions

Overall, the Study helped organize investment priorities for intersection mobility projects on non-freeway principal arterials. Discussions during the December 2015 outreach meetings (summarized below) helped the Project Management Team (PMT) members and local representatives refine the Study's approach and understanding. Based in-part on these inputs, the results of the Study:

- **Focused on opportunities and priorities for new grade separations.** Meaningful results are best attained by keeping the focus on strategic high-priority investments for grade separations (interchanges or other projects using bridges to reduce conflicts). Subject to available resources, and in coordination with other planning, the Study has also identified other opportunities for high-capacity intersections, including potential for lower-cost/high-benefit innovative-intersection projects, with or without grade separation.

MnDOT has been engaged in related studies, to identify cost-effective highway projects for many years – most notably the Congestion Management Safety Plan (CMSP), now in Phase 4.[4]

- **Addressed relevant timeframes for funding and implementation.** The Study's outcome clarifies investment priorities within a foreseeable timeframe, approximately 10 years—similar to MnDOT 10-Year Work Plans for each district. While 20 years (or more) is consistent with the *Transportation Policy Plan's* long-term planning framework, the Intersection Conversion Study's focus is on more near-term priorities. The needs identified for intersection upgrade projects stretch beyond expected funding levels, in case additional funding becomes available and to support long-term plans. However, corridor visions must not be so far-reaching and comprehensive that the most achievable and strategic projects are unclear. Relevant short-term planning cycles include:
    - The Regional Solicitation for federal funding (every two years)
    - The Metropolitan Council *Transportation Policy Plan* update cycle and the MnDOT State Highway Investment Plan (MnSHIP), which are 20-year plans, generally updated every four years
    - Other funding and programming cycles which range from one to five years, including the Transportation Economic Development (TED) program, the Congestion Mitigation Safety Plan (CMSP) framework, and similar funding programs
    - The annual State Transportation Improvement Program (STIP), and local capital improvement budget cycles[5]
    - The anticipated practical timeframe for relevance of the intersection priorities in this Study, which is no more than 10 years

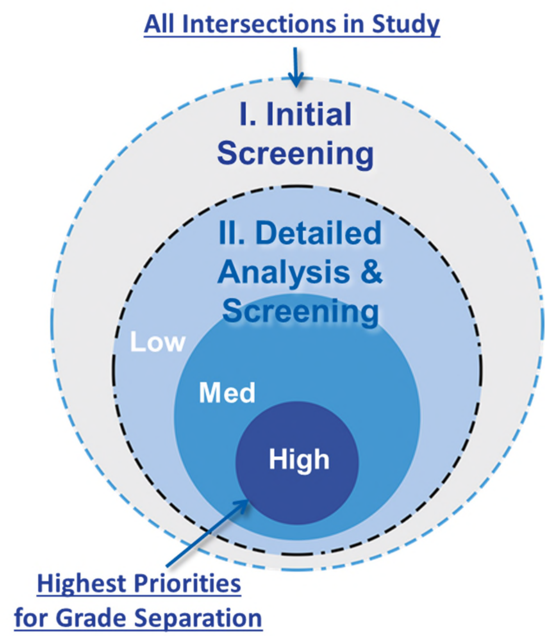


Figure 1. Study Process Summary

- **Emphasized planning that is driven both locally and regionally.** Local support and participation in this regional Study and in project development was critical to the development of intersection priorities and will remain critical to develop high-capacity intersection projects, including efforts to leverage funding sources.

[4] The CMSP planning framework (led by MnDOT's Metro District and the Metropolitan Council) recognizes that system-wide capacity expansion will not be feasible and focuses a portion of Metro District resources on opportunities for lower-cost/high-benefit mobility and safety improvements.

[5] This study does not represent any change in funding cycles or funding availability. However, it will be used to help organize studies and priorities for project funding on non-freeway principal arterials in the Regional Solicitation process and in other funding programs like the TED program.

2 Phase I Screening Summary

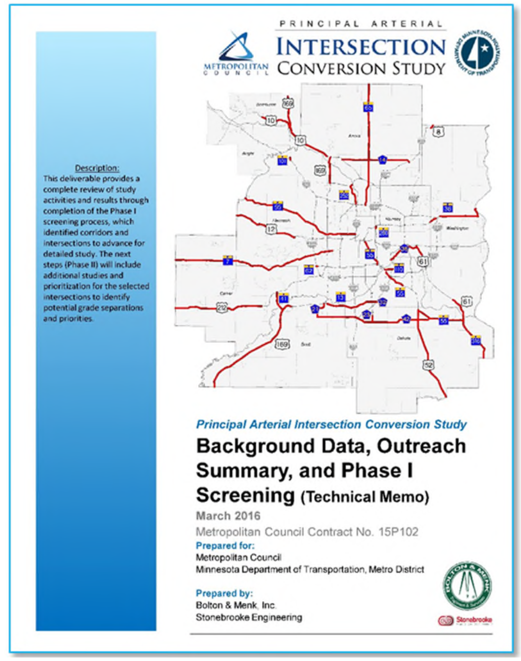
2.1 Basic Screening Question and Overall Results

Phase I was documented in a Technical Memorandum to conclude the Study's Phase I screening (see ***Attachment 5***). This part of the Study was conducted to answer the basic question:

> ***Which non-freeway principal arterial locations are not candidates for grade separation at this time?***

The primary work elements in Phase I included:

- Document reviews to determine locations previously identified as priorities for grade separation, or locations where grade separation was not preferred due to site constraints or other factors.
- Outreach to county and local stakeholders to discuss needs and priorities.
- Technical screening using data-driven methods refined through the outreach process; this process recommended locations for Phase II analysis.



Through the Phase I work, 374 at-grade intersections were initially identified for the Study. These are at-grade intersections on principal arterials, including cross streets and intersections with ramps. Of these, 104 intersections (28 percent) were ultimately advanced to Phase II analysis. That number was later adjusted to 101 intersections based on local input and additional information. Ultimately, Phase II addressed 91 conventional at-grade intersections and 10 intersections of principal arterials with freeway ramps. The recommended Phase II locations are highlighted on ***Figure 2*** and more information about the screening process and outcomes is provided in Section 2.2 and in the referenced Phase I Technical Memorandum.

The initial Phase I screening result was that 104 of 374 intersections (28 percent) were identified for more detailed study in Phase II.

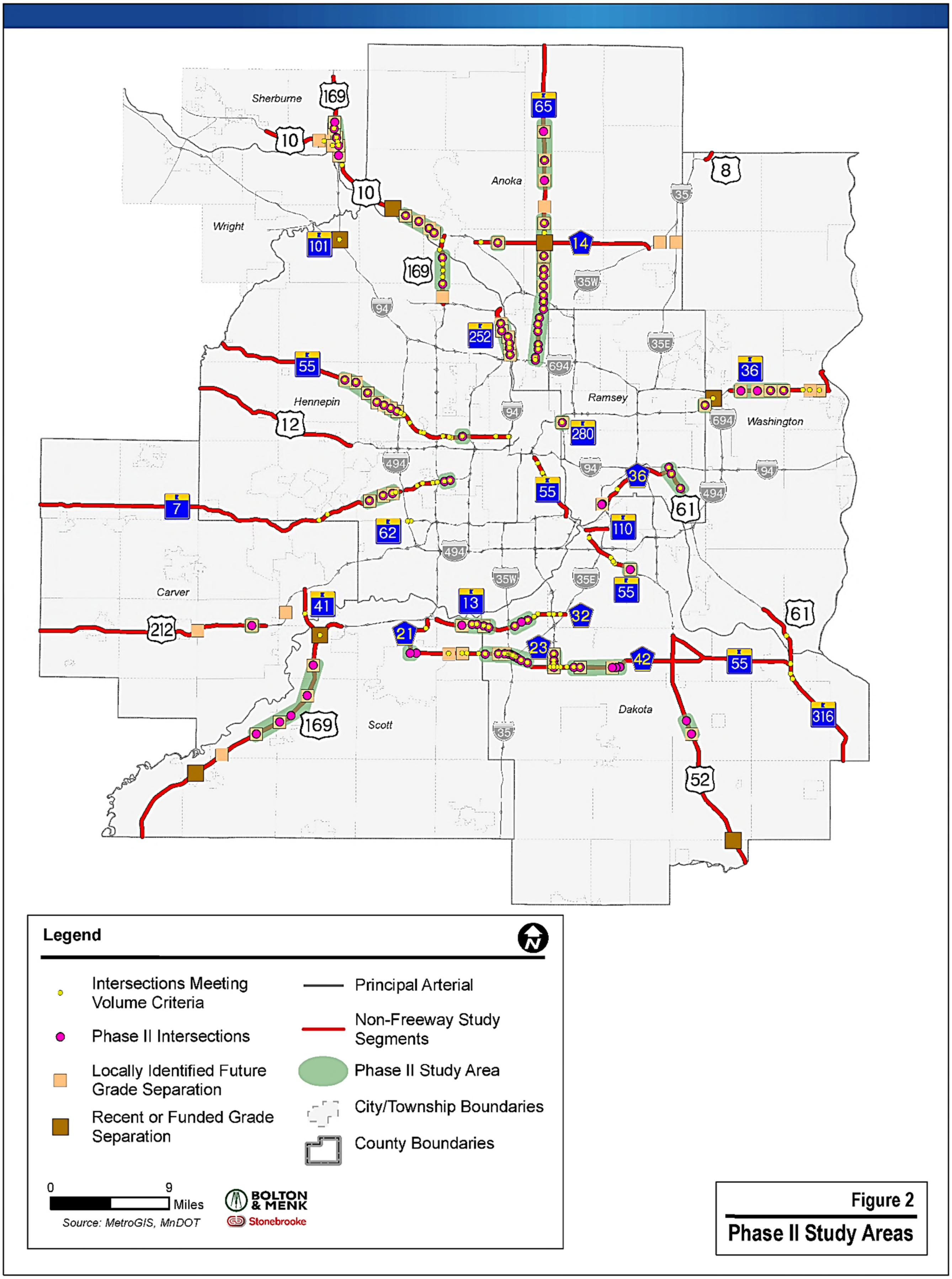


Figure 2

Phase II Study Areas

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2.2 Phase I Screening Objectives and Criteria

2.2.1 Phase I Objectives and Screening Documentation

Many discussions with participants during Phase I concerned the approach and focus of the Study and the Phase I screening objectives. The Phase I screening process used technical criteria (including intersection volumes) and contextual criteria to consider intersections both individually and in corridors. This work was based generally on the following objectives:

- **Address in Phase II** those intersections and segments for which grade-separated design solutions (or innovative high-capacity intersections) warrant planning-level consideration in the foreseeable future.

- **Dismiss from Phase II** intersections and segments that do not exhibit local support for grade-separated design solutions or innovative high-capacity intersections.

Intersections and segments that did not advance to Phase II represented locations where investments are expected to address conventional at-grade intersections. This does not preclude future safety projects or other adjustments, nor a later shift toward a grade-separated vision based on future intersection conversion priorities. Technical Phase I Technical Memorandum provides the following information for intersections and segments not advanced to Phase II:

- The basis for the screening recommendation
- Reference to local input
- Information about needs and context – locations screened out may be considered in MnDOT's Congestion Management Safety Plan (CMSP)

2.2.2 Phase I Traffic Volume-Based Screening Criteria

Based on input received at the county outreach meetings, the Study's technical team worked to refine the Phase I screening approach and criteria. The first consideration was to adjust the traffic volume criteria based on technical observations about intersection capacity and conflicts.

At the Phase I county outreach meetings, the Study leadership team initially proposed and discussed thresholds based on MnDOT Intersection Control Evaluation (ICE) guidance. However, these values were typically seen as representing the low end of guidance to justify grade-separated intersection designs and projects. Many participants said such thresholds did not adequately reflect industry experience in decision-making for an intersection project, including conversion to a grade separation. The refinements to the traffic volume criteria considered the discussions at the outreach meetings and other industry guidance – primarily Highway Capacity Manual (HCM) methodologies to analyze the capacity of a signalized intersection. The resulting guidance on intersection volumes (see ***Figure 3*** below) takes into account a range of conditions for mainline (principal arterial) volumes and crossing volumes and was used as the Study's threshold guidance to identify potential grade separations.

The Phase I guidance on intersection volumes was based on the capacity of a signalized intersection and takes into account a range of conditions for mainline and crossing volumes.

The volume threshold plot depicts a range of volume scenarios at the level of service D/E threshold of a signalized intersection, with various volumes for both the mainline principal arterial and the intersecting roadways. The development of the curve considered the capacity of an intersection based on the HCM methodology for a four-lane roadway. Because this methodology is peak-hour orientated, different directional splits and peak-hour ranges were used to determine the volume ranges.

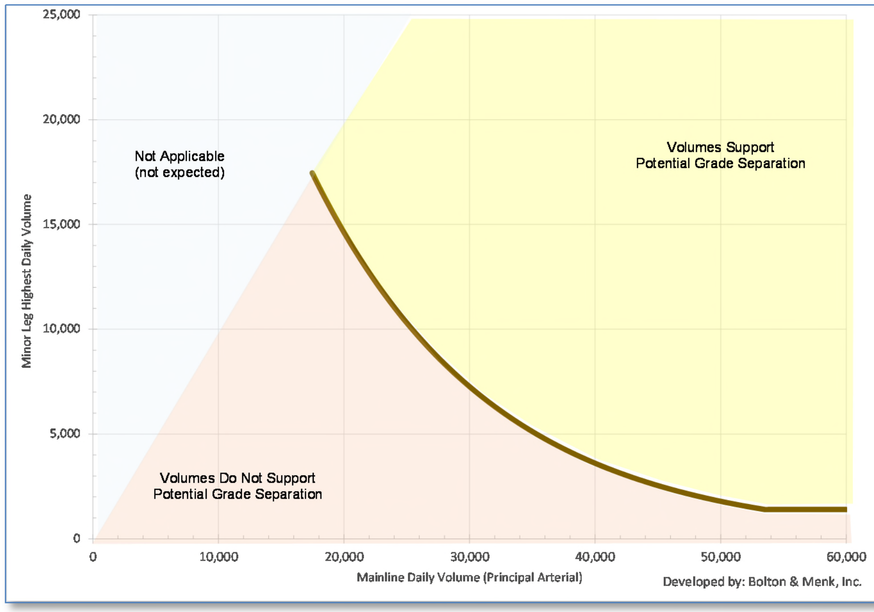


Figure 3. Intersection Volumes and Threshold Guidance for Potential Grade Separation

2.2.3 Other Phase I Screening Criteria and Overall Screening Approach

Figure 4 below outlines the series of criteria considered during the Phase I screening, both data-driven factors (e.g. volume and safety) and context-driven factors (based on the arterial's role in the system, previous planning, and local context). The flowchart structure and methodology was refined from the initial criteria in response to the outreach meetings, including screening discussions for specific intersections and related practical observations.

In practice, the safety, context, and local input factors provided examples in the outreach meetings which transcended the volume and mobility factors in the Phase I screening process. As noted on the Phase I Screening Flowchart, these examples were based especially on safety, local support, right-of-way or context issues, or the state of new infrastructure (questions 1, 3, 4, and 6). Such outcomes resulted in recommendations to not advance several high-volume locations.

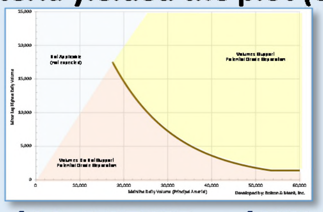
This was expected in the Study because some principal arterial stretches (for example, the TH 55 Hiawatha corridor) present current context and constraints that are incompatible with planning for grade-separated intersections. In a few cases, the PMT recommended that some relatively low-volume locations advance to Phase II based on local/regional context and support in local planning.

The safety, context, and local input factors provided examples in the outreach meetings which transcended the volume and mobility factors in the Phase I screening process.

Volume and Capacity Factors

Guidance Based on ADT Thresholds

Study of volume criteria yielded the plot (explanation above).



Thresholds considered MnDOT ICE and HCM guidance, based on capacity of a signalized intersection (plot)

Safety, Context & Local Input Factors

Criteria Based on PA Role, Previous Planning, and Local Context

1. **Safety.** Is the critical crash rate index > 1.0? Are there observed safety deficiencies or concerns?
2. **Functional Class & System Context.** Intersection with another PA or A-Minor arterial? In context with multiple intersections and cumulative demands? Nearby interchange(s) on the PA?
3. **Local Planning Support.** Recent/current studies recommend grade separation? Support at local meetings? (No strong opposition?)
4. **Right-of-Way and Physical Feasibility.** Expressway to freeway character or potential within right-of-way? (Not an urban arterial/street with dense development and little/no setback?)
5. **Regional Mobility or Growth Corridor.** Priority corridor for mobility in region? Serving growth area(s)?
6. **Infrastructure and Funding Cycle.** Need for new infrastructure? (No large recent/committed projects in 10-year funding cycle?)

- ***Answering "yes" to questions 1-6 increases support to advance high-volume intersections/corridors to Phase II analysis.***
- ***Some locations, even with high volumes, may not advance to Phase II based on lack of support, right-of-way or context issues, or the presence of new infrastructure (questions 3, 4, and 6).***

Figure 4. Phase I Screening Flowchart

3 Phase II Prioritization Criteria and Process

3.1 Overview

With input from the Technical Steering Committee, 91 at-grade intersections were identified for the Phase II portion of the project and were assigned priorities for grade separation, High, Medium and Low. The Study also identified 10 principal arterial intersections with freeway ramps, which were relevant to the Study's context; however, the ramp intersections were not prioritized.[6] This part of the Study's Final Report summarizes the Phase II screening criteria and the results, organized by county and location. Additional Phase II data and details are provided in attachments, including:

- **Attachment 1. Detailed Phase II Data Tables** – Detailed listing of data for the 91 Phase II intersections, sorted both by score and by location
- **Attachment 2. County Maps of Study Results** – Maps of each county included in the Study to provide locations of the non-freeway principal arterials initially considered and the Phase II intersections
- **Attachment 3. Analysis of Principal Arterial Intersections with Freeway Ramps** – Presentation and high-level analysis of the 10 ramp intersections

In Phase II, the Study evaluated 91 at-grade intersections based on the criteria and process explained here. The 91 intersections were also organized into 26 Focus Areas, which are presented in detail in Section 4.

The 91 Phase II intersections analyzed in detail were ultimately organized into 26 Focus Areas, which are locations and corridors with one or more intersection. The Focus Areas will help to establish a basis for locally based strategic transportation studies (see Section 4, which provides the detailed Focus Area results).

3.2 Capacity Analysis

For the 91 Phase II intersections, the team collected turning-movement data and geometric information to analyze the capacity of the existing intersections. The Capacity Analysis for Planning of Junctions (CAP-X) tool, developed by the FHWA, was used to evaluate existing intersections using worst-case peak-hour volumes (AM or PM).[7] Each intersection was evaluated to provide planning-level capacity assessments, for both existing conditions and expected conditions with various improvement levels assumed. The Study's intersection capacity analyses were not detailed operational assessments and, importantly, were always based on existing traffic volumes. The objective was to create a consistent comparative approach for the 91 intersections. The main questions asked for each intersection were:

- What is the volume/capacity (V/C) ratio of the existing intersection and is it acceptable?

[6] The 10 ramp intersections were identified for planning consideration based on proximity with the at-grade intersections evaluated in the Study and possible needs and issues identified through stakeholder input. The ramp intersections operate differently than conventional at-grade intersections and are already associated with a grade-separated condition. Therefore, they were addressed separately as documented in Attachment 3 and were not prioritized.

[7] For more on the FHWA CAP-X tool, see: http://www.fhwa.dot.gov/software/research/operations/cap-x.

- How would that V/C ratio change under a range of intersection scenarios, from at-grade improvements to interchanges?

Consistent with industry guidance, the calculated existing V/C ratios were considered either poor (V/C ≥ 1); borderline (V/C > 0.85); or acceptable (V/C ≤ 0.85). This result was calculated for all intersections based on the existing at-grade configuration and based on a range of improvement scenarios (see more on the scenarios considered and the results in Section 4).

The capacity analysis results were the most important single input to the intersection scores to determine grade-separation priority, accounting for about 50 percent of the result. The other 50 percent of the scoring was based on the weighted Phase II screening criteria as described in detail below.

3.3 Phase II Screening Criteria and Weighting

3.3.1 Identification of Screening Criteria

The following criteria were proposed and weighted with input from the Technical Steering Committee (TSC) at a series of meetings. These screening criteria served to describe each intersection based on how each category would relate to the need for intersection conversion:

- **Mobility – Provide grade separations at locations that serve higher volumes of traffic, need more capacity, and where there is more variability in travel times.**[8]
  - Traffic Volume – Measure the total entering annual average daily traffic (AADT), with emphasis on the relationship of mainline AADT to cross street AADT.
  - General Intersection Capacity – Based on the volume and overall intersection layout, the general intersection configuration was considered to determine a representative V/C ratio (this evaluation was general, not as detailed as the capacity analysis work described above).
- **Safety – Provide grade separations at locations that have a higher number of crashes and a higher number of severe crashes.**
  - Crash Frequency – The frequency of crashes at the intersection.
  - Crash Index – A relative score based on the number of crashes and intersection volume as compared to similar intersections throughout Minnesota.
  - Crash Severity – Crash severity or costs are considered to give higher weight to more severe crashes.
- **Corridor Context - Provide grade-separations at locations that are better able to accommodate grade separation and serve important regional crossing routes.**
  - Functional Class – The functional classification of the cross street. Higher functional class crossroads serve more regional traffic and were rated higher.
  - Intersection Density – The intersection density of the arterial segment in which the intersection is located (lower densities are more favorable).
  - Proximity to Existing Grade-Separation – Intersection is located within two miles of an existing freeway or interchange.

[8] Development of the mobility criteria included discussion of other specific factors. For example, "events and special traffic generators" was identified as a possible issues and was included in the initial weighting discussions (at about 5 percent). However, that weight was ultimately distributed evenly to the other general mobility criteria because differentiating intersections based on special peak-traffic generators was not feasible in the study's scope.

- Existing Land Use and Potential Impact – The land uses immediately adjacent (within 500' buffer) to the intersection will be summarized to determine the ease of constructing improvements.
- Prior Planning for an Interchange – Was an interchange proposed at the intersection location in previous planning documents?
- Freight – The number of heavy commercial vehicles (relative rating).
- Transit – Does the principal arterial (and intersection) support an express transit route? If yes, this will increase the priority score.
- Regional Bicycle Transportation Network (RBTN) – Is the intersection within ½-mile of a RBTN crossing of the principal arterial? If yes, this will increase the priority score.

3.3.2 Weighting of Criteria

The following weights were based on the values given to the above-described criteria based on TSC input and as finalized based on rounding and appropriate adjustments as determined by the Project Management Team.

Table 1. Phase II Screening Criteria Weights

General Criteria	Detailed Criteria	Final Weights
Mobility	Traffic Volume	16%
	Capacity (V/C ratio)	24%
	Subtotal	**40%**
Safety	Crash Frequency	10%
	Crash Index	11%
	Crash Severity	9%
	Subtotal	**30%**
Corridor Context	Functional Classification	2%
	Intersection Density	3%
	Proximity to Existing Grade Separation	5%
	Land Use Impact (500-ft. buffer)	6%
	Prior Planning for Interchange	7%
	Freight (no. of heavy commercial vehicles)	4%
	Transit (presence of express route on PA)	2%
	Bicycle (potential enhancement to RBTN trail)	1%
	Subtotal	**30%**
	Total	**100%**

3.4 Composite Scores and Grade-Separation Priorities

The final Phase II scoring analysis combined representative capacity analysis scores with the weighted criteria scores to derive composite scores for each intersection. The composite scores and data were carefully reviewed to develop the Study's final results, identifying intersections with High-, Medium-, and Low-Priority for possible grade separations.

This subsection provides an overview of the Study results based on grade-separation priorities for the 91 Phase II intersections. The overall results of the Study provide high-level guidance for the “right-sizing” of potential projects as follows:

- **34 High-Priority Intersections** – The High-Priority intersections often exhibit needs that can justify high-capacity at-grade improvements or grade separations. These intersection locations (and the corridors they are within) should be addressed in more detail to determine the right-sized investments.

- **27 Medium-Priority Intersections** – The Medium-Priority intersections typically do not need grade-separation projects based on current demand. However, additional studies at these locations could show needs for high-capacity at-grade improvements or limited/emerging needs for grade-separation elements (for example, a bridge which may serve only one movement).

- **30 Low-Priority Intersections** – These locations generally do not need major changes or projects based on current demand and any problems can most likely be addressed with at-grade projects. However, some Low-Priority intersections are located on corridors near Medium- and High-Priority intersections or may be in growth areas.

3.4.1 Definition of Focus Areas (Corridors)

Table 2 and ***Figure 5*** (on the following pages) show that the 91 prioritized intersections were organized into 26 Focus Areas, which are locations and corridors with one or more intersection. As the Study concluded, the Focus Areas established the basis for future corridor studies to support development of projects and funding. The Focus Areas were defined based on the presence of:

- Phase II intersections, either one or more in a series

- Clear “breaks” along a corridor (for example on TH 65 in the north metro) based on major junctions with other principal arterials or long gaps between Phase II intersections

In many cases the Focus Areas may define logical corridors for additional planning; however, the definition of logical termini for future project development was not formally considered.

3.4.2 Focus Area Summary

The 26 Focus Areas provide the best means to review and understand the Study’s results in detail based on the 91 intersection locations and their priorities. Observations on the Focus Areas include:

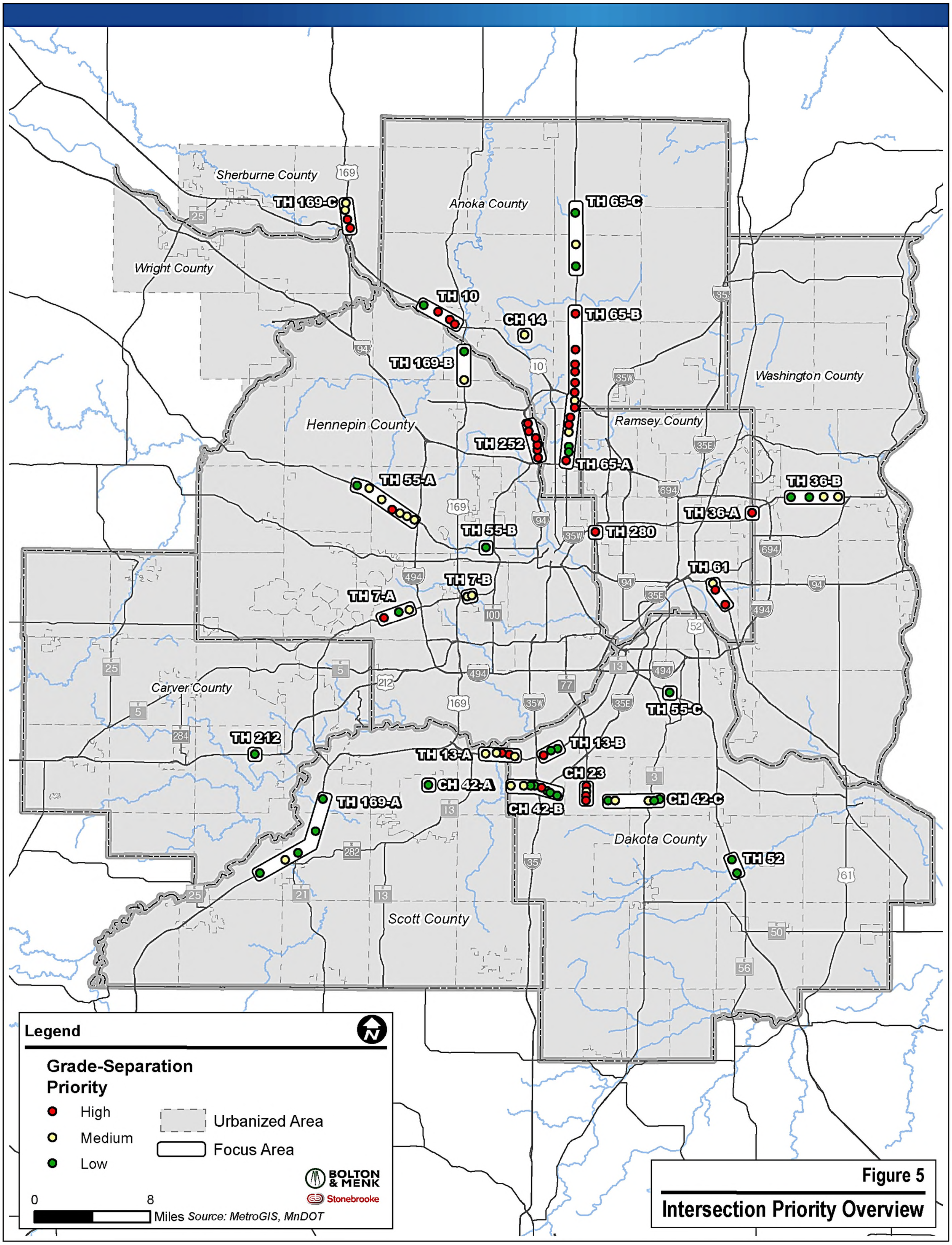
- **Two North-Metro Corridors Both Include a Series of Six High-Priority Intersections** – These two corridors are:
  - Anoka County TH 65-B (93rd Lane to Bunker Lake Blvd.) – Six high-priority intersections; 5.5 miles
  - Hennepin County TH 252 (66th Ave. to 85th Ave.) – Six high-priority intersections; 2.5 miles

- **More than Half of the Focus Areas Include at Least One High-Priority Intersection** – Of the 26 Focus Areas, 14 of them have at least one high-priority intersection.

- **Many Corridors Include Intersections with a Range of Priorities** – While there are five Focus Areas comprised exclusively of Low-Priority intersections, many others define corridors with a range of priorities. While the exclusively Low-Priority locations suggest little need for major improvements, the presence of medium-priority intersections may be trend indicators. The 27 Medium-Priority intersections are distributed to 15 of the Focus Areas. These Focus Areas could provide a basis to investigate lower-cost/high-benefit design solutions, using either high-capacity at-grade concepts or hybrid-type grade separations. Additionally, traffic growth forecasts should be carefully considered for mixed-priority corridors, especially where development is ongoing or is anticipated.[9]

Table 2. Summary of Focus Area Results for Intersection Grade-Separation Priority			**No. of Intersections by Priority**			**Total**
County	**Focus Area**	**Location**	**Low**	**Med**	**High**	
Anoka	TH 10	Ramsey Blvd to Fairoak Ave.	1		3	**4**
	CH 14	CH 14 & Hanson Blvd.		1		**1**
	TH 65-A	Medtronic Pkwy to 89th Ave. (I-694 to TH 10)	2	2	4	**8**
	TH 65-B	93rd Lane to Bunker Lake Blvd.			6	**6**
	TH 65-C	Constance Blvd. to Viking Blvd.	2	1		**3**
Carver	TH 212	TH 212 & CH 43	1			**1**
Dakota	CH 23 (Cedar Ave.)	CH 42 (150th St.) to 140th St.		1	3	**4**
	CH 42-B	Burnsville Pkwy to CH 11 (in the I-35W & I-35E area)	5	2	1	**8**
	CH 42-C	Johnny Cake Ridge Rd. to 145th St.	3	2		**5**
	TH 13-B	Nicollet Ave. to 12th Ave. (Burnsville)	2		1	**3**
	TH 52	200th St. to 190th St.	2			**2**
	TH 55-C	TH 55 & Argenta Trail	1			**1**
Hennepin	TH 7-A	CH 101 to Williston Rd.	1	1	1	**3**
	TH 7-B	Blake Rd. to Texas Ave.		2		**2**
	TH 55-A	CH 116 to Fernbrook Ln.	1	5	1	**7**
	TH 55-B	TH 55 & Douglas Drive	1			**1**
	TH 169-B	109th Ave. & Haden Lake Rd.	1	1		**2**
	TH 252	66th Ave. to 85th Ave.			6	**6**
Ramsey	TH 36-A	TH 36 & Century Ave. (with Washington Co.)			1	**1**
	TH 61	Lower Afton Rd. to Burns Ave.		1	2	**3**
	TH 280	TH 280 & Broadway St.			1	**1**
Scott	CH 42-A	CH 42 & CH 21	1			**1**
	TH 13-A	Dakota Ave. (Scott Co.) to Washburn Ave. (Dakota Co.)		2	3	**5**
	TH 169-A	Delaware Ave. to 150th St.	4	1		**5**
Sherburne	TH 169-C	Main St. to 197th Ave.		2	2	**4**
Washington	TH 36-B	Demontreville Trail to Manning Ave.	2	2		**4**
		Total	**30**	**27**	**34**	**91**

[9] High rates of traffic growth could affect the appropriate timing and extent of improvements and could lead to higher intersection priorities when the study's results are updated.


Sherburne County
Anoka County
Wright County
Hennepin County
Ramsey County
Washington County
Carver County
Dakota County
Scott County
TH 169-C
TH 65-C
TH 10
CH 14
TH 65-B
TH 169-B
TH 252
TH 65-A
TH 55-A
TH 36-B
TH 36-A
TH 280
TH 55-B
TH 61
TH 7-B
TH 7-A
TH 55-C
TH 212
TH 13-A
TH 13-B
CH 23
CH 42-A
CH 42-B
CH 42-C
TH 169-A
TH 52
Legend
Grade-Separation Priority
High
Medium
Low
Urbanized Area
Focus Area
0
8
Miles Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Figure 5
Intersection Priority Overview

- **There are Opportunities to Coordinate Corridor-Wide Intersection Improvements** – Several Focus Areas suggest opportunities to coordinate intersection improvements along corridors, including the possible consolidation or closure of intersections at some locations. Opportunities for access management can also be noted for some corridors; and clearly, removal of at-grade access points is a prerequisite for complete conversions from at-grade to grade-separated corridors. While the Study recognized these opportunities, it did not develop site-specific design concepts nor develop scores for the consolidation or closure of intersections. Note as well the discussion of "right-sizing" in Section 5, which was addressed in this Study through guidance on the appropriate scaling of intersection or interchange designs based on assigned grade-separation priorities.

The Focus Areas identified in this Study will help counties and local governments, working with the Metropolitan Council and MnDOT, to structure future highway planning, funding, and design efforts. In addition, the reasons that other locations were eliminated from Phase II will remain part of the record (more than 270 intersections were initially screened out).

The 26 Focus Areas are presented in detail below in Section 4. They often suggest opportunities to coordinate intersection improvements along corridors, including the consolidation or closure of intersections at some locations.

For more detailed information on the Focus Areas and the role of this Study in future planning, see Sections 4 and 5 below and the Phase I Technical Memorandum.

- Section 4 presents the 26 Focus Areas in detail, including a data page and a map for each one. These pages, and other information in this Final Report, can be used as a basis for additional planning.
- Section 5 outlines the role for this Study in future planning and references background information and tools to support additional studies.

Section 4 presents the Focus Areas (corridors) in detail.

Section 5 outlines the role for this Study in future planning.

4 Phase II Focus Area Review

4.1 Focus Areas and Observed Corridor Types

The 26 Focus Areas are locations or corridors comprised of the 91 Phase II intersections. Each Focus Area was established based on the locations of Phase II intersections and geographical factors such as proximity to other principal arterials or distance from another Phase II intersection.

Figure 6. Observed Corridor Types

To establish general context, ***Figure 6*** illustrates the observed principal arterial corridor types in the 26 Focus Areas. The first corridor type is the suburban arterial. These corridors (with four or six general lanes) are constrained by surrounding development and exhibit closely spaced intersections or access points. Posted speed limits along suburban arterial corridors are generally lower, typically 40 to 50 mph. The second observed type, a constrained limited-access expressway, is a corridor that exhibits more space for the highway; this type will often have more right-of-way, but with development constraints and moderate spacing of access points. Speed limits are higher than seen on a suburban arterial, typically 55 mph. The third type, an unconstrained limited-access expressway generally exhibits the maximum right-of-way (footprint) and longest access spacing of the four observed corridor types. Speed limits are also the highest, at 55 to 65 mph.

These three corridor types describe observed *existing* conditions. The long-term *future* vision for a principal arterial corridor is another topic that generated attention and discussion during the Study process. While visioning is appropriate for long-term corridor planning, the consensus was that shorter-term timeframes are more relevant to set general regional priorities. Specifically, the Study's Technical Steering Committee supported the shorter-term perspective emphasized in the work, reaching consensus that Study results should not set out long-term visions for the 26 Focus Areas (this is better left to corridor planning studies). Similarly, the Study recognizes that if long-term corridor visions were identified, and if they are too far-reaching and comprehensive, the most strategic intersections and Focus Areas might then be less clear.

4.2 Overview Map

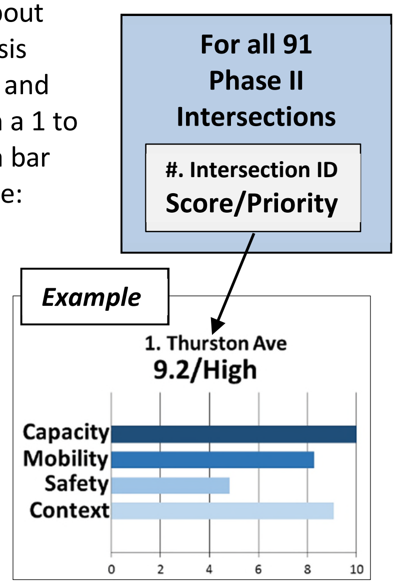
As noted above, the 91 conventional at-grade intersections prioritized in the Study are organized into 26 Focus Areas. ***Figure 7*** shows the Focus Areas by county with a colors assigned for each county. This serves as a map key for ***Figures 8 through 33***, which show each Focus Area in detail.

4.3 Focus Area Narrative Pages and Maps

The 52 pages that follow Figure 7 present the Study's results in detail, for all 91 Phase II intersections. The pages are sequenced with one narrative page for each Focus Area and one referenced map/figure. This section is organized alphabetically and by color for each county as follows:

- Anoka Co. (Figures 8-12)
- Carver Co. (Figure 13)
- Dakota Co. (Figures 14-19)
- Hennepin Co. (Figures 20-25)
- Ramsey Co. (Figures 26-28)
- Scott Co. (Figures 29-31)
- Sherburne Co. (Figure 32)
- Washington Co. (Figure 33)

Presentation of Scores/Priorities. The narrative pages include information about the intersection priorities and underlying scores, as well as the capacity analysis results. Each intersection has a bar chart that depicts the intersections scores and grade-separation priority by ranking capacity, mobility, safety, and context on a 1 to 10 scale. The image here is an example of an intersection score graphic with a bar chart showing components of the composite score of 9.2. The components are:

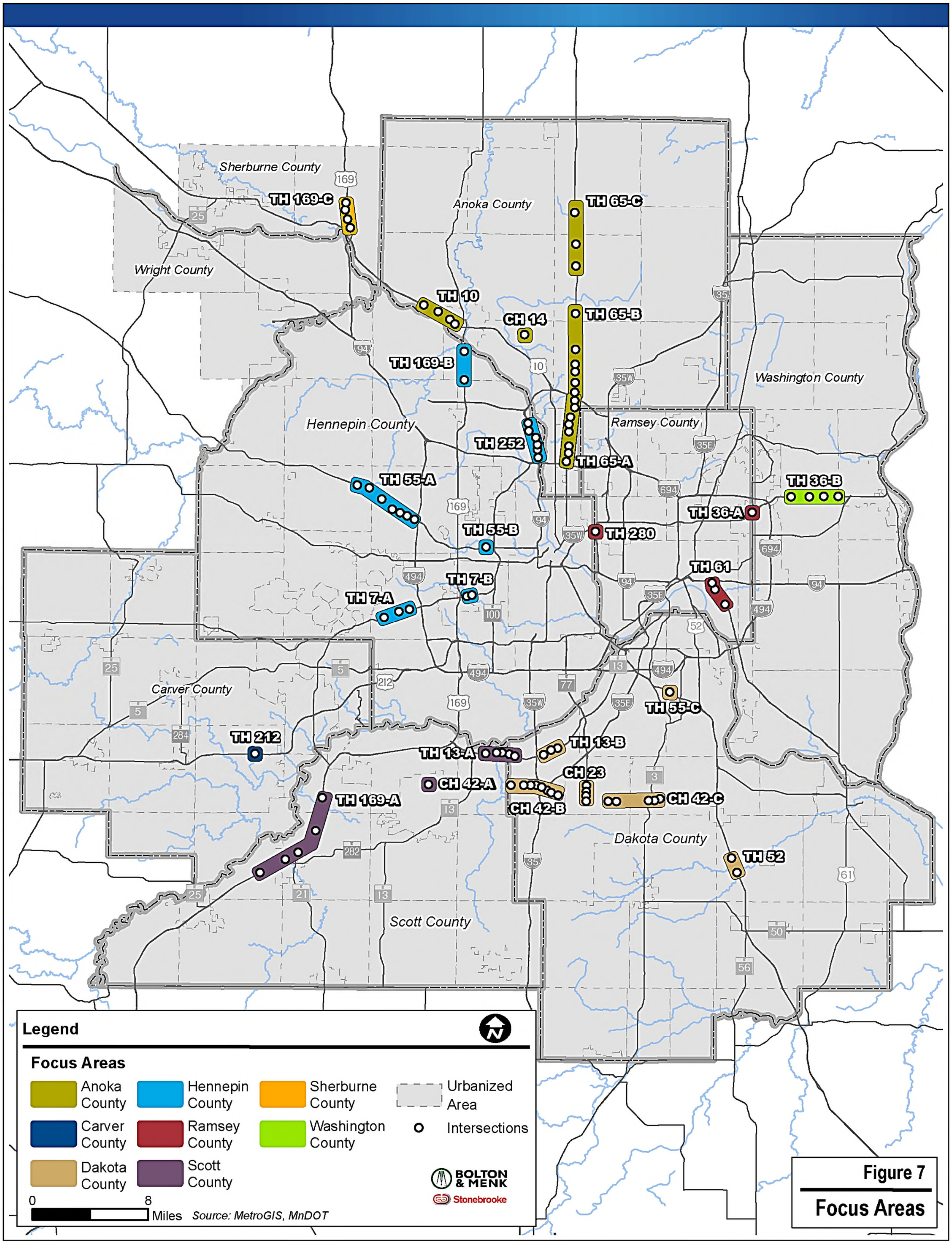


- **Capacity** – Measures if current peak-hour traffic volumes and operations exceed the practical capacity of the given intersection
- **Mobility** – Asks if the average daily traffic volumes and congestion are at high levels
- **Safety** – Considers if the intersection has a known history of frequent or severe crashes
- **Context** – Accounts for plans or studies that support a grade separation at the intersection and other context favorable to a major project

Safety Top 10. The intersections with the top-10 highest safety scores are indicated on the appropriate narrative pages and Focus Area maps using the orange flag symbol shown here. These intersections scored well above the mid-range based on crash data and deserve special attention to identify specific crash types or other safety issues.

Presentation of Capacity Analysis Results. The capacity analysis summary table is derived from the Intersection Capacity Analysis (CAP-X Tool) and relates closely to the Capacity scoring component above (it represents about half of the composite score). The CAP-X result is based on volume/capacity at the intersection based on six scenarios and is summarized by color-code and symbol (, , or) – see the legend on each table for more detail. The six scenarios considered are:

- **Existing Intersection** – The existing traffic demands and conditions at the intersection
- **Expanded Intersection** – Assumes the addition of turn lanes to the intersection
- **Alternative At-Grade Intersection** – Assumes a reduced-conflict or unconventional intersection
- **Add PA Capacity** – Assumes the addition of continuous capacity to principal arterial mainline
- **Hybrid Interchange** – Assumes use of limited grade separation elements with other at-grade features
- **Full Interchange** – Assumes a fully grade-separated intersection (various interchange configurations)



Sherburne County
Anoka County
Wright County
Washington County
Ramsey County
Hennepin County
Carver County
Dakota County
Scott County
TH 169-C
TH 65-C
TH 10
CH 14
TH 65-B
TH 169-B
TH 252
TH 65-A
TH 55-A
TH 36-B
TH 36-A
TH 280
TH 55-B
TH 61
TH 7-B
TH 7-A
TH 55-C
TH 212
TH 13-B
TH 13-A
CH 23
CH 42-A
CH 42-C
CH 42-B
TH 169-A
TH 52
Legend
Focus Areas
Anoka County
Hennepin County
Sherburne County
Urbanized Area
Carver County
Ramsey County
Washington County
Intersections
Dakota County
Scott County
0
8
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Figure 7
Focus Areas

4.3.1 Anoka County

TH 10: Ramsey Boulevard to Fairoak Avenue (Anoka County 1 of 5)

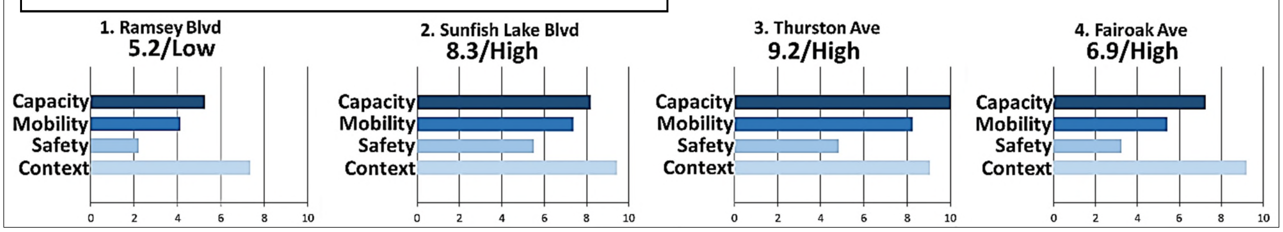
Corridor Context. Constrained Limited-Access Expressway with four at-grade intersections evaluated in the study (see ***Figure 8***). This corridor generally has four through lanes of mainline capacity and a median, which narrows towards the southeastern end of the corridor. The posted speed limit is 60 mph. The corridor is constrained by development and a railroad, but also has areas with wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The four intersections are spaced approximately 0.5 to 1.1 miles apart and are located 0.8 miles west of the TH 169 interchange.
- Access – Roadway access is limited to intersections with right-in/right-out access and private businesses.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for Ramsey Boulevard, Sunfish Lake Boulevard and Thurston Avenue.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

Note: A locally led grade-separation project is now planned and funded for intersection 4.

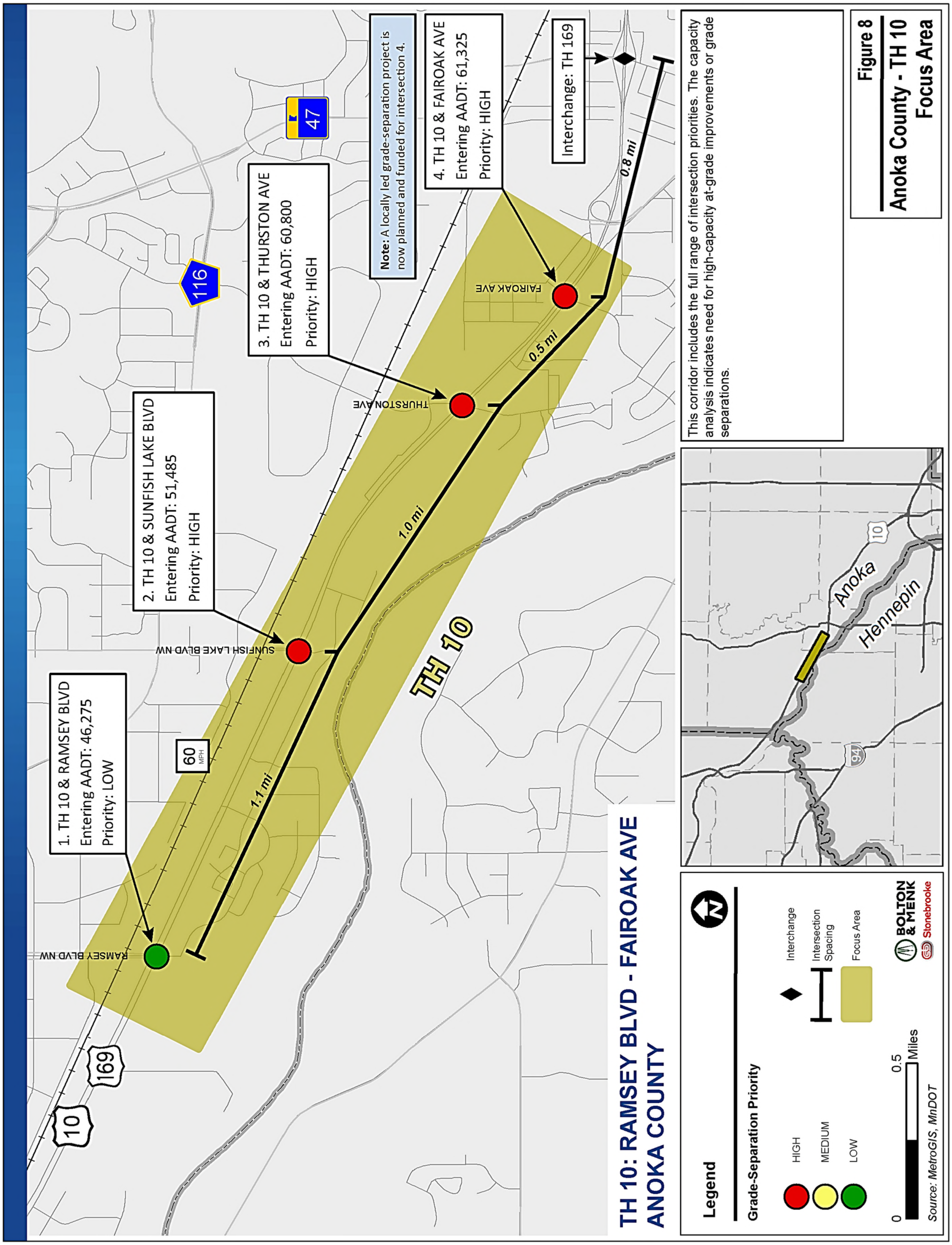
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes the full range of intersection priorities. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 10							
1	Ramsey Blvd.	☐	☐	☐	☐	☐	☐
2	Sunfish Lake Blvd.	⊠	⊠	⊠	☐	⊠	☐
3	Thurston Ave.	⊠	⊠	⊠	⊠	⊠	☐
4	Fairoak Ave.	⊠	⊠	⊠	☐	☐	☐
Key		⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	


TH 10: RAMSEY BLVD - FAIROAK AVE
ANOKA COUNTY
1. TH 10 & RAMSEY BLVD
Entering AADT: 46,275
Priority: LOW
2. TH 10 & SUNFISH LAKE BLVD
Entering AADT: 51,485
Priority: HIGH
3. TH 10 & THURSTON AVE
Entering AADT: 60,800
Priority: HIGH
4. TH 10 & FAIROAK AVE
Entering AADT: 61,325
Priority: HIGH
Note: A locally led grade-separation project is now planned and funded for intersection 4.
Interchange: TH 169
RAMSEY BLVD NW
SUNFISH LAKE BLVD NW
THURSTON AVE
FAIROAK AVE
1.1 mi
1.0 mi
0.5 mi
0.8 mi
TH 10
60 MPH
10
169
116
47
This corridor includes the full range of intersection priorities. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.
Figure 8
Anoka County - TH 10
Focus Area
Anoka
Hennepin
10
94
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Interchange
Intersection Spacing
Focus Area
0
0.5
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke

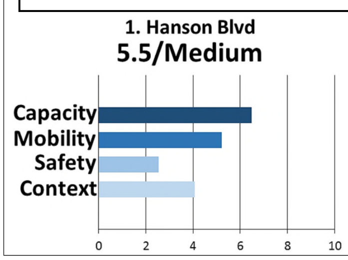
CH 14: Intersection at Hanson Boulevard/CH 78 (Anoka County 2 of 5)

Corridor Context. Suburban Arterial with one intersection evaluated in the study (see ***Figure 9***). The corridor at this medium-priority intersection has four through lanes of mainline capacity with turn lanes present and a median. The posted speed limit is 55 mph. The corridor is constrained by development, but also includes some areas of open land. Other characteristics include:

- Intersection Spacing – This intersection is located approximately 1.6 miles east of TH 10 and about 3.5 miles west of TH 65.
- Access – Roadway access is limited to major street intersections along this section of CH 14, and right-in/right-out access.
- Previous Planning for Interchanges? Yes. A grade separation has been proposed for this intersection in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

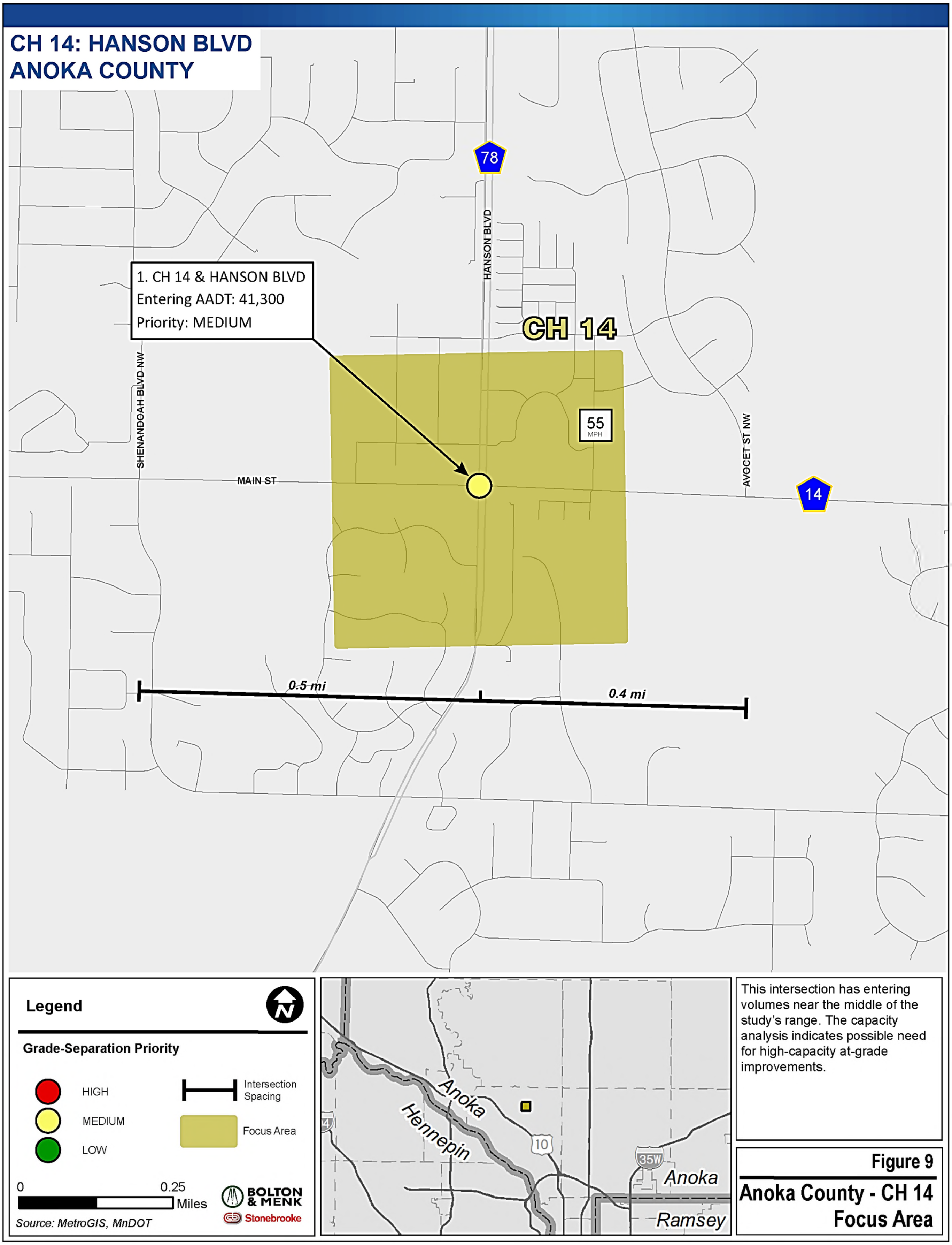
Intersection Score and Grade-Separation Priority



Capacity Analysis, Needs, and Opportunities. This intersection has entering volumes near the middle of the study's range. The capacity analysis indicates possible need for high-capacity at-grade improvements.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
CH 14							
1	Hanson Blvd.	▧	☐	▧	☐	☐	☐
Key		▩ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This intersection has entering volumes near the middle of the study's range. The capacity analysis indicates possible need for high-capacity at-grade improvements.

Figure 9
Anoka County - CH 14 Focus Area

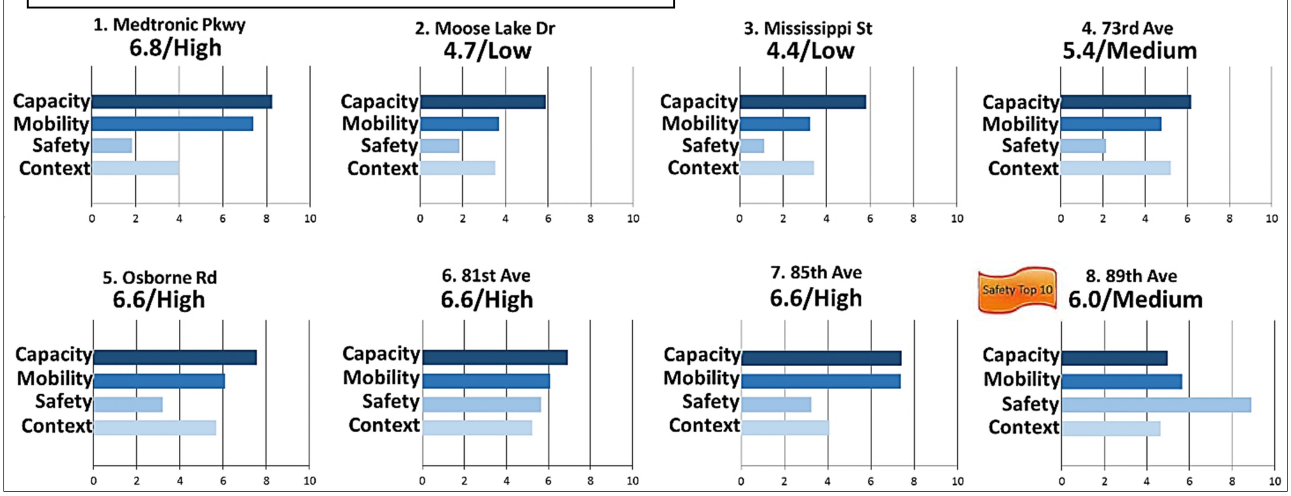
TH 65-A: I-694 to TH 10 (Anoka County 3 of 5)

Corridor Context. Constrained Limited-Access Expressway with eight at-grade intersections evaluated in the study, as well as three ramp intersections (see ***Figure 10***). This corridor generally has four through lanes of mainline capacity, a median, and is a proposed future BRT corridor. The posted speed limit is 50-55 mph. The corridor is constrained by development, includes the railroad crossing as shown, and often includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The eight intersections are spaced approximately 0.4 to 1.0 mile(s) apart, and are about 0.2 miles from the I-694 interchange and less than 0.1 miles from the TH 10 interchange.
- Access – Roadway access between the major intersections is limited to right-in/right-out access and private access roadways.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

<u>Intersection measures</u>:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

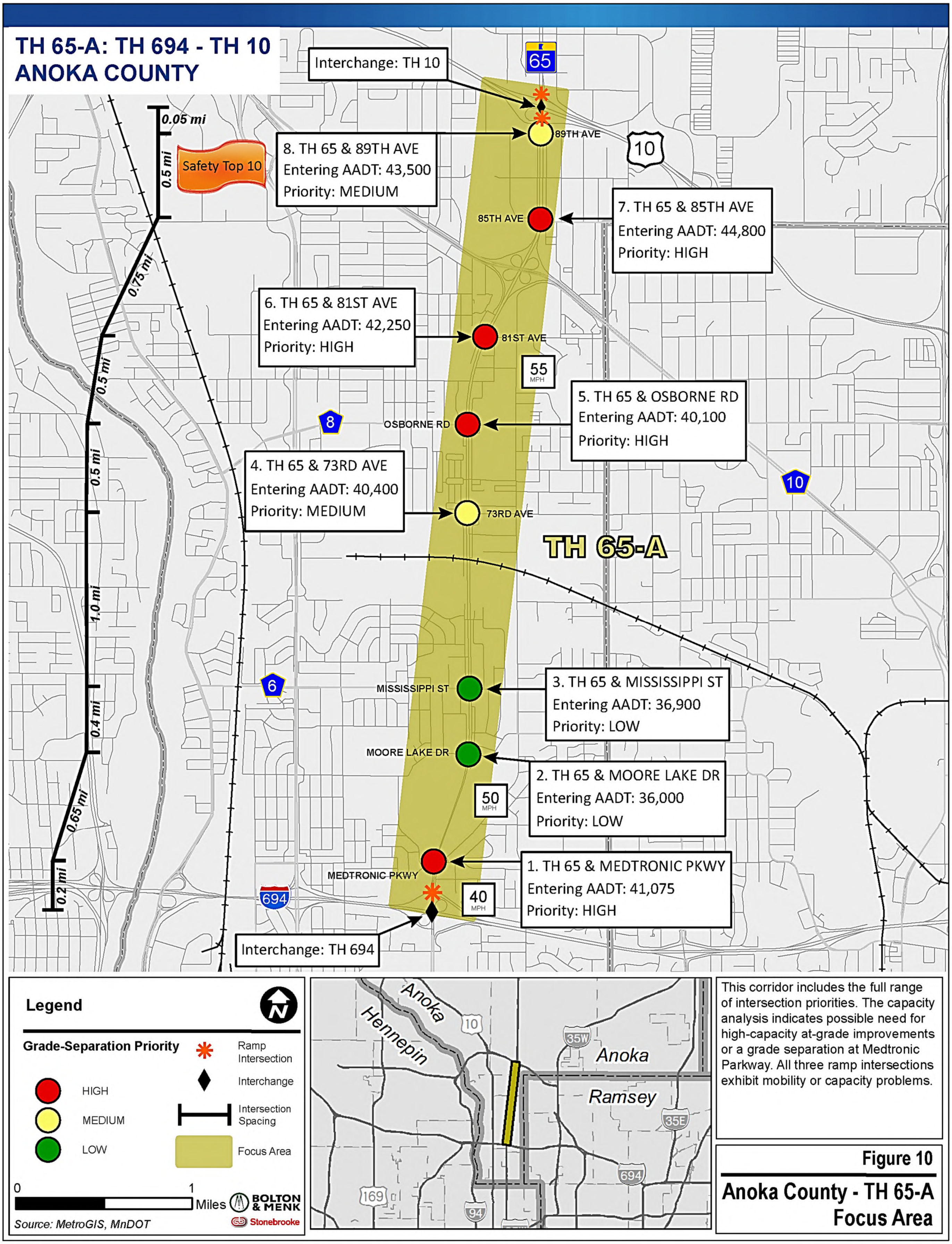
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes the full range of intersection priorities. The capacity analysis indicates possible need for high-capacity at-grade improvements or a grade separation at the Medtronic Parkway intersection, located 0.2 miles north of the I-694 interchange. The segment from Osborne Avenue to the north also warrants attention for possible capacity improvements. All three ramp intersections exhibit mobility or capacity problems.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 65-A							
1	Medtronic Pkwy.	☒	☒	☒	▧	☐	☐
2	Moore Lake Dr.	☐	☐	☐	☐	☐	☐
3	Mississippi St.	☐	☐	☐	☐	☐	☐
4	73rd Ave.	☐	☐	▧	☐	☐	☐
5	Osborne Rd.	☒	☒	☒	☐	▧	☐
6	81st Ave.	▧	▧	▧	☐	▧	☐
7	85th Ave.	▧	▧	☒	☐	☐	☐
8	89th Ave.	☐	☐	☐	☐	☐	☐
	Key	☒ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This corridor includes the full range of intersection priorities. The capacity analysis indicates possible need for high-capacity at-grade improvements or a grade separation at Medtronic Parkway. All three ramp intersections exhibit mobility or capacity problems.

Figure 10

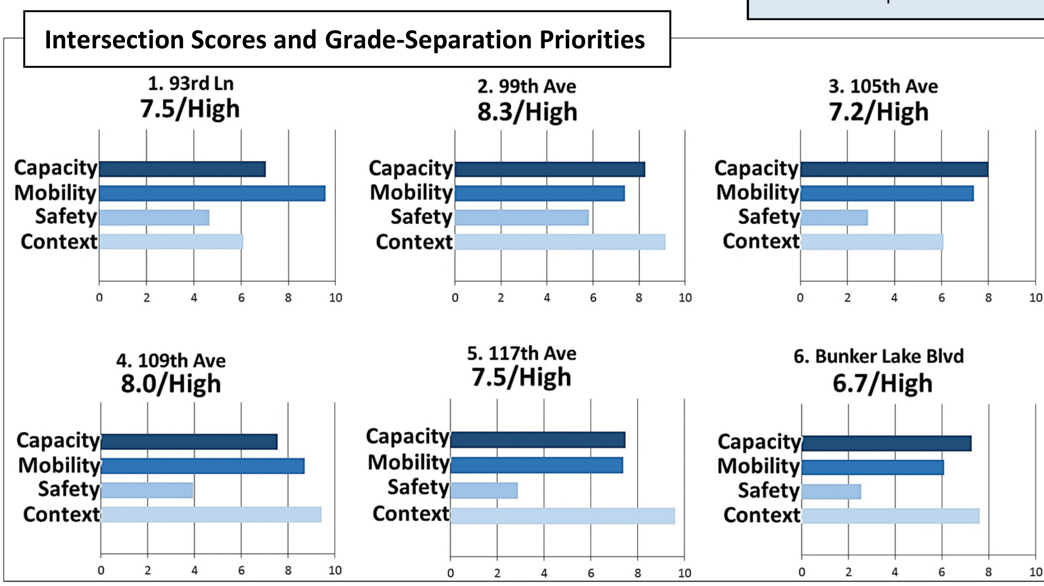
Anoka County - TH 65-A Focus Area

TH 65-B: 93rd Lane to CH 116 (Anoka County 4 of 5)

Corridor Context. Constrained Limited-Access Expressway with six at-grade intersections evaluated in the study (see ***Figure 11***). The two ramp intersections at TH 10 are addressed within the TH 65-A Focus Area narrative. This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55-65 mph. The corridor is constrained by development but often includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The six intersections are spaced approximately 0.5 to 2.5 miles apart and are located approximately 0.4 miles from the TH 10 interchange.
- Access – Roadway access is limited to right-in/right-out access and private access roadways.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for this area in previous planning documents. Current design studies are also addressing potential at-grade capacity and safety improvements.

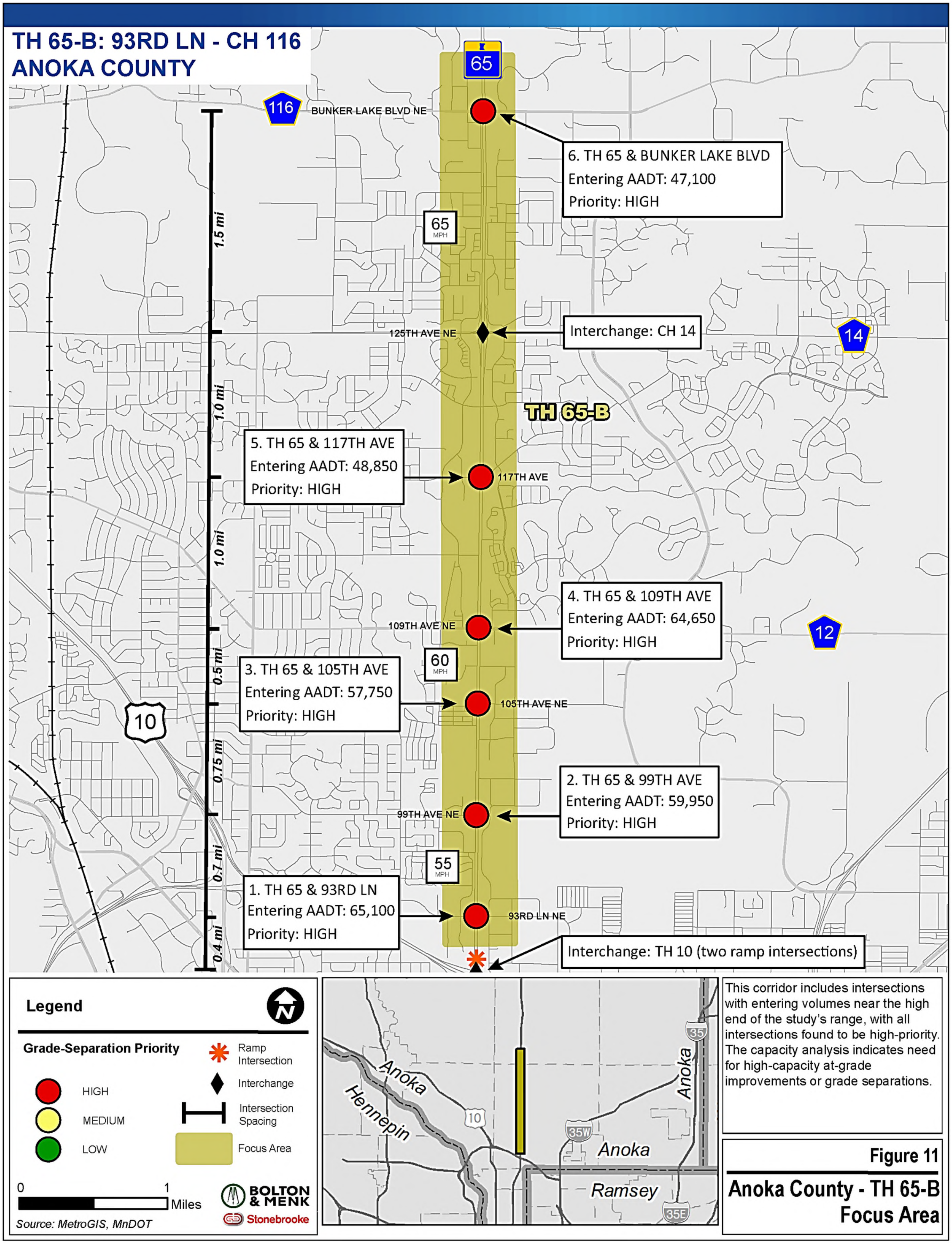
> **Intersection measures:**
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes near the high end of the study's range, with all intersections found to be high priority. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 65-B							
1	93rd Ln.	▧	☐	▧	☐	☐	☐
2	99th Ave.	⊠	⊠	⊠	▧	⊠	☐
3	105th Ave.	⊠	⊠	⊠	☐	▧	☐
4	109th Ave.	⊠	⊠	⊠	☐	⊠	☐
5	117th Ave.	⊠	⊠	⊠	☐	☐	☐
6	Bunker Lake Blvd.	⊠	⊠	▧	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This corridor includes intersections with entering volumes near the high end of the study's range, with all intersections found to be high-priority. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.

Figure 11

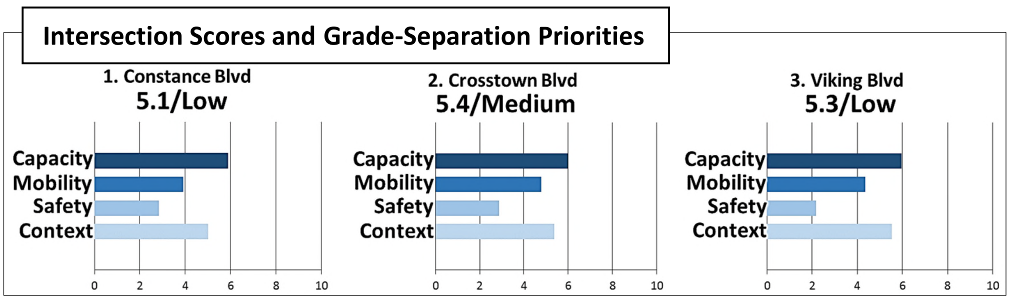
Anoka County - TH 65-B Focus Area

TH 65-C: Constance Blvd. to Viking Blvd. (Anoka County 5 of 5)

Corridor Context. Constrained and Unconstrained Limited-Access Expressway with three at-grade intersections evaluated in the study (see ***Figure 12***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 65 mph. The corridor is unconstrained with development at Viking Boulevard, but otherwise is constrained with some wide setbacks. Other characteristics include:

- Intersection Spacing – The three intersections are spaced approximately 1.5 and 2.2 miles apart and there are no major expressways near the focus area.
- Access – Roadway access is limited to right-in/right-out access, and private roadway access. Left-hand turns are allowed onto 169th Avenue NE., 181th Avenue NE, and 187th Lane NE.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for these intersections in previous planning documents.

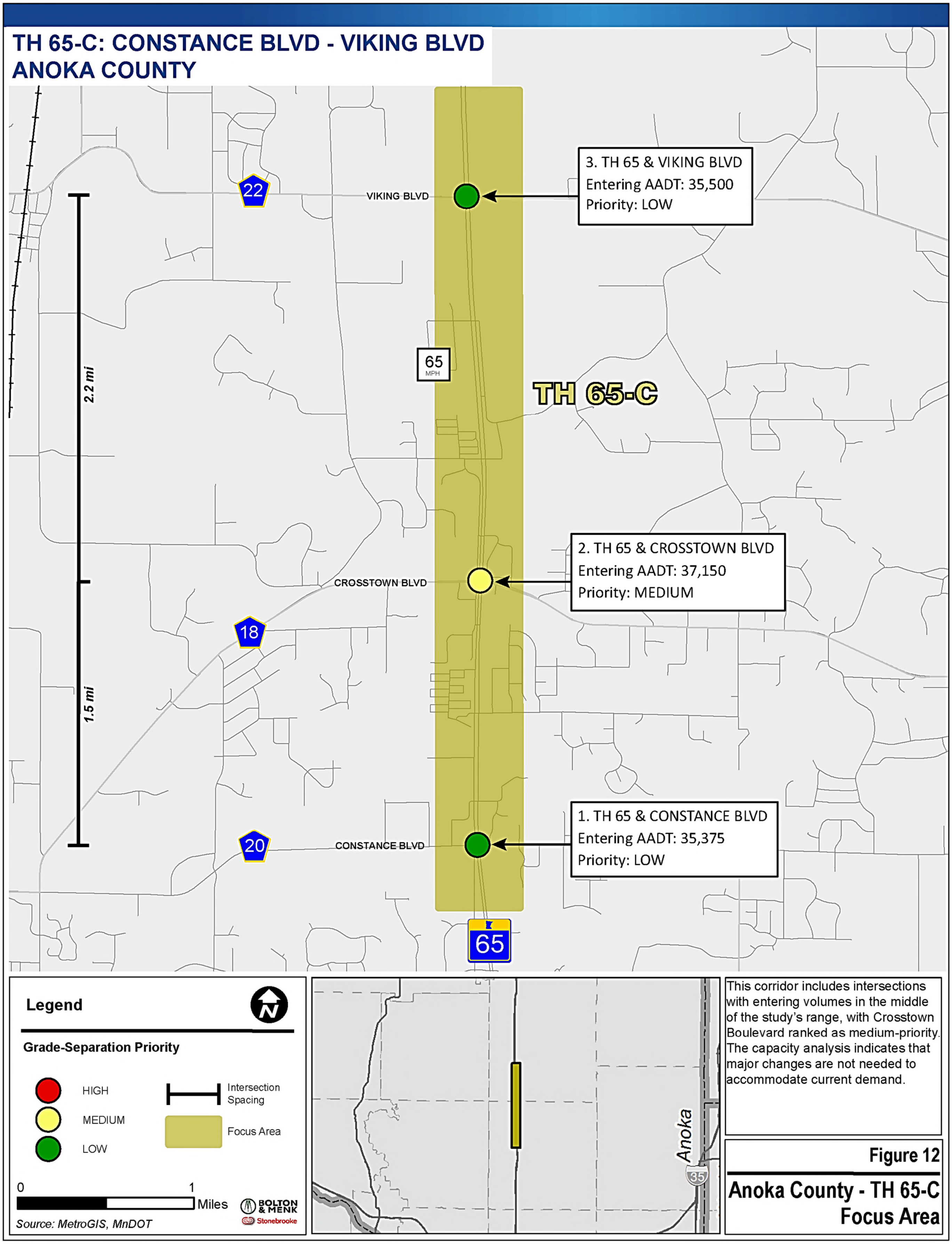
<u>Intersection measures</u>:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes near the middle of the study's range, with Crosstown Boulevard ranked as medium-priority. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 65-C							
1	Constance Blvd.	☐	☐	☐	☐	☐	☐
2	Crosstown Blvd.	☐	☐	▧	☐	☐	☐
3	Viking Blvd.	☐	☐	☐	☐	☐	☐
	Key	▩ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	


TH 65-C: CONSTANCE BLVD - VIKING BLVD
ANOKA COUNTY
3. TH 65 & VIKING BLVD
Entering AADT: 35,500
Priority: LOW
2. TH 65 & CROSSTOWN BLVD
Entering AADT: 37,150
Priority: MEDIUM
1. TH 65 & CONSTANCE BLVD
Entering AADT: 35,375
Priority: LOW
VIKING BLVD
CROSSTOWN BLVD
CONSTANCE BLVD
22
18
20
65
65
MPH
TH 65-C
2.2 mi
1.5 mi
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Intersection Spacing
Focus Area
0
1
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Anoka
35
This corridor includes intersections with entering volumes in the middle of the study's range, with Crosstown Boulevard ranked as medium-priority. The capacity analysis indicates that major changes are not needed to accommodate current demand.
Figure 12
Anoka County - TH 65-C Focus Area

4.3.2 Carver County

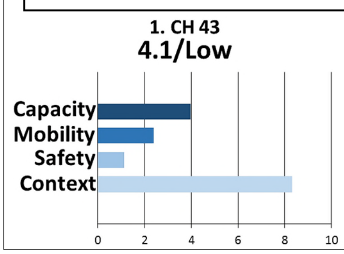
TH 212: Intersection at CH 43 (Carver County 1 of 1)

Corridor Context. Unconstrained Limited-Access Expressway with one intersection evaluated in the study (see ***Figure 13***). The corridor at this low-priority intersection has two through lanes of mainline capacity with turn lanes present, but no median. The posted speed limit is 55 mph and the corridor is unconstrained by development. Other characteristics include:

- Intersection Spacing – This intersection is located two miles west of the TH 212/CH 11 interchange.
- Access – Roadway access near this intersection includes several private access points and some minor public streets.
- Previous Planning for Interchanges? No. A grade separation has not been proposed for this intersection in previous planning documents.

> **Intersection measures:**
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?

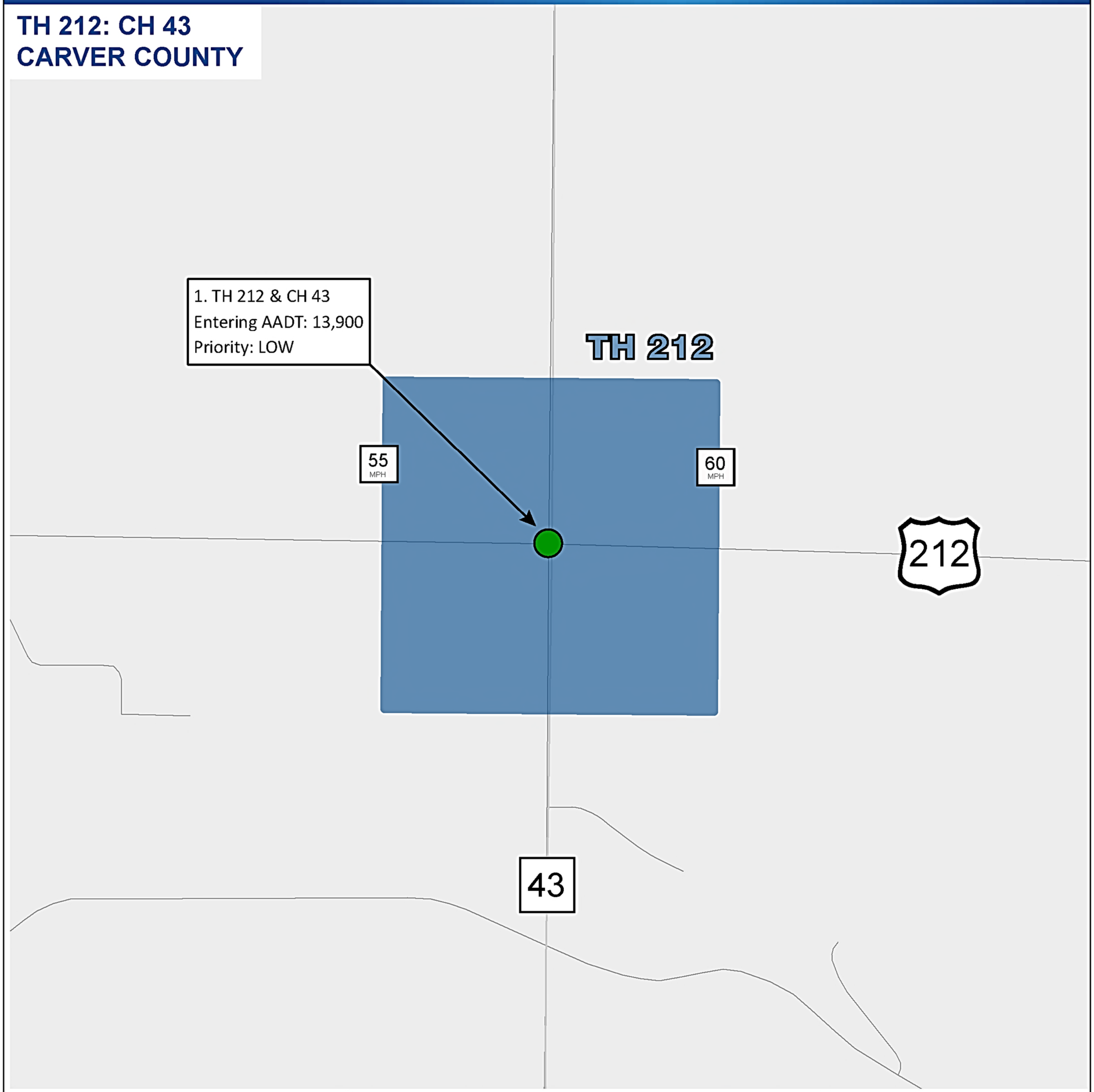
Intersection Score and Grade-Separation Priority

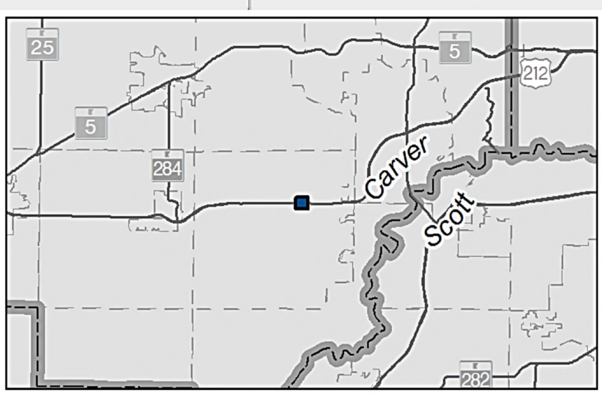


Capacity Analysis, Needs, and Opportunities. This intersection has entering volumes near the low of the study's range. But the location is within two miles of an existing interchange and the capacity analysis indicates possible need for at-grade capacity improvements versus the existing 2-lane arterial. Access management should also be considered.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				TH 212			
1	CH 43	⊠	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	





This intersection is along a 2-lane principal arterial and has entering volumes at the low end of the study's range. But the capacity analysis indicates possible need for at-grade capacity improvements versus the existing 2-lane arterial.

Figure 13

Carver County - TH 212 Focus Area

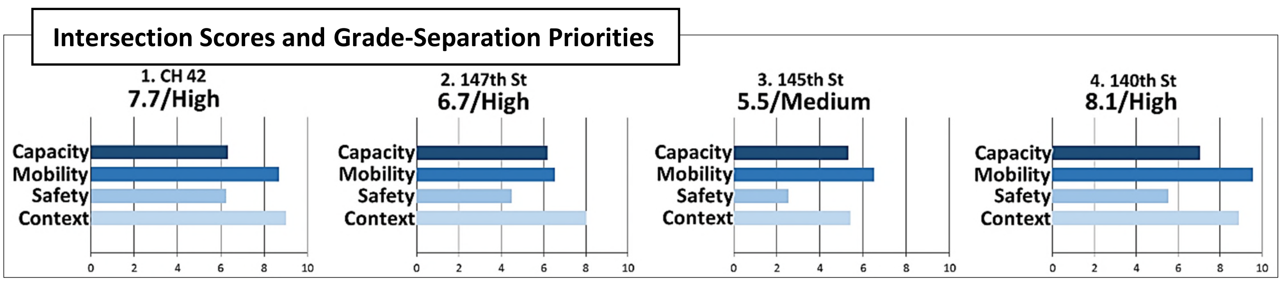
4.3.3 Dakota County

CH 23 (Cedar Ave.): CH 42 to 140th St. (Dakota County 1 of 6)

Corridor Context. Suburban Arterial with four at-grade intersections evaluated in the study (see ***Figure 14***). This corridor generally has six through lanes of mainline capacity, a median, and is an existing BRT corridor. The posted speed limit is 40-50 mph and the corridor is constrained by development. Other characteristics include:

- Intersection Spacing – The four intersections are spaced approximately 0.2 to 0.5 miles apart, and are located about a quarter mile south of the transition to TH 77 (a freeway).
- Access – Roadway access includes public street intersections that allow for right-in/right-out turns as well as multiple private access roadways.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for CH 42, 147th Street and 140th Street.

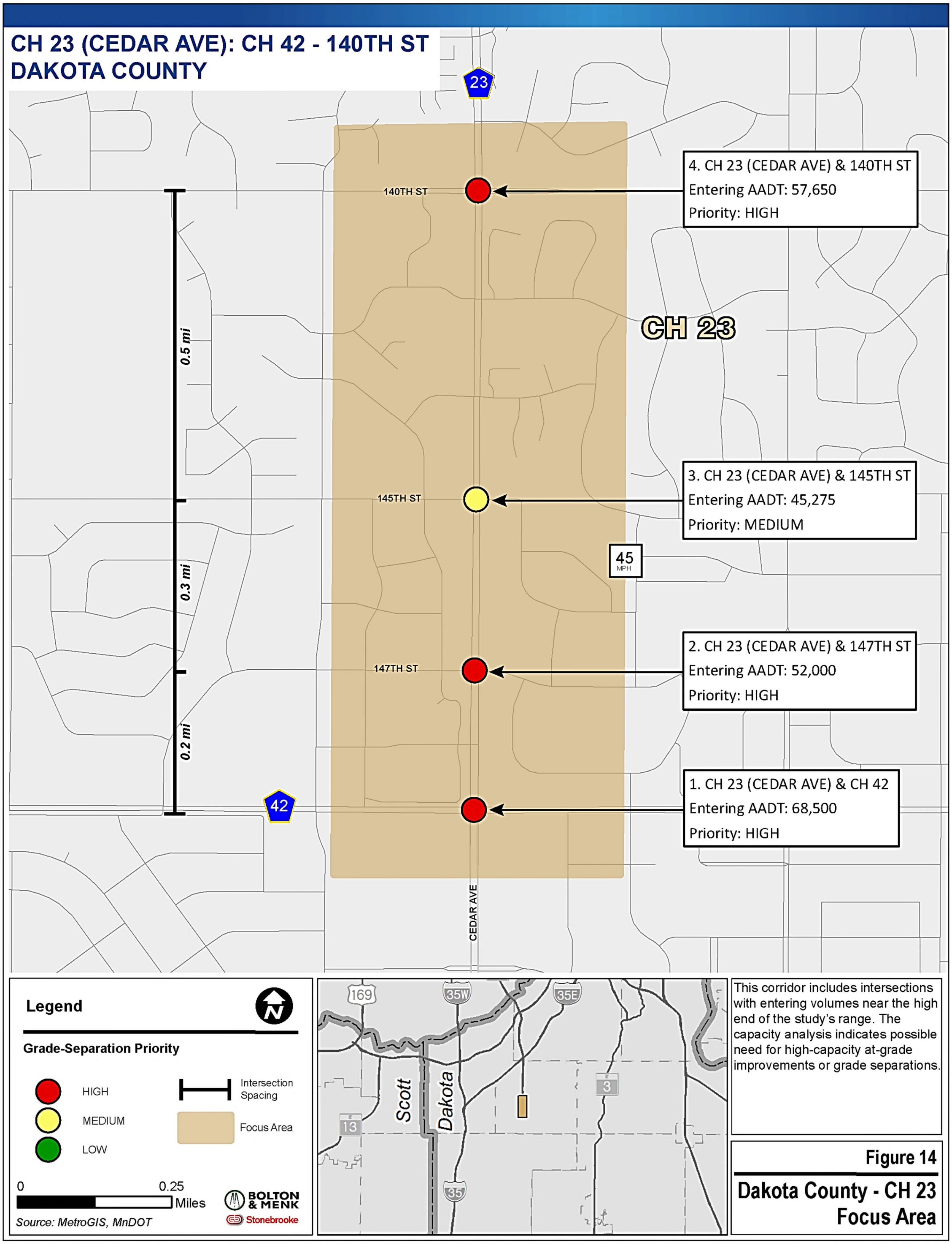
Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes near the high end of the study's range. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations. Contextually, CH 23 has received major at-grade investments and improvements in the last few years and access management, grades, and adjacent development will continue to constrain design concepts that include grade separations.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				CH 23			
1	CH 42	⧅	⧅	⊠	⧅	☐	☐
2	147th St.	⧅	⧅	⧅	⧅	☐	☐
3	145th St.	☐	☐	☐	☐	☐	☐
4	140th St.	⧅	☐	⊠	☐	⧅	☐
	Key	⊠ V/C ≥ 1.0		⧅ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This corridor includes intersections with entering volumes near the high end of the study's range. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations.

Figure 14

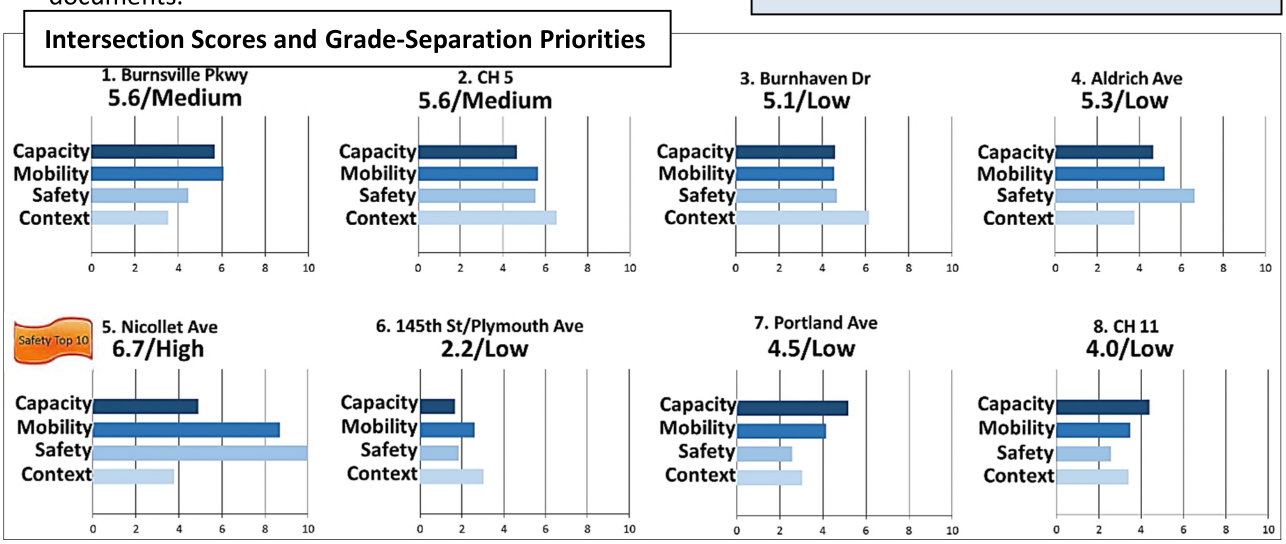
Dakota County - CH 23 Focus Area

CH 42-B: Burnsville Parkway to CH 11 (Dakota County 2 of 6)

Corridor Context. Suburban Arterial with eight at-grade intersections evaluated in the study, and four ramp intersections (see ***Figure 15***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 40-55 mph. The corridor is constrained by development, but often includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The eight intersections are spaced approximately 0.1 to 1.0 mile(s) apart, and are located about two miles west of CH 23. I-35W and I-35E both cross through the corridor and are only 0.1 miles from the Nicollet Avenue intersection.
- Access – Roadway access is limited to right-in/right-out access, public street intersections and private businesses.
- Previous Planning for Interchanges? Yes. A grade separation has been proposed for all study intersections from CH 5 to Nicollet Avenue in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes the full range of intersection priorities. While the close spacing of intersections and high volumes make the corridor complex, the capacity analysis indicates that major changes are not needed to accommodate current demand. All four ramp intersections exhibit mobility or capacity concerns.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				CH 42-B			
1	Burnsville Pkwy.	☐	☐	☐	☐	☐	☐
2	CH 5	☐	☐	☐	☐	☐	☐
3	Burnhaven Dr.	☐	☐	▧	☐	☐	☐
4	Aldrich Ave.	☐	☐	▧	☐	☐	☐
5	Nicollet Ave.	☐	☐	☐	☐	☐	☐
6	Plymouth Ave.	☐	☐	☐	☐	☐	☐
7	Portland Ave.	☐	☐	☐	☐	☐	☐
8	CH 11	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

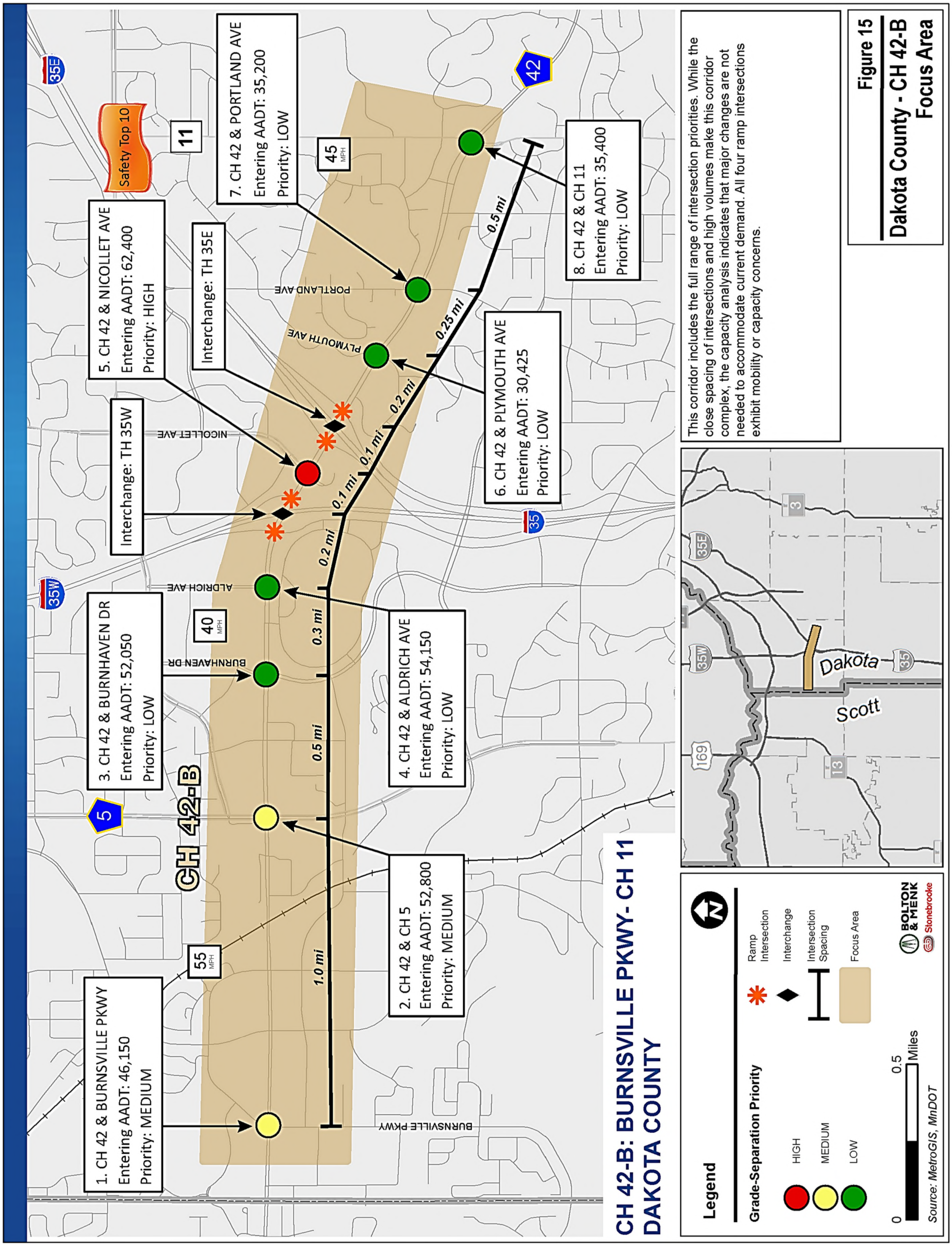


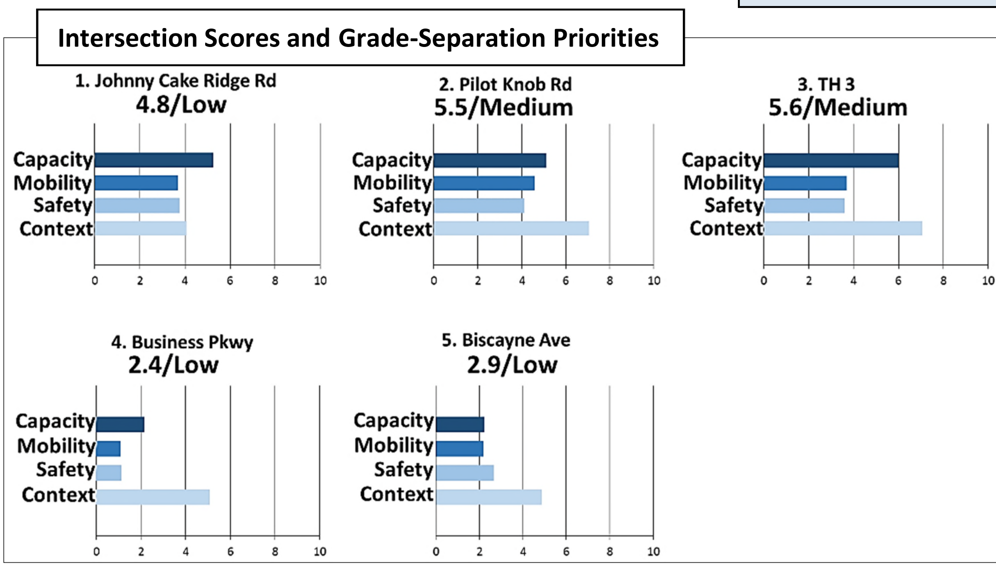
Figure 15
Dakota County - CH 42-B Focus Area

CH 42-C: Johnny Cake Ridge Road to Biscayne Avenue (Dakota County 3 of 6)

Corridor Context. Constrained Limited-Access Expressway and suburban arterial with five intersections evaluated in the study (see ***Figure 16***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 50-55 mph. The corridor is constrained by development, includes the railroad crossing as shown, but also includes some areas of open land. Other characteristics include:

- Intersection Spacing – The five intersections are spaced approximately 0.3 to 2.4 miles apart.
- Access – Roadway access is limited to intersections with right-in/right-out turns, left-hand turn-restricted intersections, and private access roadways.
- Previous Planning for Interchanges? Yes. Grade separations have been identified for the Pilot Knob Road and TH 3 intersections (Source: Dakota County).

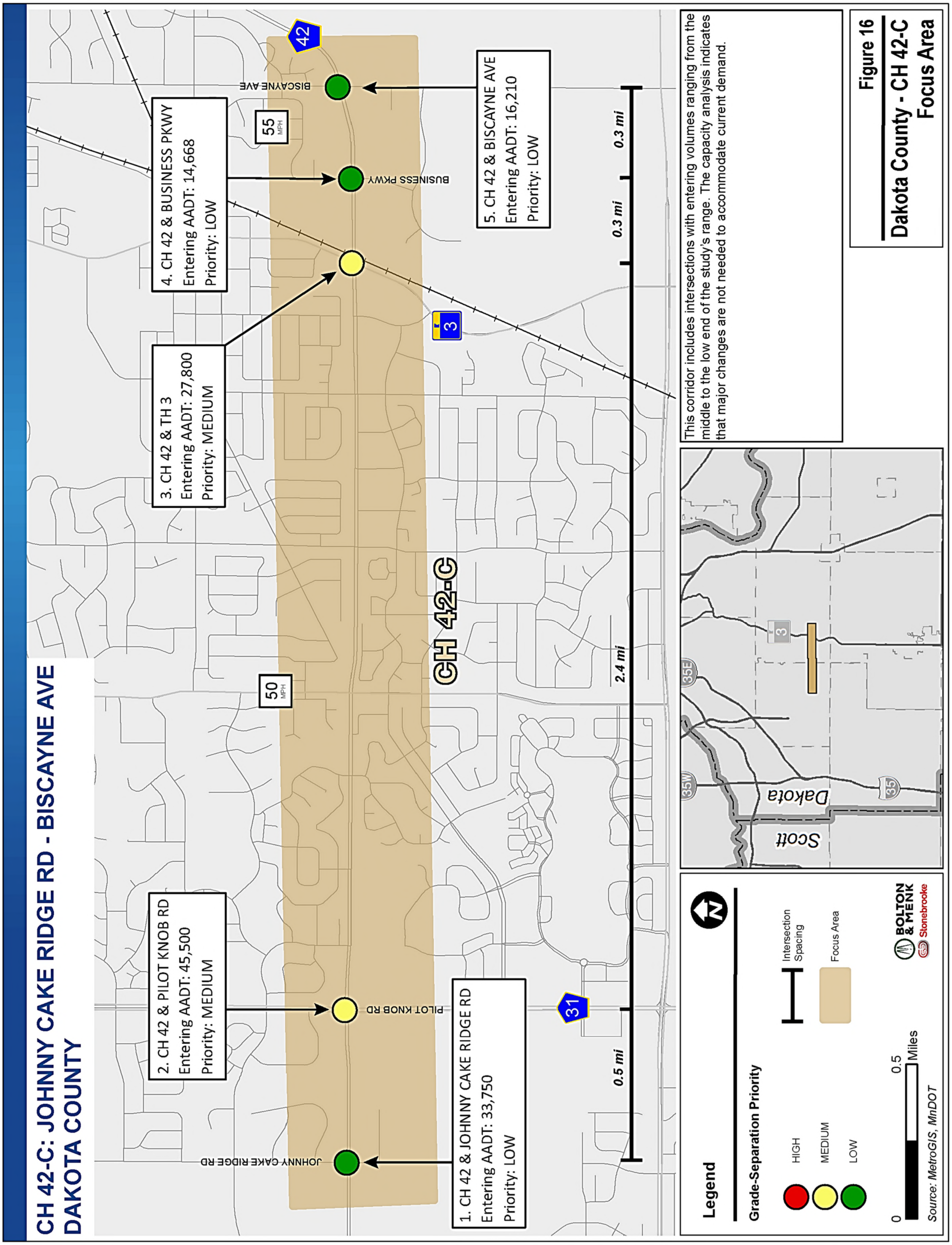
> **Intersection measures:**
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes ranging from the middle to the low end of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
CH 42-C							
1	Johnny Cake Rdg. Rd.	☐	☐	☐	☐	☐	☐
2	Pilot Knob Rd.	☐	☐	▧	☐	☐	☐
3	TH 3	☐	☐	☐	☐	☐	☐
4	Business Pkwy.	☐	☐	☐	☐	☐	☐
5	Biscayne Ave.	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	


CH 42-C: JOHNNY CAKE RIDGE RD - BISCAYNE AVE
DAKOTA COUNTY
1. CH 42 & JOHNNY CAKE RIDGE RD
Entering AADT: 33,750
Priority: LOW
2. CH 42 & PILOT KNOB RD
Entering AADT: 45,500
Priority: MEDIUM
3. CH 42 & TH 3
Entering AADT: 27,800
Priority: MEDIUM
4. CH 42 & BUSINESS PKWY
Entering AADT: 14,668
Priority: LOW
5. CH 42 & BISCAYNE AVE
Entering AADT: 16,210
Priority: LOW
JOHNNY CAKE RIDGE RD
PILOT KNOB RD
BUSINESS PKWY
BISCAYNE AVE
CH 42-C
50 MPH
55 MPH
0.5 mi
2.4 mi
0.3 mi
0.3 mi
This corridor includes intersections with entering volumes ranging from the middle to the low end of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.
Figure 16
Dakota County - CH 42-C
Focus Area
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Intersection Spacing
Focus Area
0
0.5
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Dakota
Scott

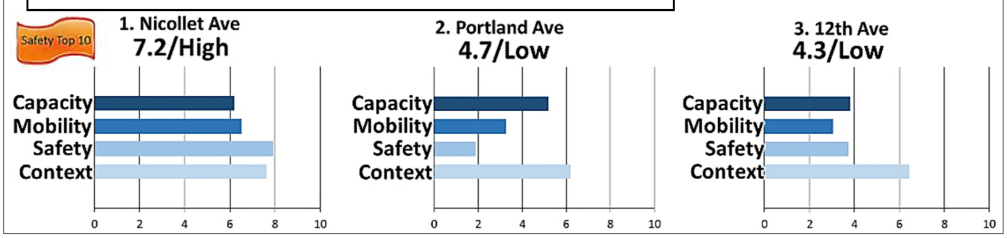
TH 13-B: Nicollet Avenue to 12th Avenue (Dakota County 4 of 6)

Corridor Context. Suburban Arterial with three at-grade intersections evaluated in the study (see ***Figure 17***). This corridor generally has four through lanes of mainline capacity and median. The posted speed limit is 50-55 mph. The corridor is constrained by development, but includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The three intersections are spaced approximately 0.5 and 0.6 miles apart, and are located about a half-mile east of the I-35W interchange.
- Access – Roadway access is very limited between the three intersections with only local access to businesses.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

> **Intersection measures:**
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?

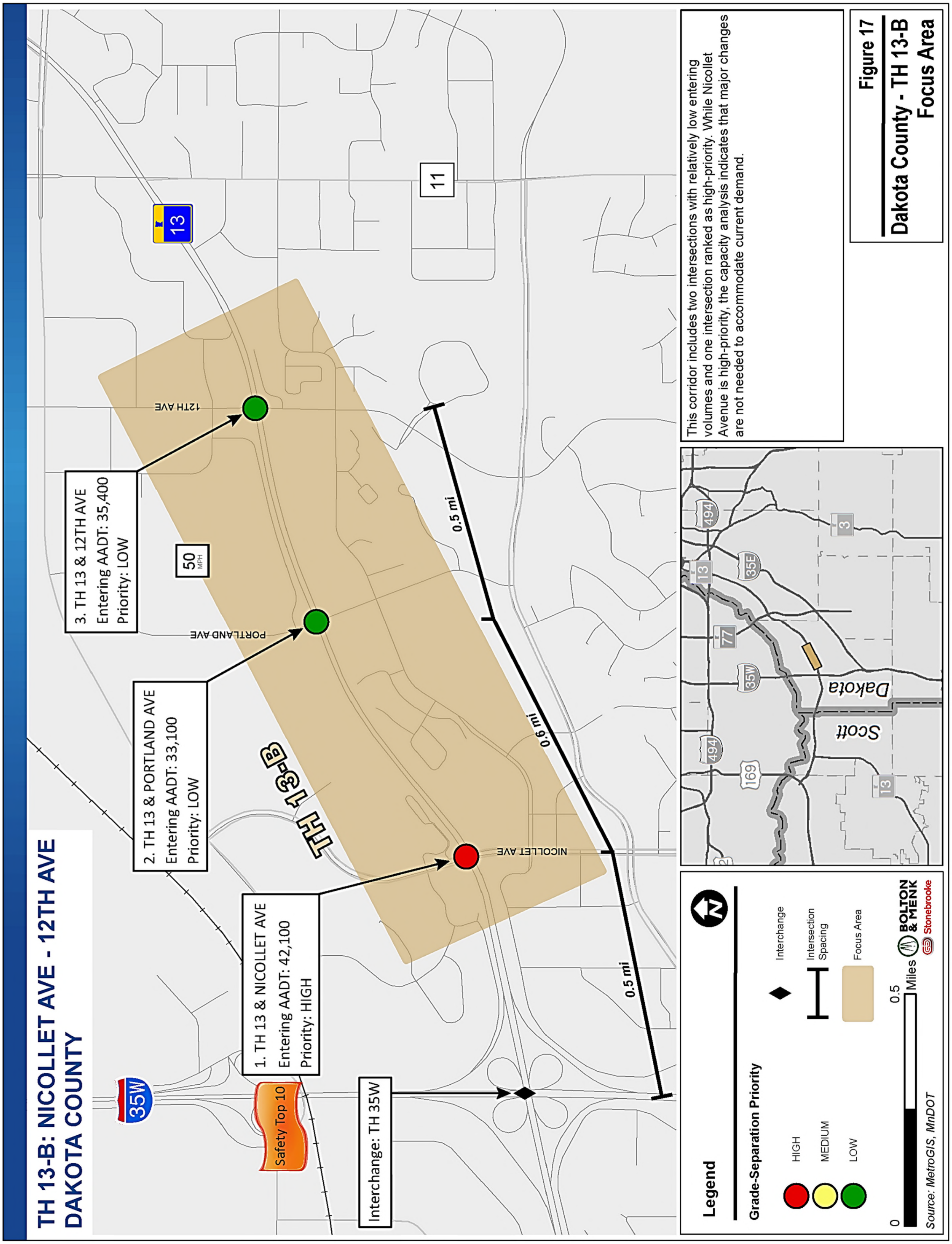
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes two intersections with relatively low entering volumes and one intersection ranked as high-priority. While Nicollet Avenue is high-priority, the capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 13-B							
1	Nicollet Ave.	☐	☐	▧	☐	☐	☐
2	Portland Ave.	☐	☐	☐	☐	☐	☐
3	12th Ave.	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

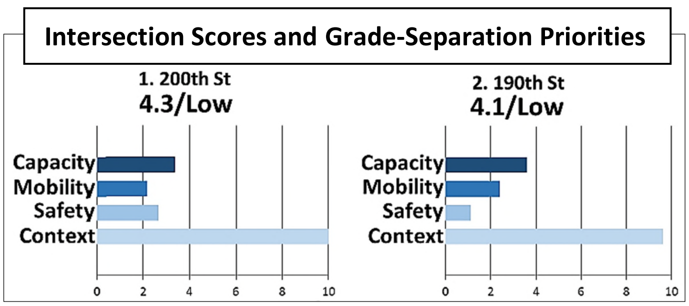

TH 13-B: NICOLLET AVE - 12TH AVE
DAKOTA COUNTY
1. TH 13 & NICOLLET AVE
Entering AADT: 42,100
Priority: HIGH
2. TH 13 & PORTLAND AVE
Entering AADT: 33,100
Priority: LOW
3. TH 13 & 12TH AVE
Entering AADT: 35,400
Priority: LOW
Interchange: TH 35W
Safety Top 10
35W
13
11
50 MPH
TH 13-B
NICOLLET AVE
PORTLAND AVE
12TH AVE
0.5 mi
0.6 mi
0.5 mi
494
35E
3
77
35W
169
Dakota
Scott
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Interchange
Intersection Spacing
Focus Area
0
0.5
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
This corridor includes two intersections with relatively low entering volumes and one intersection ranked as high-priority. While Nicollet Avenue is high-priority, the capacity analysis indicates that major changes are not needed to accommodate current demand.
Figure 17
Dakota County - TH 13-B
Focus Area

TH 52: 200th Street to 190th Street (Dakota County 5 of 6)

Corridor Context. Unconstrained Limited-Access Expressway with two at-grade intersections evaluated in the study (see ***Figure 18***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 65 mph and the corridor is unconstrained by development. Other characteristics include:

- Intersection Spacing – The two intersections are spaced approximately one mile apart and there are no nearby expressways.
- Access – Roadway access is limited between the two intersections to two residential access points.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

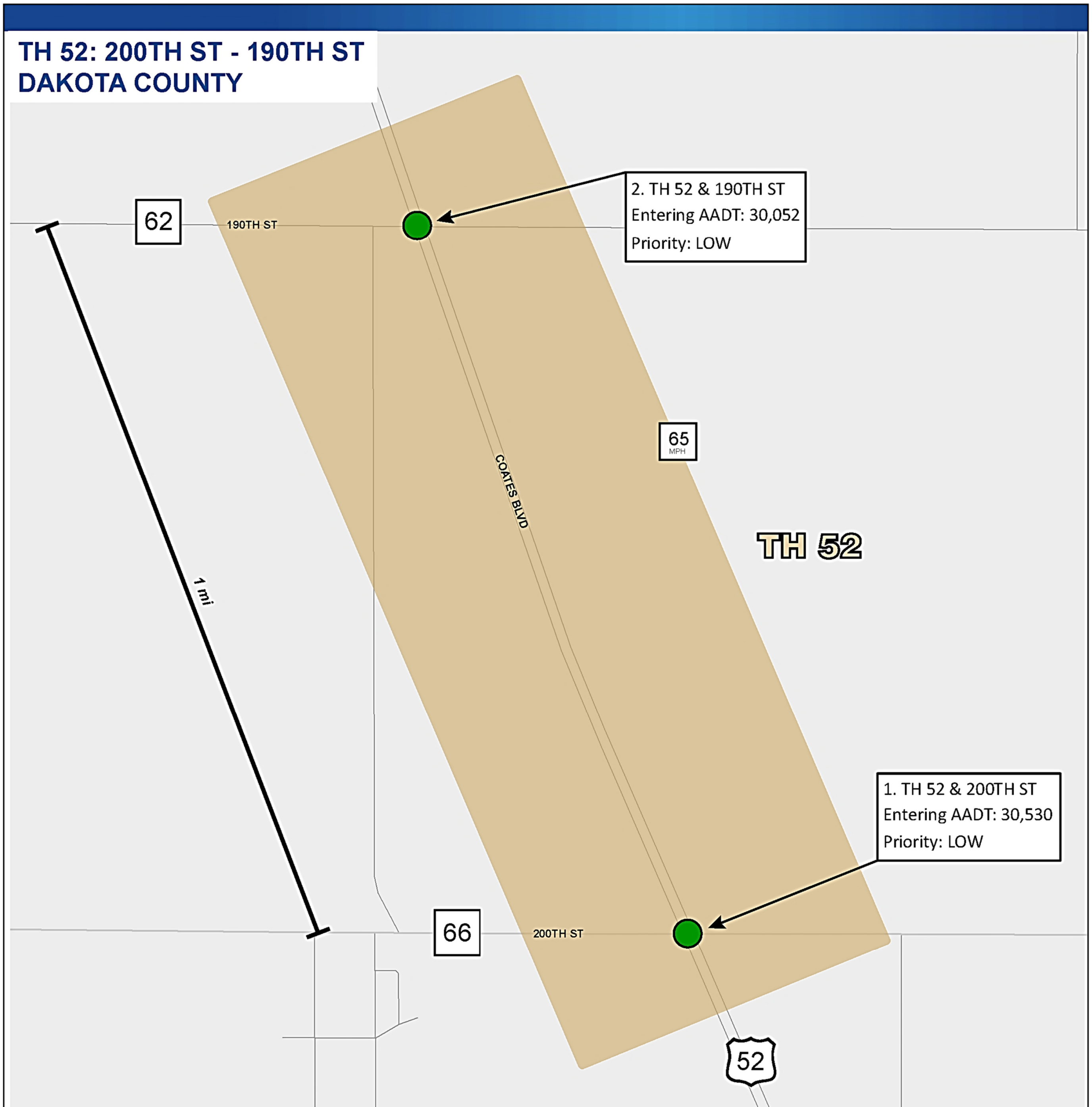
Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

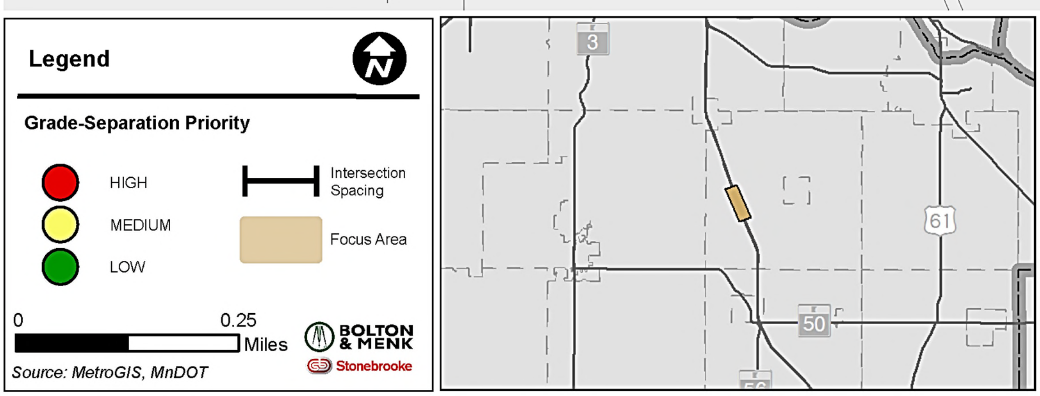


Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with relatively low entering volumes and low-priority rankings. The capacity analysis indicates that major changes are not needed to accommodate current demand. However, this is a high-speed rural expressway location with potential for growing demand and need for access management.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 52							
1	200th St.	☐	☐	☐	☐	☐	☐
2	190th St.	☐	☐	☐	☐	☐	☐
	Key	☒ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	





This corridor includes intersections with entering volumes relatively low and low-priority rankings. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 18

Dakota County - TH 52 Focus Area

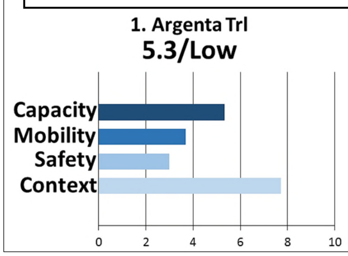
TH 55-C: Intersection at Argenta Trail (Dakota County 6 of 6)

Corridor Context. Constrained Limited-Access Expressway with one intersection evaluated in the study (see ***Figure 19***). The corridor at this low-priority intersection has four through lanes of mainline capacity and a median. The posted speed limit is 65 mph and the corridor is constrained by development. Other characteristics include:

- Intersection Spacing – This intersection is located approximately 2.5 miles southeast of the I-35E and I-494 interchange and about 0.8 miles west of the South Robert Trail interchange.
- Access – Roadway access is limited to major intersections along this part of TH 55, which allow right-in/right-out access.
- Previous Planning for Interchanges? Yes. A grade separation has been proposed for this intersection in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

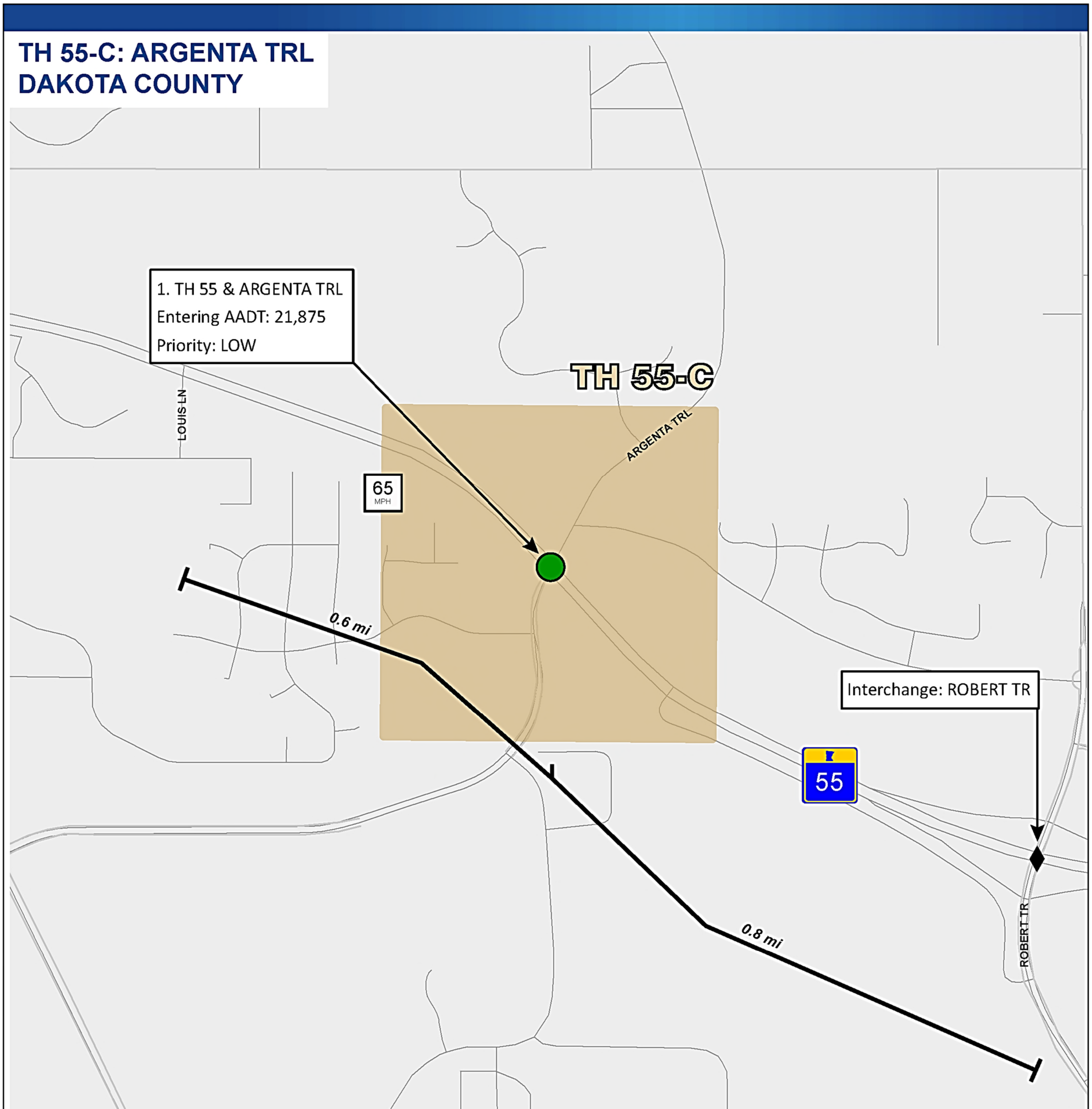
Intersection Score and Grade-Separation Priority

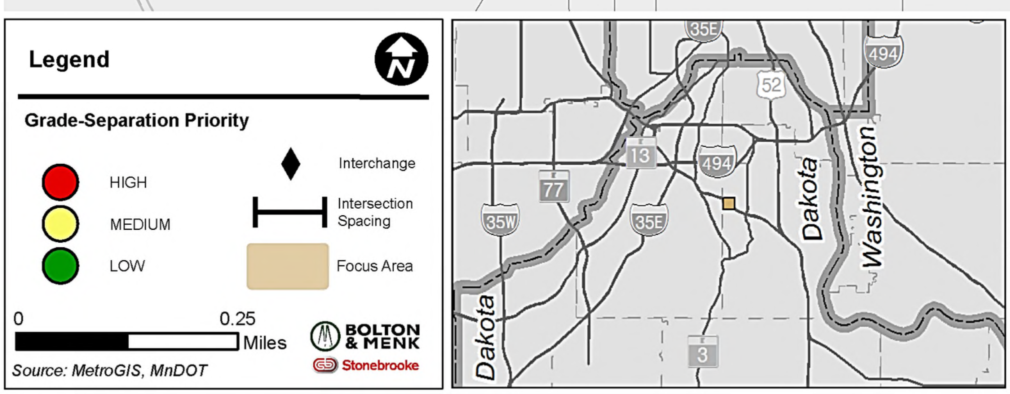


Capacity Analysis, Needs, and Opportunities. This intersection has entering volumes near the low end of the study's range, and scored on the low end of the intersection priority ranking. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 55-C							
1	Argenta Trl.	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	





This intersection has entering volumes near the low end of the study's range and scored a low-priority ranking. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 19

Dakota County - TH 55-C Focus Area

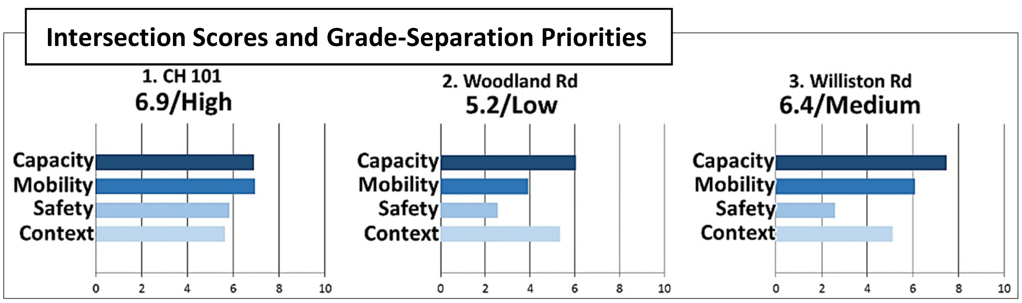
4.3.4 Hennepin County

TH 7-A: CH 101 to Williston Road (Hennepin County 1 of 6)

Corridor Context. Suburban Arterial with three at-grade intersections evaluated in the study (see ***Figure 20***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 50 mph and the corridor is constrained by development. Other characteristics include:

- Intersection Spacing – The two intersections are spaced approximately 0.75 and 1.1 miles apart and located about 0.75 miles west of the I-494 interchange.
- Access – Roadway access is limited to right-in/right-out access and private businesses.
- Previous Planning for Interchanges? Yes. Grade separation has been proposed for CH 101 and Williston Road in previous planning documents.

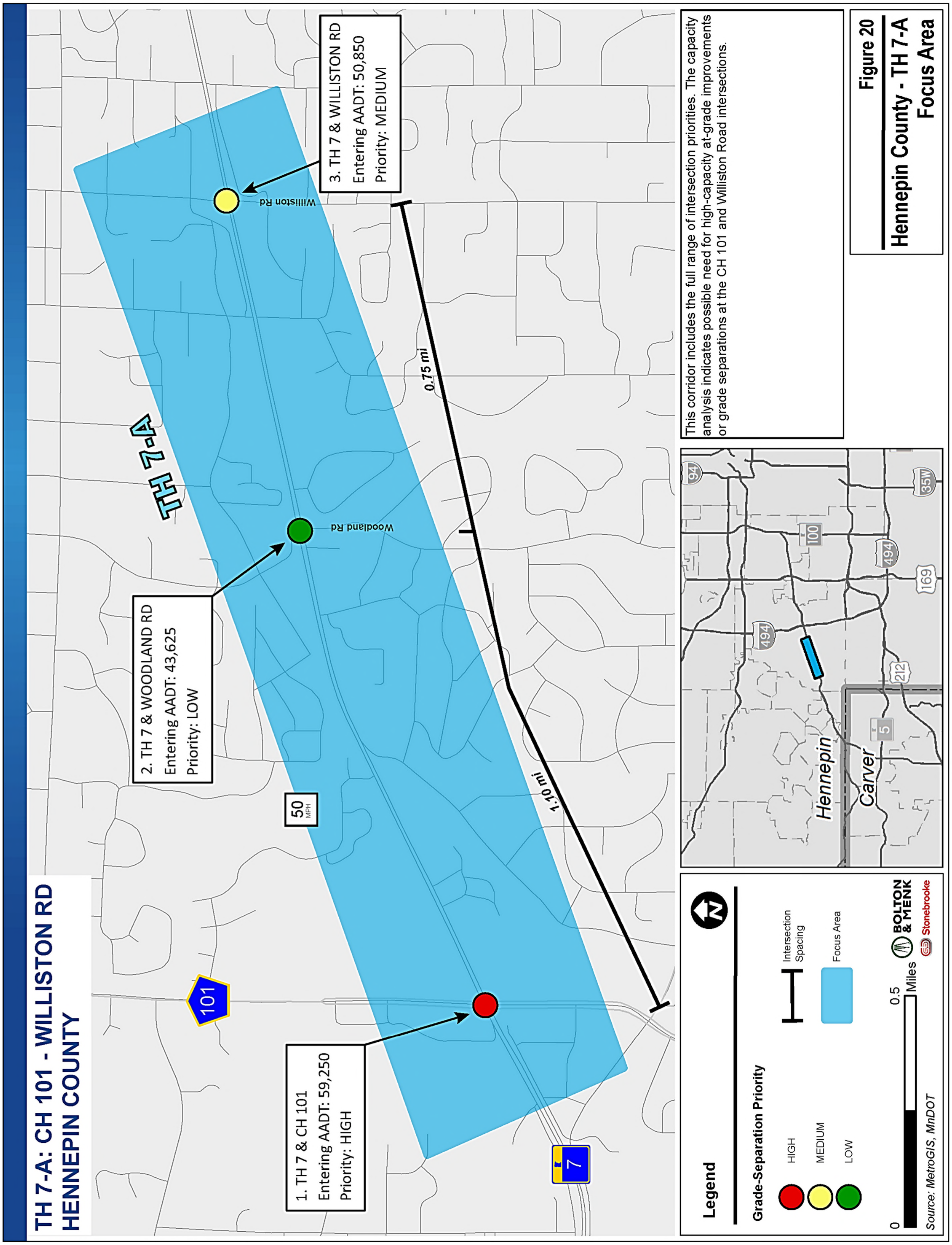
<u>**Intersection measures**</u>:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes the full range of intersection priorities. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations at the CH 101 and Williston Road intersections.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				TH 7-A			
1	CH 101	▧	▧	▧	☐	▧	☐
2	Woodland Rd.	☐	☐	☐	☐	☐	☐
3	Williston Rd.	⊠	⊠	⊠	☐	▧	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

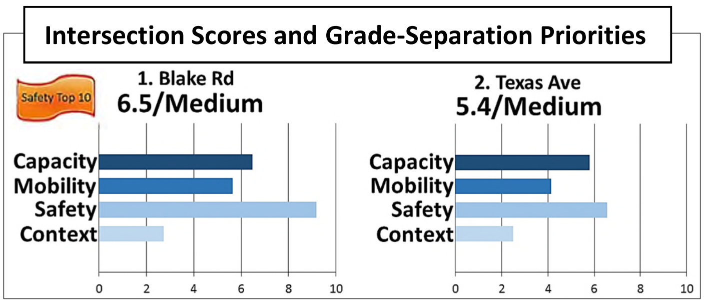

TH 7-A: CH 101 - WILLISTON RD
HENNEPIN COUNTY
TH 7-A
1. TH 7 & CH 101
Entering AADT: 59,250
Priority: HIGH
2. TH 7 & WOODLAND RD
Entering AADT: 43,625
Priority: LOW
3. TH 7 & WILLISTON RD
Entering AADT: 50,850
Priority: MEDIUM
Williston Rd
Woodland Rd
101
7
50 MPH
1.10 mi
0.75 mi
This corridor includes the full range of intersection priorities. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations at the CH 101 and Williston Road intersections.
Figure 20
Hennepin County - TH 7-A
Focus Area
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Intersection Spacing
Focus Area
0
0.5
Miles
BOLTON & MENK
Stonebrooke
Source: MetroGIS, MnDOT
94
100
494
35W
169
212
5
Hennepin
Carver

TH 7-B: Blake Road to Texas Avenue (Hennepin County 2 of 6)

Corridor Context. Suburban Arterial with two at-grade intersections evaluated in the study (see ***Figure 21***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph and the corridor is constrained by development. Other characteristics include:

- Intersection Spacing – The two intersections are spaced approximately 0.25 miles apart and located about 0.5 miles east of the TH 169 interchange.
- Access – There are no major access points to TH 7 between the two intersections with the exception of a right-in access off the westbound lane to a shopping center.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes near the middle of the study's range. With Blake Road scoring a medium priority ranking, the capacity analysis indicates possible need for high-capacity at-grade improvements for the intersection.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 7-B							
1	Blake Rd.	▧	▧	☐	☐	☐	☐
2	Texas Ave.	☐	☐	▧	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

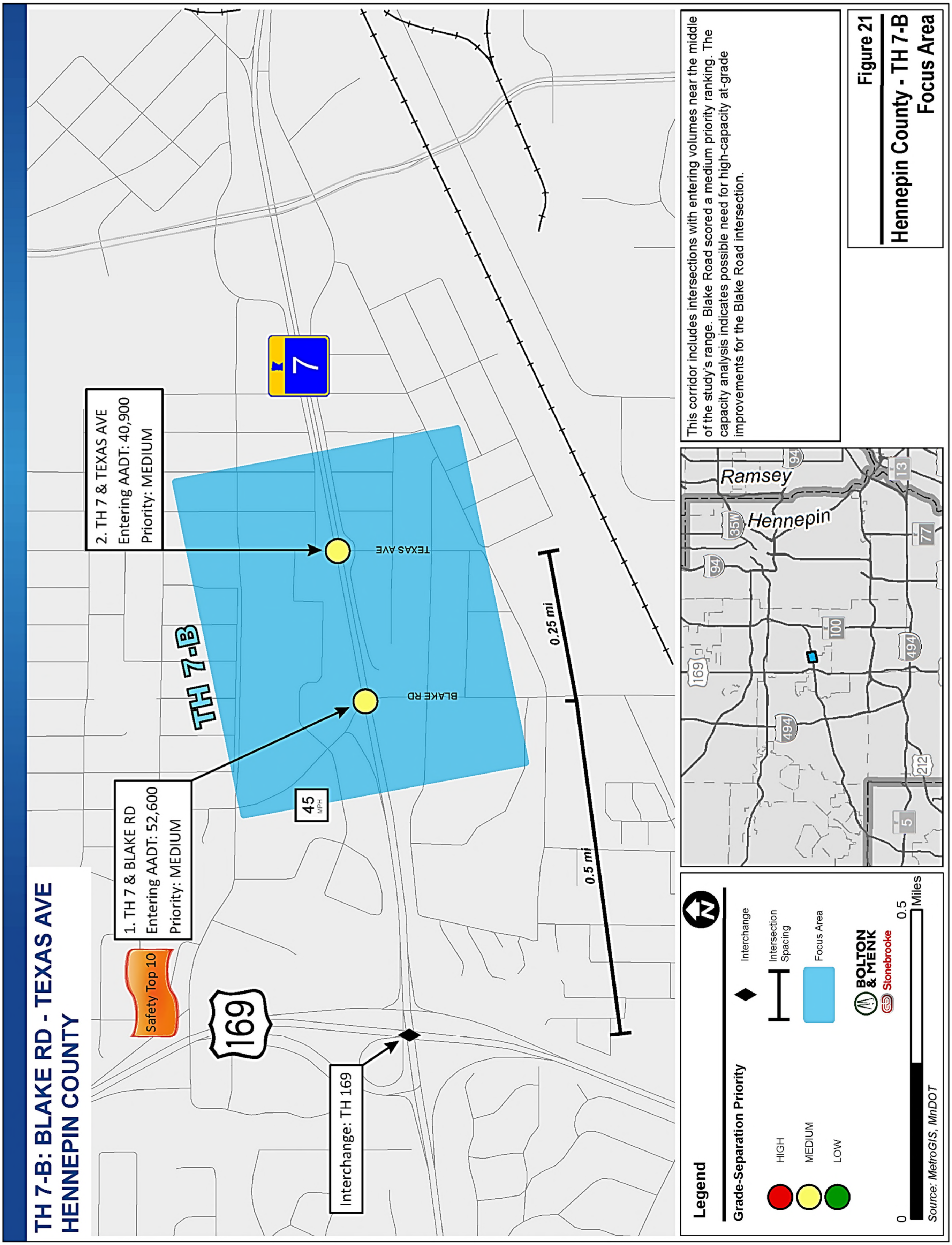


Figure 21
Hennepin County - TH 7-B Focus Area

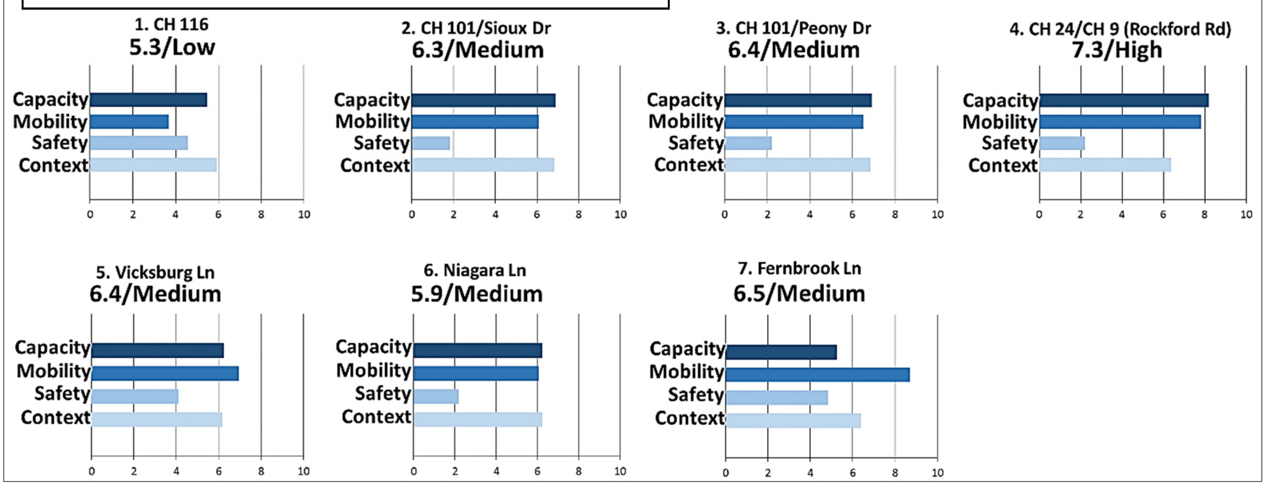
TH 55-A: CH 116 to Fernbrook Lane (Hennepin County 3 of 6)

Corridor Context. Constrained Limited-Access Expressway with seven at-grade intersections evaluated in the study (see ***Figure 22***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph. The corridor is constrained by development and a railroad that runs along a short segment of the corridor's western end. Other characteristics include:

- Intersection Spacing – The seven intersections are spaced approximately 0.6 to 1.2 miles apart and are located approximately 0.2 miles west of the TH 494 interchange.
- Access – Roadway access is limited to right-in/right-out access for public street intersections and private businesses.
- Previous Planning for Interchanges? Yes. Grade separation has been proposed for all intersections along this corridor in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

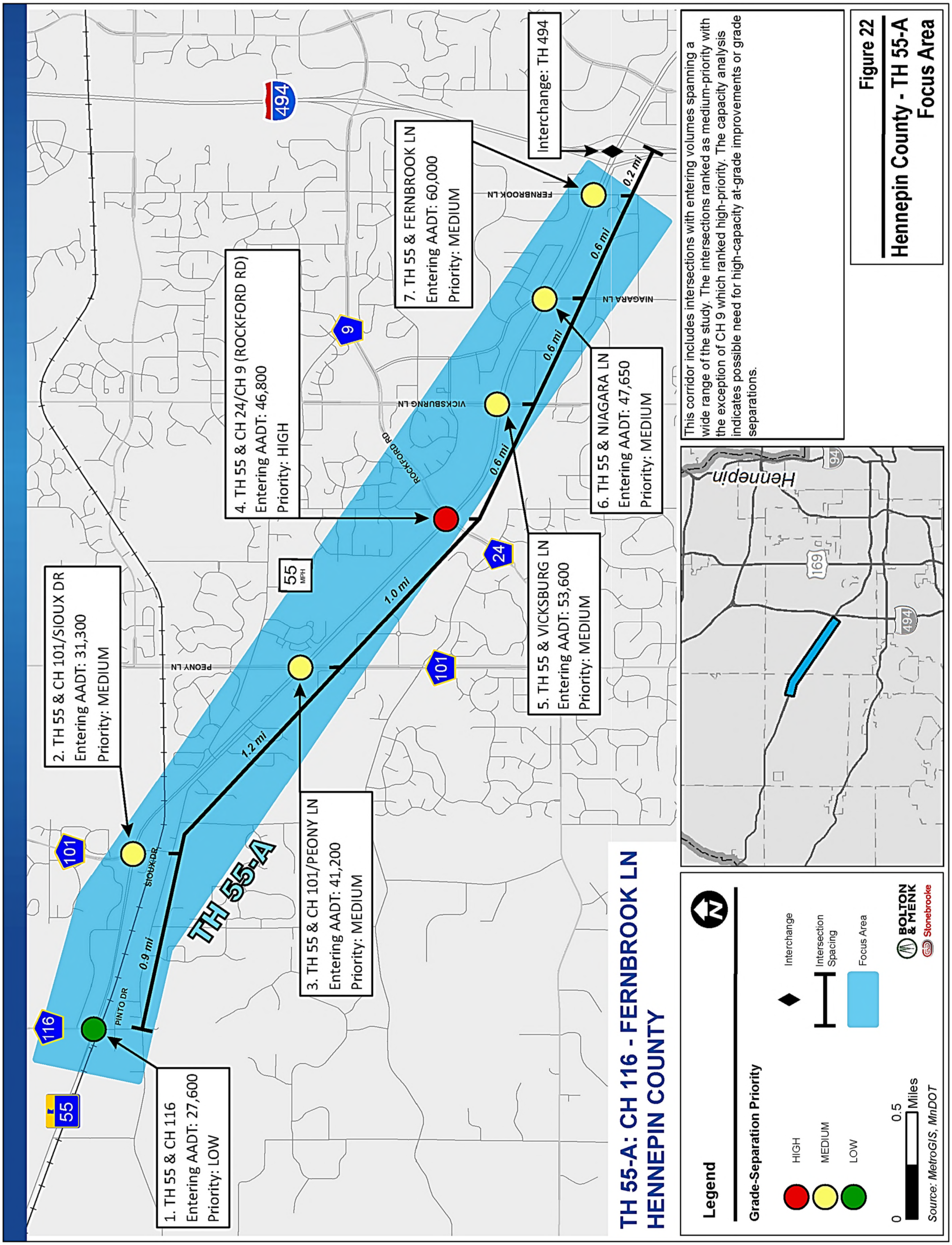
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes spanning a wide range of the study. The intersections ranked as medium-priority with the exception of CH 9 which ranked high-priority. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 55-A							
1	CH 116	▧	☐	▧	☐	☐	☐
2	CH 101/Sioux Dr.	▧	▧	⊠	☐	☐	☐
3	CH 101/Peony Ln.	▧	▧	▧	☐	☐	☐
4	CH 24/CH 9 (Rockford Rd)	⊠	⊠	⊠	☐	▧	☐
5	Vicksburg Ln.	▧	▧	⊠	☐	☐	☐
6	Niagara Ln.	▧	▧	▧	☐	☐	☐
7	Fernbrook Ln.	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



1. TH 55 & CH 116
Entering AADT: 27,600
Priority: LOW
2. TH 55 & CH 101/SIOUX DR
Entering AADT: 31,300
Priority: MEDIUM
3. TH 55 & CH 101/PEONY LN
Entering AADT: 41,200
Priority: MEDIUM
4. TH 55 & CH 24/CH 9 (ROCKFORD RD)
Entering AADT: 46,800
Priority: HIGH
5. TH 55 & VICKSBURG LN
Entering AADT: 53,600
Priority: MEDIUM
6. TH 55 & NIAGARA LN
Entering AADT: 47,650
Priority: MEDIUM
7. TH 55 & FERNBROOK LN
Entering AADT: 60,000
Priority: MEDIUM
Interchange: TH 494
0.9 mi
1.2 mi
1.0 mi
0.6 mi
0.6 mi
0.6 mi
0.2 mi
PINTO DR
SIOUX DR
PEONY LN
ROCKFORD RD
VICKSBURG LN
NIAGARA LN
FERNBROOK LN
TH 55-A
55
116
101
24
9
494
55 MPH
Hennepin
169
94
This corridor includes intersections with entering volumes spanning a wide range of the study. The intersections ranked as medium-priority with the exception of CH 9 which ranked high-priority. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations.
Figure 22
Hennepin County - TH 55-A Focus Area
TH 55-A: CH 116 - FERNBROOK LN
HENNEPIN COUNTY
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Interchange
Intersection Spacing
Focus Area
0 0.5 Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke

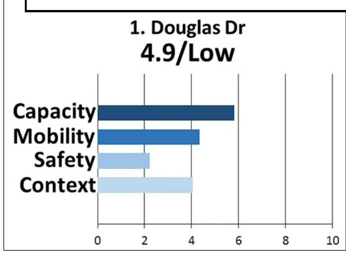
TH 55-B: Intersection at Douglas Drive (Hennepin County 4 of 6)

Corridor Context. Suburban Arterial with one intersection evaluated in the study (***Figure 23***). The corridor at this low-priority intersection has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph. The corridor is constrained by development and a railroad. Other characteristics include:

- Intersection Spacing – This intersection is located approximately a half mile west of the TH 100 interchange.
- Access – Roadway access is limited to right-in/right-out access. Frontage roads run along this stretch of the corridor for access to residential neighborhoods.
- Previous Planning for Interchanges? No. A grade separation has not been proposed for this intersection in previous planning documents.

> <u>**Intersection measures**</u>:
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?

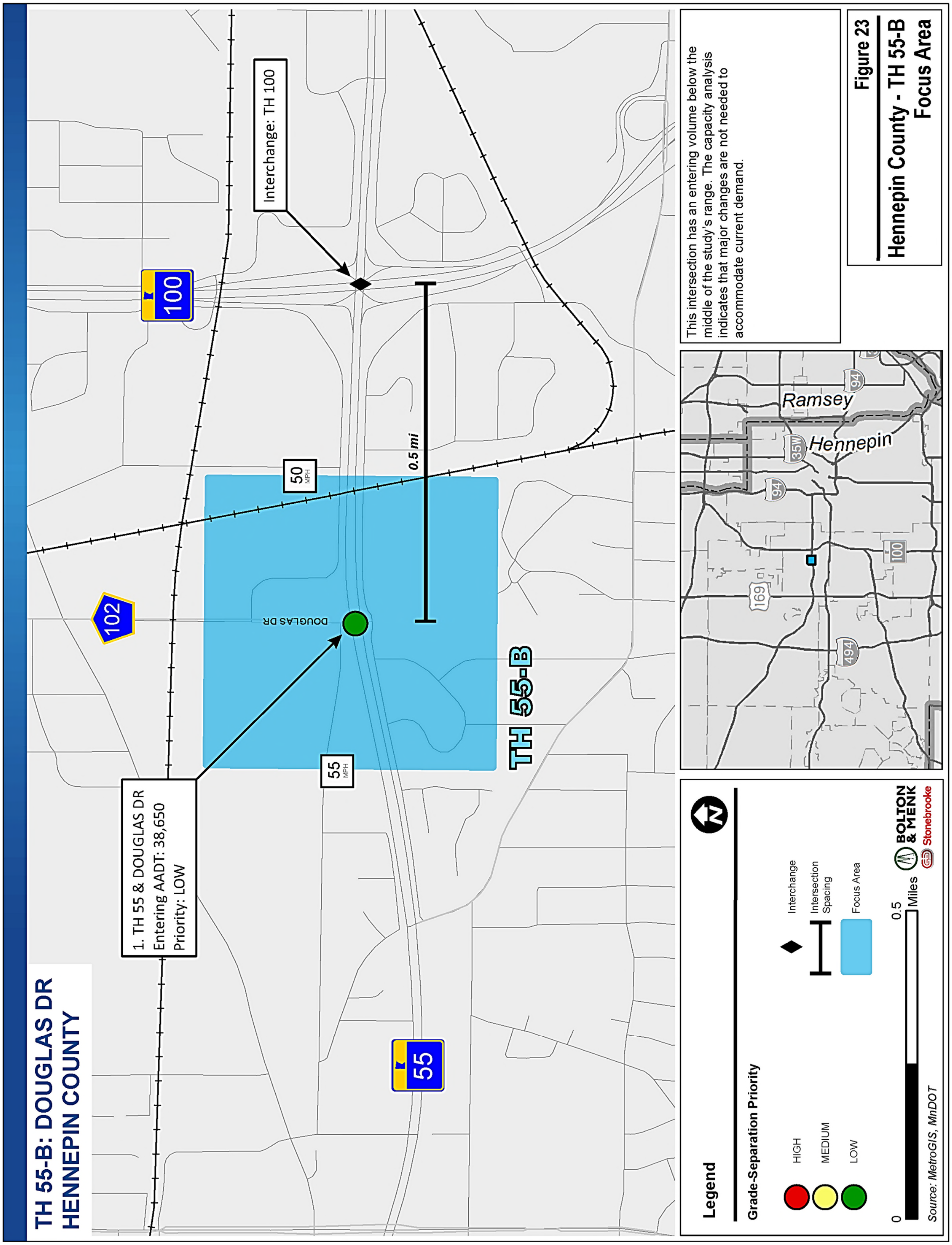
Intersection Score and Grade-Separation Priority



Capacity Analysis, Needs, and Opportunities. This corridor includes an intersection with entering volumes below the middle of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 55-B							
1	Douglas Dr.	☐	☐	▧	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



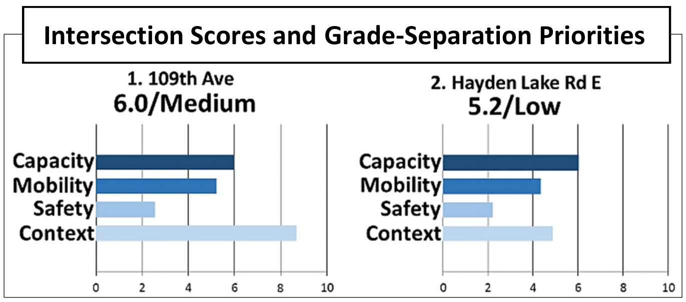
TH 55-B: DOUGLAS DR
HENNEPIN COUNTY
1. TH 55 & DOUGLAS DR
Entering AADT: 38,650
Priority: LOW
Interchange: TH 100
DOUGLAS DR
0.5 mi
50 MPH
55 MPH
TH 55-B
100
102
55
This intersection has an entering volume below the middle of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.
Ramsey
Hennepin
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Interchange
Intersection Spacing
Focus Area
0
0.5
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Figure 23
Hennepin County - TH 55-B
Focus Area

TH 169-B: 109th Avenue North to Hayden Lake Road East (Hennepin County 5 of 6)

Corridor Context. Suburban Arterial with two at-grade intersections evaluated in the study (see ***Figure 24***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph. The corridor is constrained by development, but includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The two intersections are spaced approximately 2.0 miles apart and are located about 1.5 miles north of TH 610.
- Access – Roadway access is limited to three signalized public street intersections.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. This corridor includes two intersections with entering volumes near the middle of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				TH 169-B			
1	109th Ave N	☐	☐	▧	☐	☐	☐
2	Hayden Lake Rd E	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

TH 169-B: 109TH AVE N - HAYDEN LAKE RD E
HENNEPIN COUNTY

Legend

Grade-Separation Priority

- HIGH
- MEDIUM
- LOW

Intersection Spacing

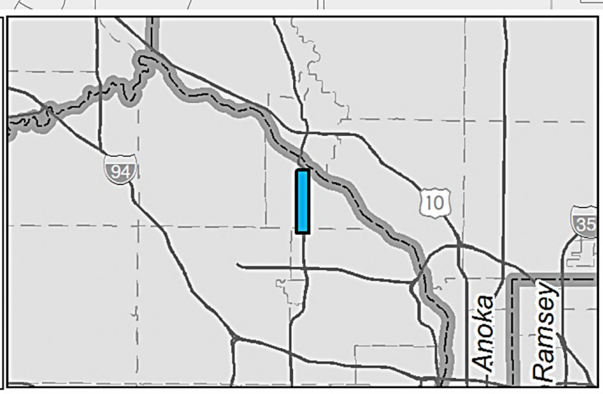
Focus Area

0 0.25 Miles

BOLTON & MENK

Stonebrooke

Source: MetroGIS, MnDOT



This corridor includes two intersections with entering volumes near the middle of the study's range. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 24

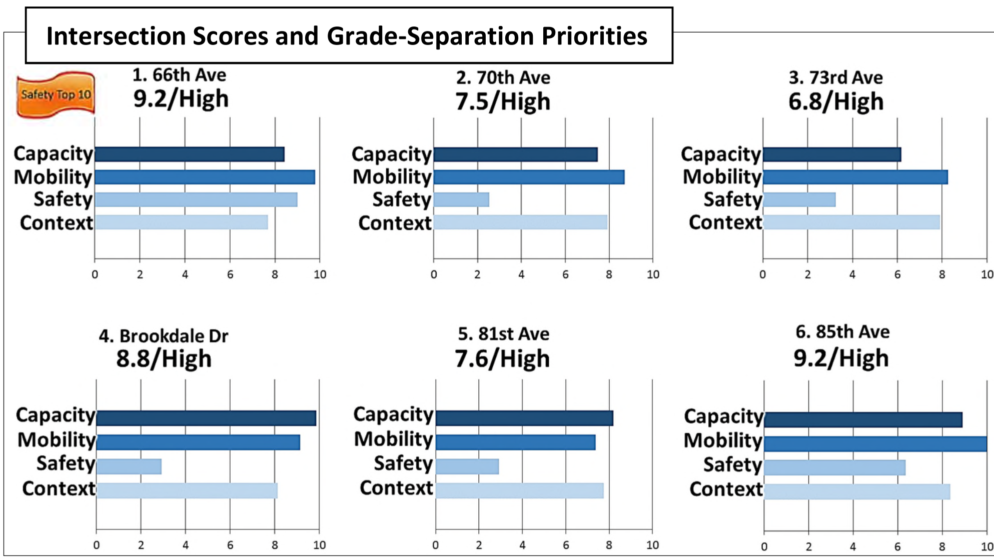
Hennepin County - TH 169-B Focus Area

TH 252: 66th Avenue to 85th Avenue (Hennepin County 6 of 6)

Corridor Context. Constrained Limited-Access Expressway with six at-grade intersections evaluated in the study (see ***Figure 25***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph. The corridor is constrained by development, but includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The six intersections are spaced approximately 0.3 to 0.7 miles apart and are located about 0.3 miles north of the TH 694 interchange.
- Access – Roadway access is limited to right-in/right-out access and private businesses.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for this entire corridor in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

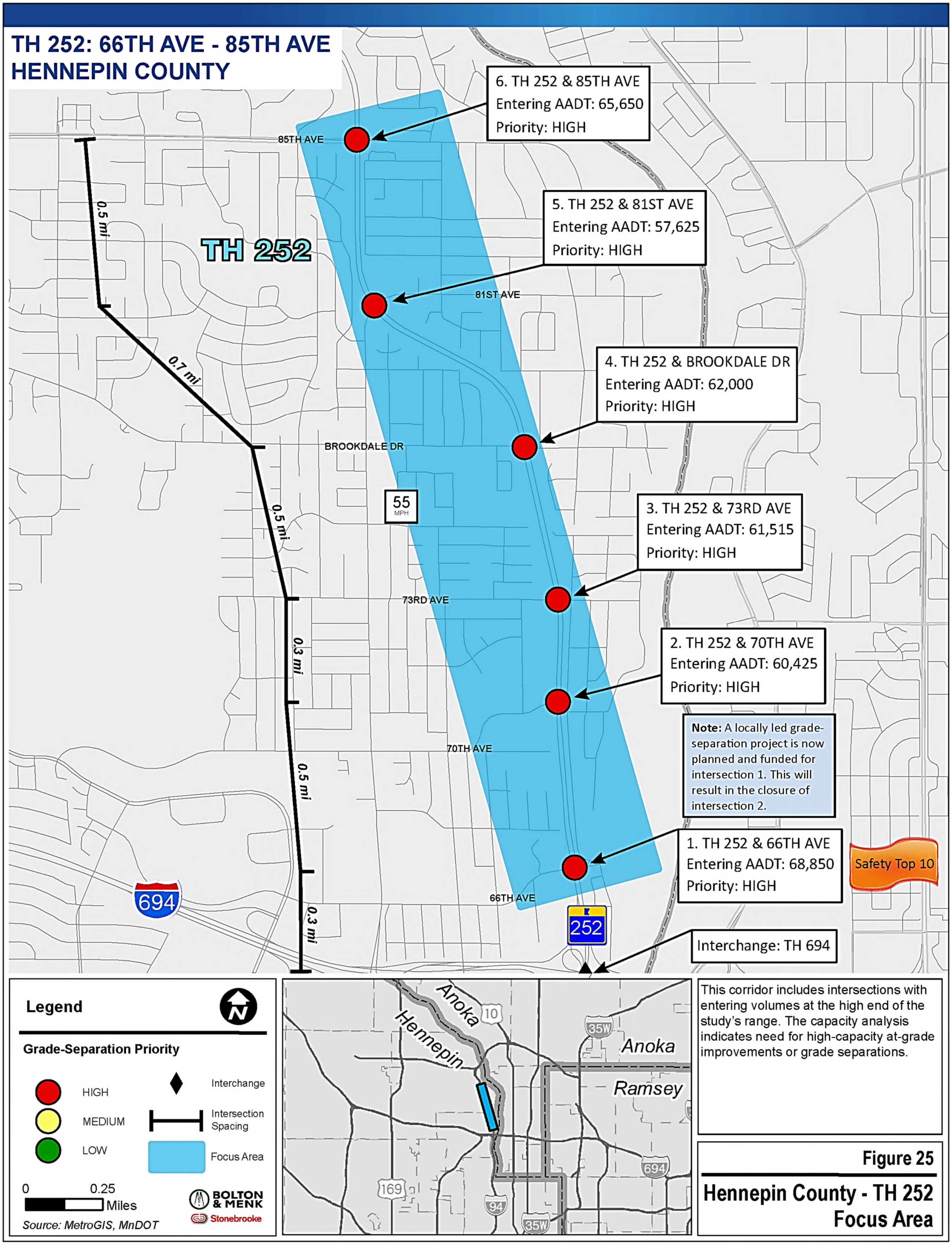


Note: A locally led grade-separation project is now planned and funded for intersection 1. This will result in the closure of intersection 2.

Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes at the high end of the study's range. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
	TH 252						
1	66th Ave.	⊠	⊠	⊠	⊠	☐	☐
2	70th Ave.	⊠	⊠	⊠	⊠	☐	☐
3	73rd Ave.	⧅	⧅	⧅	☐	☐	☐
4	Brookdale Dr.	⊠	⊠	⊠	⧅	☐	☐
5	81st Ave.	⊠	⊠	⊠	☐	☐	☐
6	85th Ave.	⊠	⊠	⊠	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		⧅ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This corridor includes intersections with entering volumes at the high end of the study's range. The capacity analysis indicates need for high-capacity at-grade improvements or grade separations.

Figure 25

Hennepin County - TH 252 Focus Area

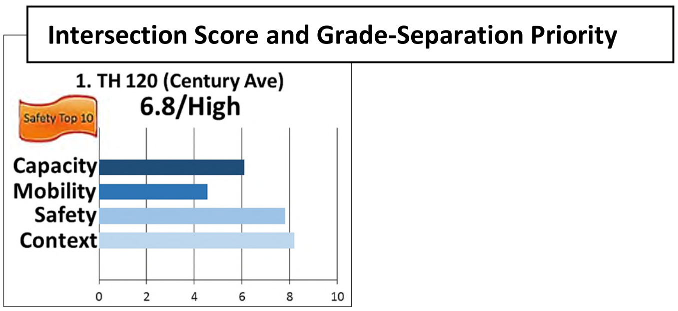
4.3.5 Ramsey County

TH 36-A: Intersection at TH 120 (Century Avenue) (Ramsey & Washington Counties 1 of 3)

Corridor Context. Constrained Limited-Access Expressway with one intersection evaluated in the study (see ***Figure 26***). The corridor at this high-priority intersection has four through lanes of mainline capacity, a median, and is a proposed BRT corridor. The posted speed limit is 55 mph. The corridor is constrained by development, but it has been upgraded to a freeway along nearby segments. Other characteristics include:

- Intersection Spacing – This intersection is located approximately 0.8 miles southwest of Hadley Avenue which is a committed and funded location for a new interchange (2019 construction).
- Access – Roadway access is limited to right-in/right-out access.
- Previous Planning for Interchanges? Yes. A grade separation has been proposed for this intersection in previous planning documents.

<u>**Intersection measures**</u>:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

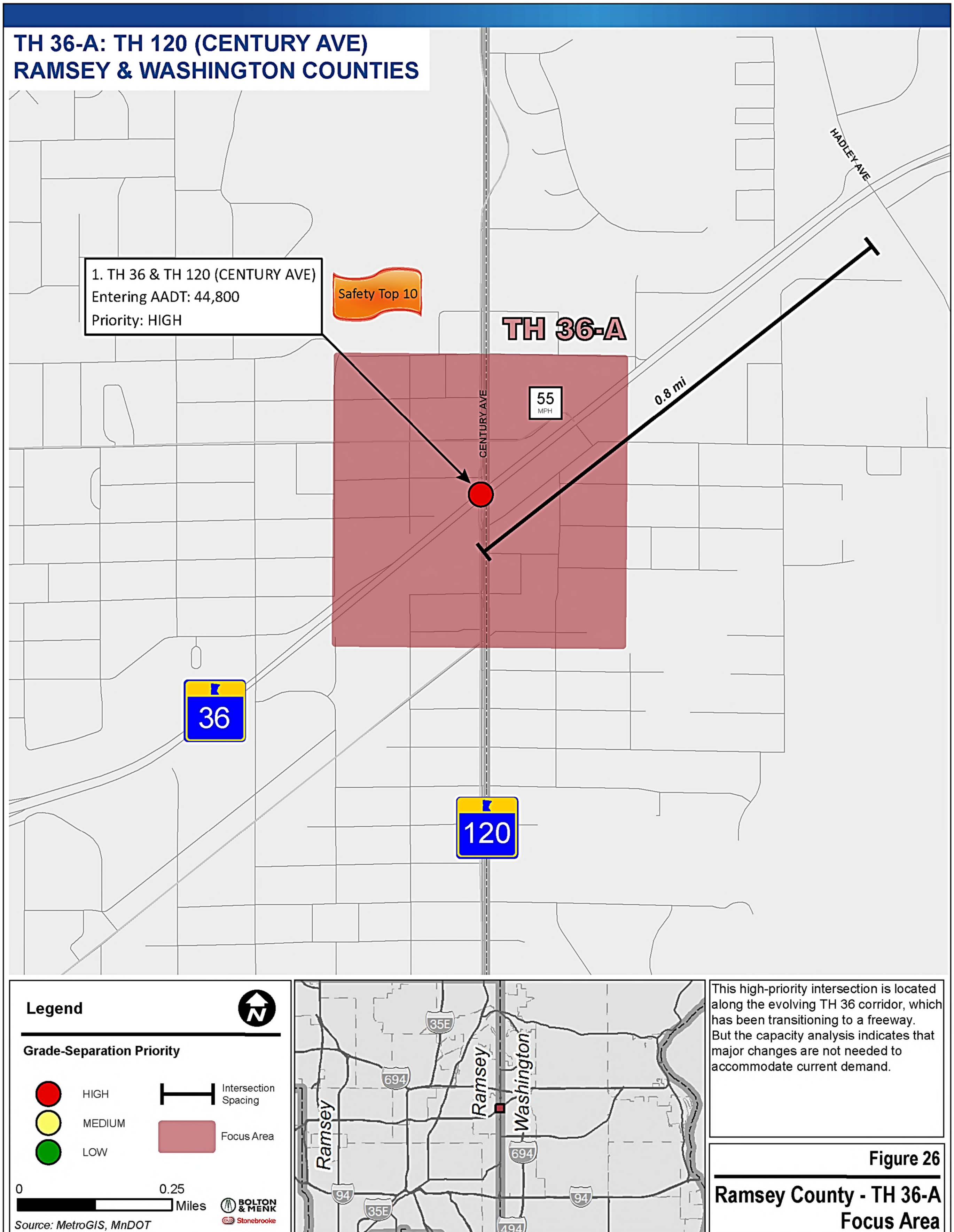


Capacity Analysis, Needs, and Opportunities. The capacity analysis indicates that major changes are not needed to accommodate current demand. However, this is a high-priority intersection and the TH 36 corridor has been transitioning to a freeway with potential for growing demand. Ramsey and Washington counties have a cooperative agreement in place and will continue to plan for possible improvements.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				TH 36-A			
1	TH 120	☐	☐	☐	☐	☐	☐
	Key	▨ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

TH 36-A: TH 120 (CENTURY AVE)
RAMSEY & WASHINGTON COUNTIES



This high-priority intersection is located along the evolving TH 36 corridor, which has been transitioning to a freeway. But the capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 26

Ramsey County - TH 36-A Focus Area

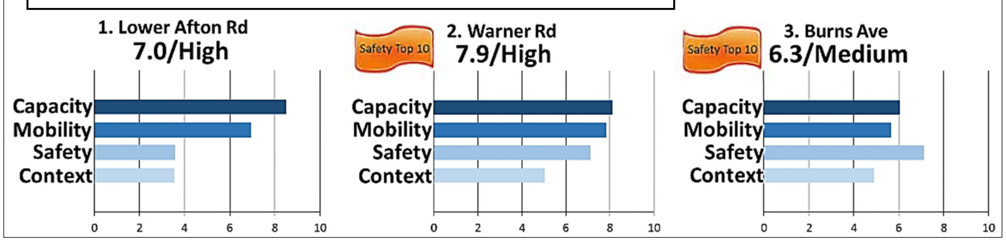
TH 61: Lower Afton Road to Burns Avenue (Ramsey County 2 of 3)

Corridor Context. Suburban Arterial with three at-grade intersections evaluated in the study (see ***Figure 27***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 45-60 mph. The corridor is constrained by development, railroads, and parklands. Other characteristics include:

- Intersection Spacing – The three intersections are spaced approximately 0.1 to 1.6 miles apart and are located about 0.25 miles south of the I-94 interchange.
- Access – There are no additional access points between the three intersections.
- Previous Planning for Interchanges? No. Grade separations have not been proposed for this area in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. The corridor includes three intersections with entering volumes in the upper end of the study's range. The capacity analysis indicates possible need for high-capacity at-grade improvements or a grade-separation at Warner Road. Contextually, the Warner Road intersection, while not constrained by development, is a jurisdictionally and operationally complex location, surrounded by parkland.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 61							
1	Lower Afton Rd.	⊠	⊠	⊠	⧅	☐	☐
2	Warner Rd.	⊠	⧅	⊠	☐	☐	☐
3	Burns Ave.	☐	☐	☐	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		⧅ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	

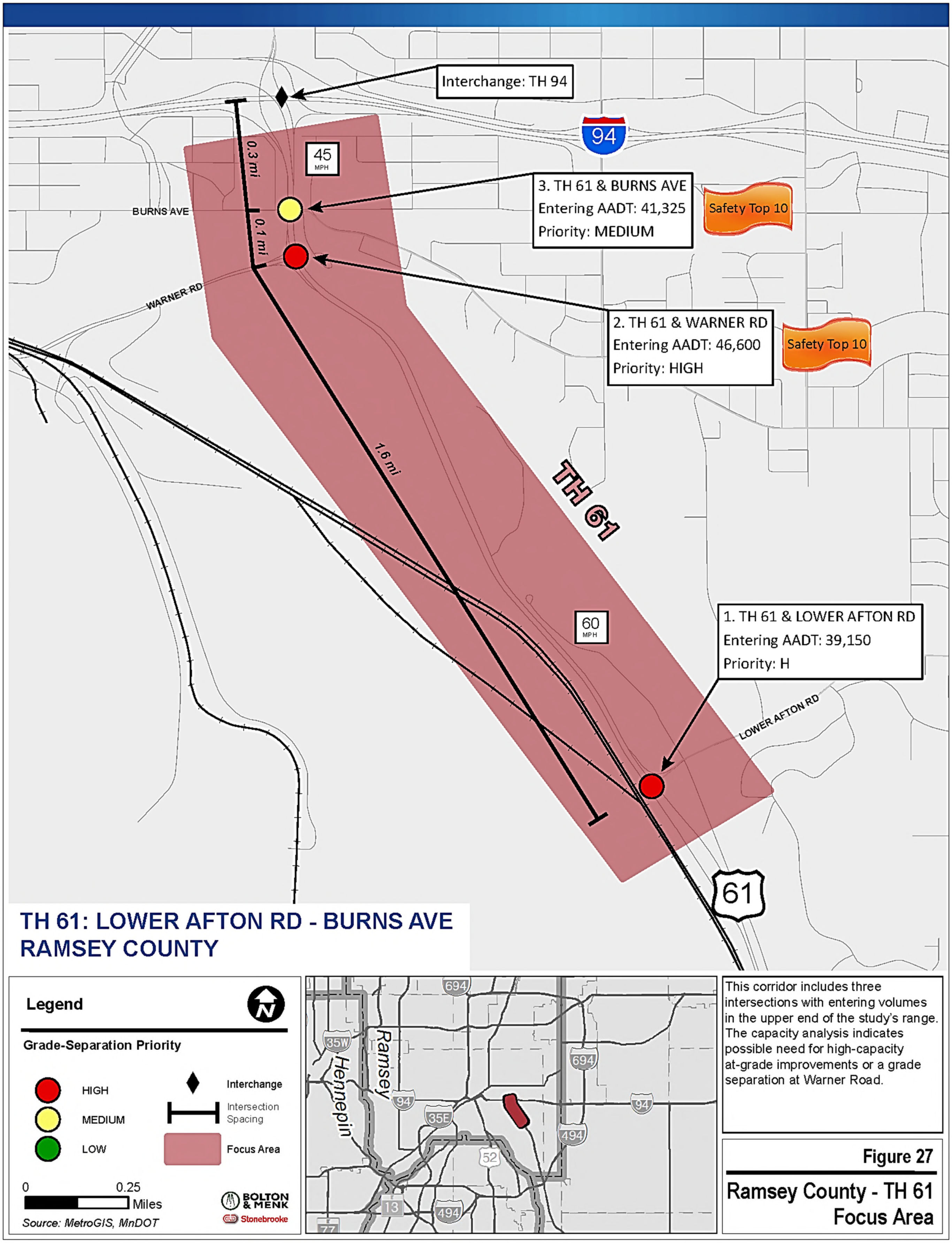


Figure 27
Ramsey County - TH 61 Focus Area

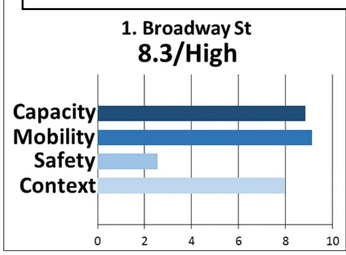
TH 280: Intersection at Broadway Street (Ramsey County 3 of 3)

Corridor Context. Constrained Limited-Access Expressway with one intersection evaluated in the study (see ***Figure 28***). The corridor at this high-priority intersection has four through lanes of mainline capacity and a median. The posted speed limit is 50 mph and the corridor is constrained by development. Other characteristics include:

- Intersection Spacing – This intersection is located approximately 0.5 miles south of the I-35W interchange and about 0.6 miles north of the Hennepin Avenue interchange.
- Access – Roadway access is limited to major intersections along this part of TH 280. There are multiple industrial entrances north of the Broadway Street intersection that allow right-in/right-out turns.
- Previous Planning for Interchanges? Yes. A grade separation has been proposed for this intersection in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

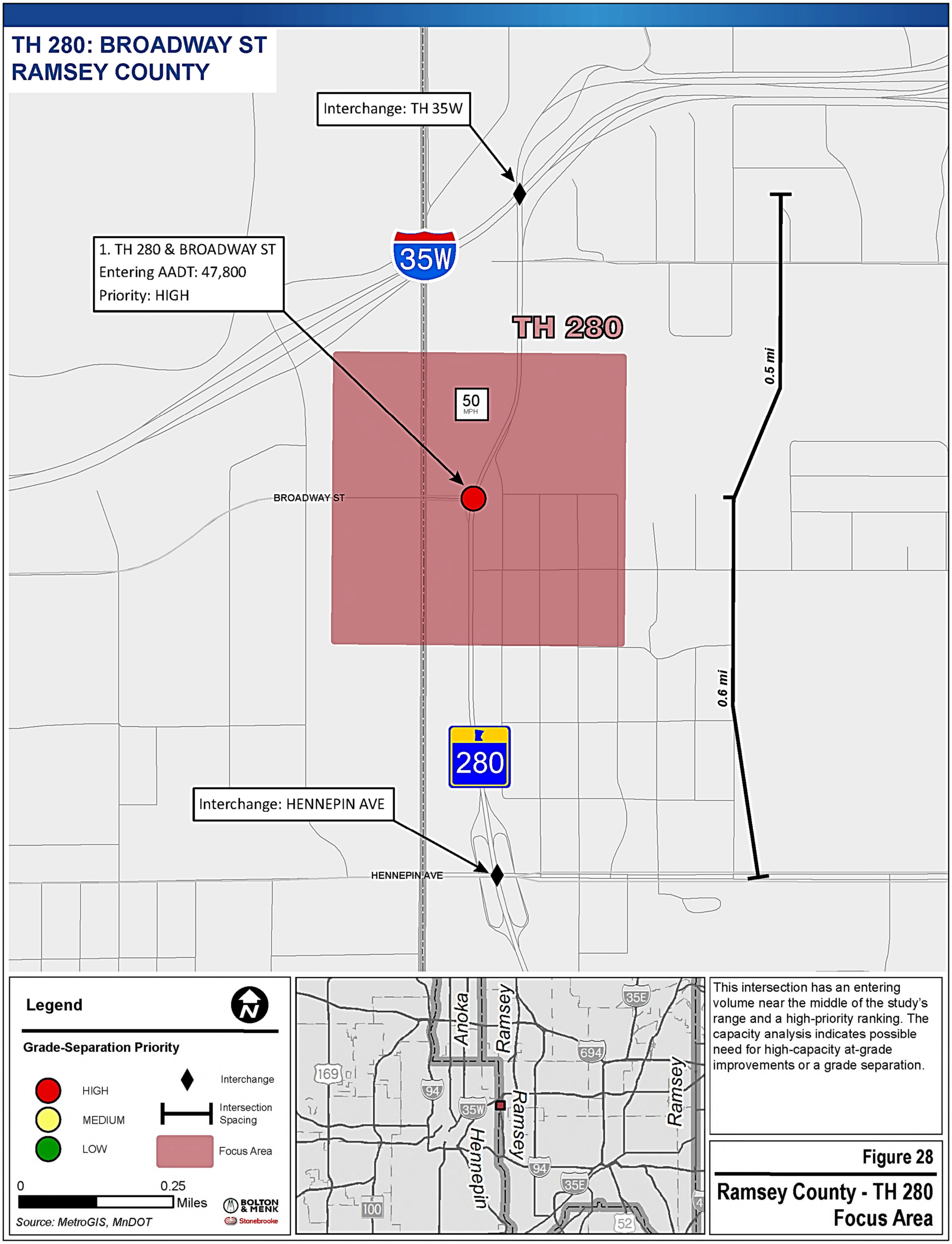
Intersection Score and Grade-Separation Priority



Capacity Analysis, Needs, and Opportunities. This intersection has entering volumes near the middle of the study's range and a high-priority ranking. The capacity analysis indicates possible need for high-capacity at-grade improvements or a grade separation. There may also be a need for MnDOT/local partnerships to examine the highly constrained right-of-way.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 280							
1	Broadway St.	⊠	▧	▧	☐	▧	☐
Key		⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This intersection has an entering volume near the middle of the study's range and a high-priority ranking. The capacity analysis indicates possible need for high-capacity at-grade improvements or a grade separation.

Figure 28

Ramsey County - TH 280 Focus Area

4.3.6 Scott County

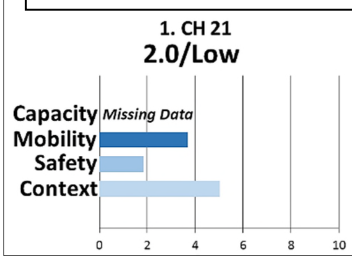
CH 42: Intersection at CH 21 (Scott County 1 of 3)

Corridor Context. Suburban Arterial with one intersection evaluated in the study (see ***Figure 29***). The corridor at this low-priority intersection has four through lanes of mainline capacity and a median. The posted speed limit is 55 mph and the corridor is unconstrained by development. Other characteristics include:

- Intersection Spacing – This intersection is located approximately 2.0 miles west of TH 13.
- Access – Roadway access is limited to right-in/right-out access, and private access.
- Previous Planning for Interchanges? No. A grade separation has not been proposed for this intersection in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

Intersection Score and Grade-Separation Priority



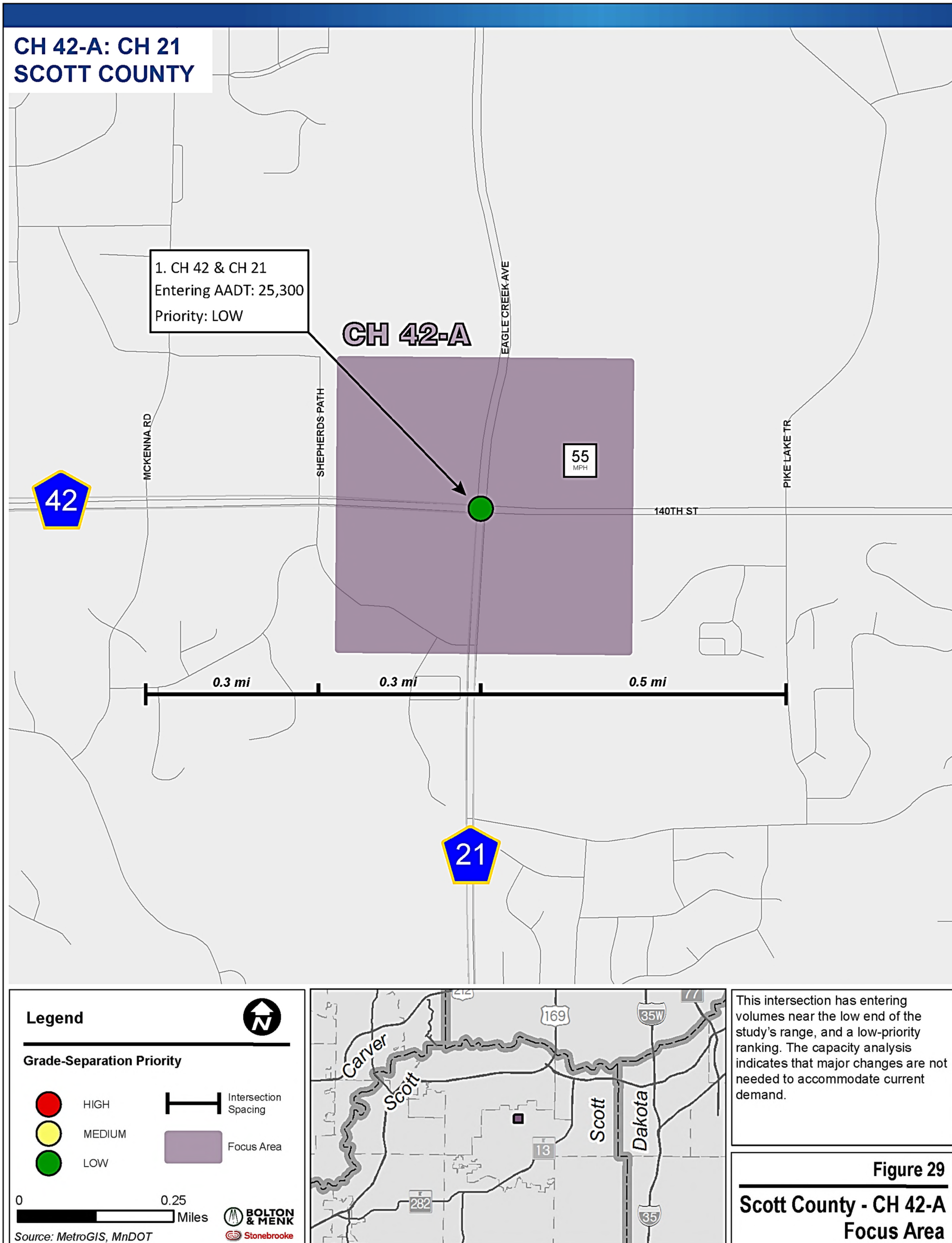
Capacity Analysis, Needs, and Opportunities. This intersection has entering volumes near the low end of the study's range and a low-priority ranking. The capacity analysis was not completed for this intersection because turning-movement data was not provided; however, the relatively low volumes indicate that major changes are not needed to accommodate current demand.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
				CH 42-A			
1	CH 21	*Missing Data (intersection turning movements were not provided)*					

Key	V/C ≥ 1.0	V/C > 0.85 & < 1.0	V/C ≤ 0.85

CH 42-A: CH 21
SCOTT COUNTY



This intersection has entering volumes near the low end of the study's range, and a low-priority ranking. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 29
Scott County - CH 42-A Focus Area

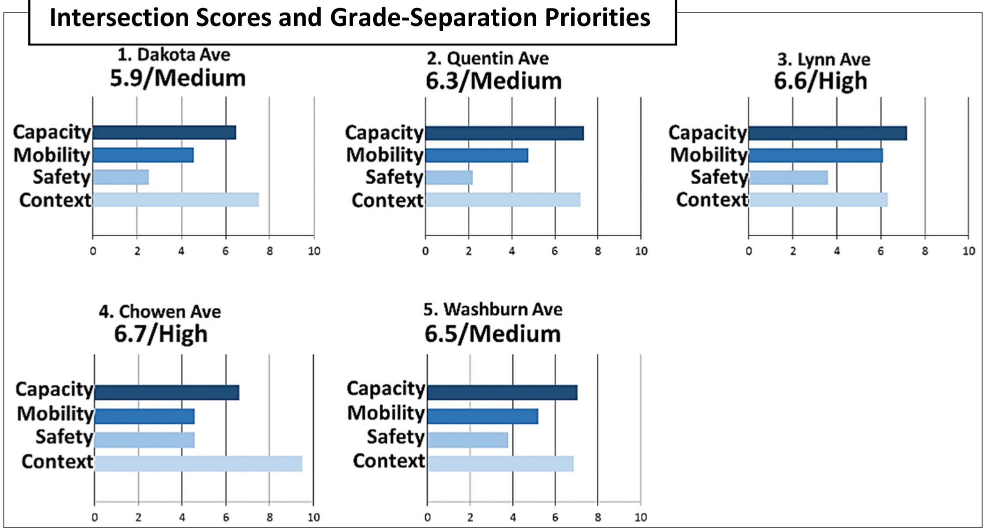
TH 13-A: Dakota Avenue to Washburn Avenue (Scott & Dakota Counties 2 of 3)

Corridor Context. Constrained Limited-Access Expressway with five at-grade intersections evaluated in the study (see ***Figure 30***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 45-mph. The corridor is constrained by development, and a railroad, but also includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The five intersections are spaced approximately 0.4 to 0.75 mile apart, and located about 1.5 miles west of the I-35W interchange.
- Access – Roadway access is limited to intersections with right-in/right-out turns, public street intersections and private access roadways which also have right-in/right-out turns.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for the Chowen Avenue intersection and the Dakota Avenue intersection.

> **Intersection measures**:
> **Capacity**: Do peak-hour volumes exceed design?
> **Mobility**: Are daily volumes and congestion high?
> **Safety**: Are there many or severe crashes?
> **Context**: Are plans and multi-modal factors supportive?

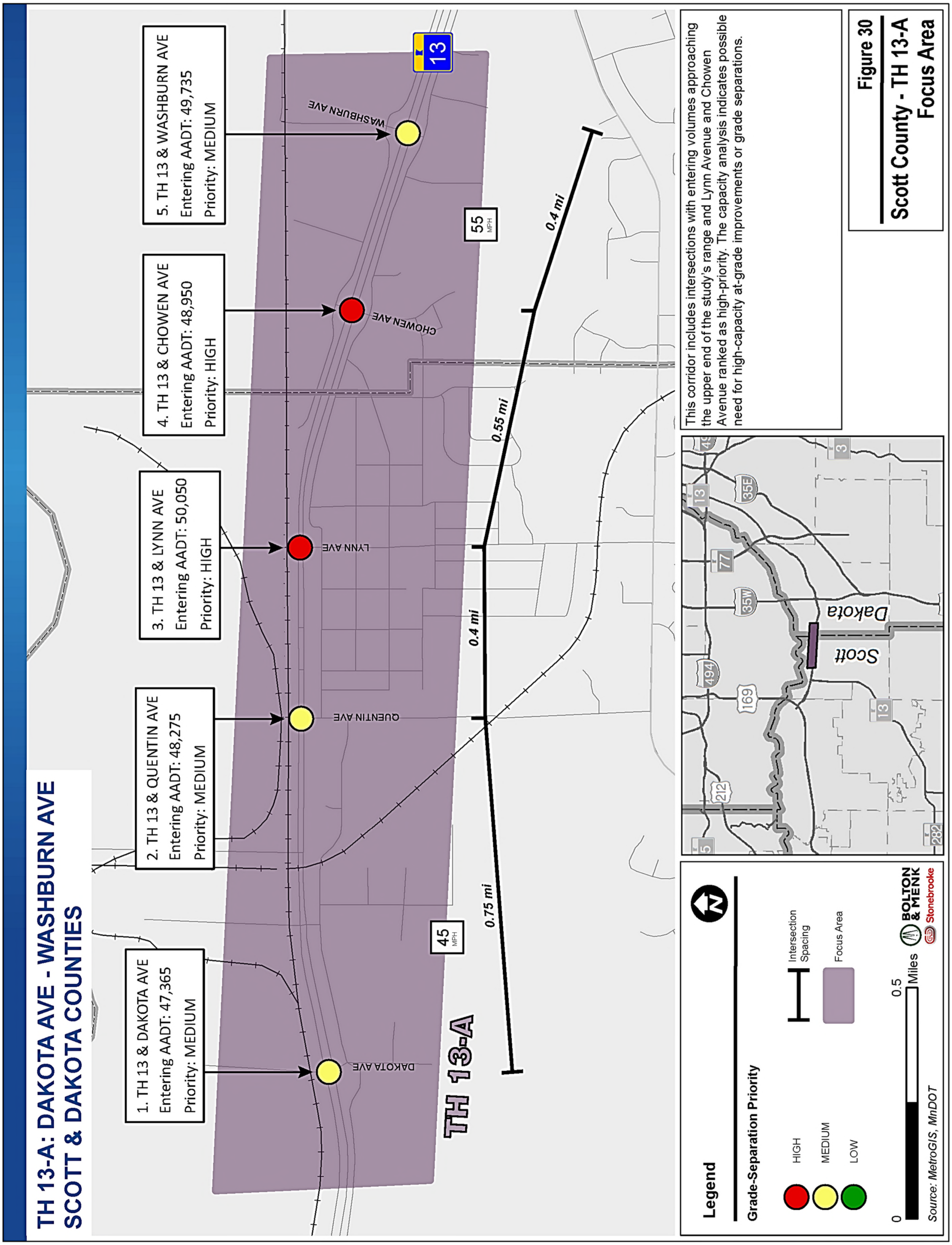
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections with entering volumes approaching the upper end of the study's range, with Lynn Avenue and Chowen Avenue ranked as high-priority. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations. This corridor crosses the Scott/Dakota County line and may warrant additional analysis as part of a joint effort based on the closely spaced intersections. Other corridor needs and planning issues include freight movement, port access, and truck traffic.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 13-A							
Scott County							
1	Dakota Ave.	▧	▧	▧	☐	☐	☐
2	Quentin Ave.	⊠	⊠	▧	☐	☐	☐
3	Lynn Ave.	⊠	▧	▧	☐	▧	☐
Dakota County							
4	Chowen Ave.	▧	▧	▧	☐	▧	☐
5	Washburn Ave.	▧	▧	▧	☐	▧	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



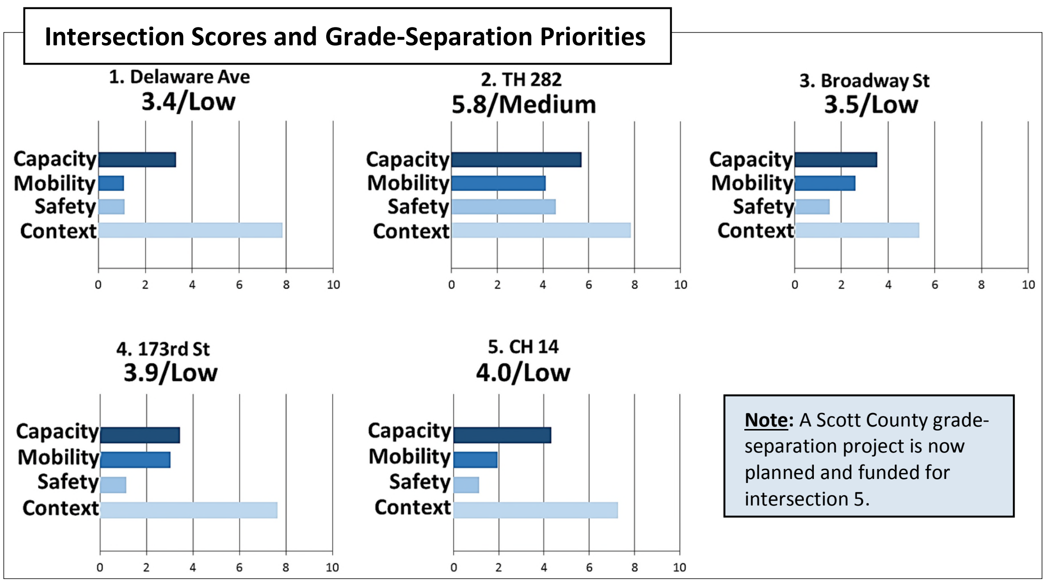
TH 13-A: DAKOTA AVE - WASHBURN AVE
SCOTT & DAKOTA COUNTIES
1. TH 13 & DAKOTA AVE
Entering AADT: 47,365
Priority: MEDIUM
2. TH 13 & QUENTIN AVE
Entering AADT: 48,275
Priority: MEDIUM
3. TH 13 & LYNN AVE
Entering AADT: 50,050
Priority: HIGH
4. TH 13 & CHOWEN AVE
Entering AADT: 48,950
Priority: HIGH
5. TH 13 & WASHBURN AVE
Entering AADT: 49,735
Priority: MEDIUM
DAKOTA AVE
QUENTIN AVE
LYNN AVE
CHOWEN AVE
WASHBURN AVE
13
45 MPH
55 MPH
TH 13-A
0.75 mi
0.4 mi
0.55 mi
0.4 mi
This corridor includes intersections with entering volumes approaching the upper end of the study's range and Lynn Avenue and Chowen Avenue ranked as high-priority. The capacity analysis indicates possible need for high-capacity at-grade improvements or grade separations.
Figure 30
Scott County - TH 13-A
Focus Area
Legend
Grade-Separation Priority
HIGH
MEDIUM
LOW
Intersection Spacing
Focus Area
0
0.5
Miles
Source: MetroGIS, MnDOT
BOLTON & MENK
Stonebrooke
Dakota
Scott

TH 169-A: Delaware Avenue to CH 14/150th Street (Scott County 3 of 3)

Corridor Context. Constrained and Unconstrained Limited-Access Expressway with five at-grade intersections evaluated in the study (see ***Figure 31***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55-65 mph. The corridor is mostly unconstrained by development, except in Jordan where there is a concentration of surrounding development. There is also a railroad on the west side of the corridor. Other characteristics include:

- Intersection Spacing – The five intersections are spaced approximately 1.0 to 2.3 miles apart.
- Access – The corridor has multiple intersections with minor public and private access roads which include median breaks.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for this area, including the TH 282 intersection in Jordan and the 150th Street intersection.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?



Capacity Analysis, Needs, and Opportunities. The capacity analysis indicates that major changes are not needed to accommodate current demand. However, this is a high-speed rural expressway location with potential for growing demand and need for access management. Note, the TH 282 intersection connects to CSAH 9 and a river crossing.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 169-A							
1	Delaware Ave.	☐	☐	☐	☐	☐	☐
2	TH 282	☐	☐	☐	☐	☐	☐
3	Broadway St.	☐	☐	☐	☐	☐	☐
4	173rd St.	☐	☐	☐	☐	☐	☐
5	CH 14	☐	☐	☐	☐	☐	☐
	Key	V/C ≥ 1.0		V/C > 0.85 & < 1.0		V/C ≤ 0.85	

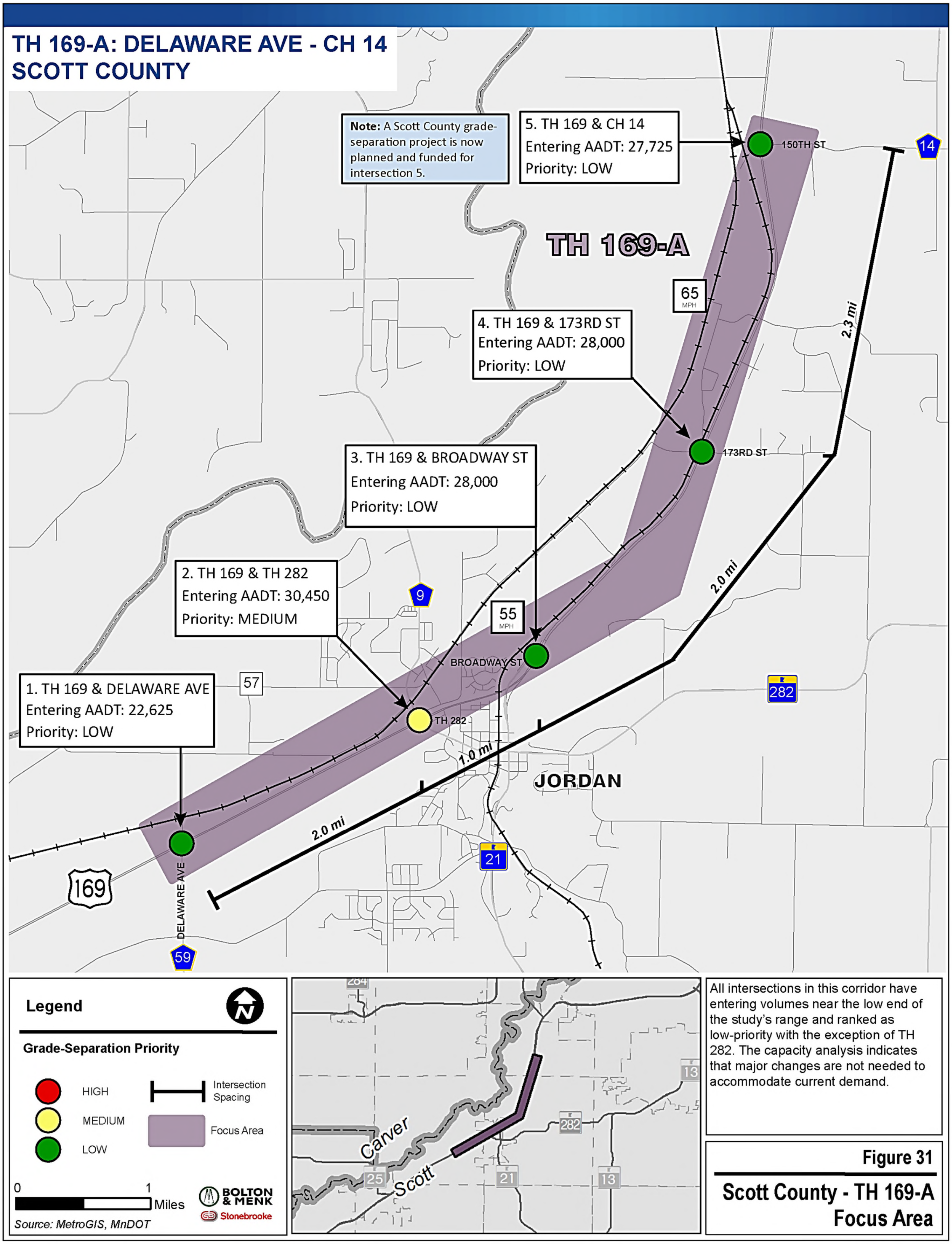


Figure 31
Scott County - TH 169-A Focus Area

4.3.7 Sherburne County

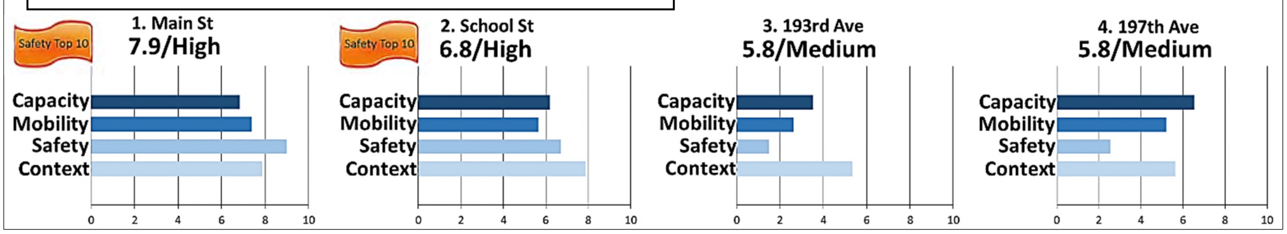
TH 169-C: Main Street to 197th Avenue (Sherburne County 1 of 1)

Corridor Context. Constrained Limited-Access Expressway with four at-grade intersections evaluated in the study and one ramp intersection (see ***Figure 32***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 55-65 mph. The corridor is constrained by development, but often includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The four intersections are spaced approximately 0.5 to 0.7 miles apart and are located about 0.8 miles north of the TH 10 Phase II ramp intersection.
- Access – Roadway access is limited to intersections allowing right-in/right-out turns.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for these intersections in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

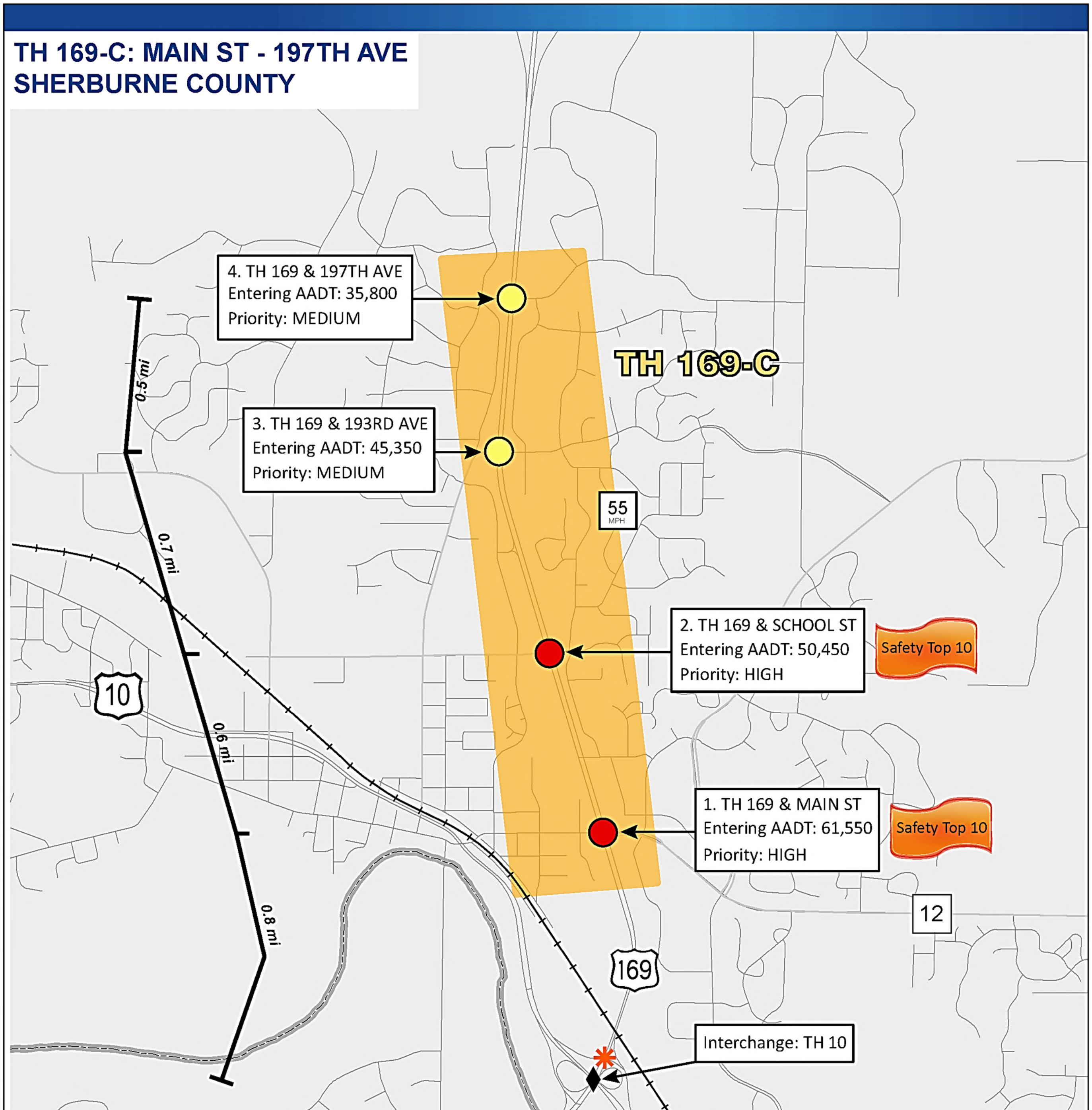
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. This corridor includes intersections spanning a range of volumes, with Main Street and School Street having high-priority rankings. The capacity analysis indicates need for high-capacity at-grade improvements or possibly grade separations. The corridor is 0.8 mile north of a signalized WB ramp intersection, which exhibits mobility concerns. This corridor connects to established regional freeway segments (on TH 10 and TH 101) and a river crossing nearby to the south and is subject to summer weekend traffic peaks.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 169-C							
1	Main St.	▧	▧	⊠	☐	☐	☐
2	School St.	▧	▧	☐	☐	☐	☐
3	193rd Ave.	☐	☐	▧	☐	☐	☐
4	197th Ave.	▧	▧	▧	☐	☐	☐
	Key	⊠ V/C ≥ 1.0		▧ V/C > 0.85 & < 1.0		☐ V/C ≤ 0.85	



This corridor includes intersections spanning a range of volumes, with Main Street and School Street having high-priority rankings. The capacity analysis indicates need for high-capacity at-grade improvements or possibly grade separations. The corridor is 0.8 mi. north of a signalized WB ramp intersection, which exhibits mobility concerns.

Figure 32

Sherburne County - TH 169-C Focus Area

4.3.8 Washington County

TH 36-B: Demontreville Trail to Manning Avenue (Washington County 1 of 1)

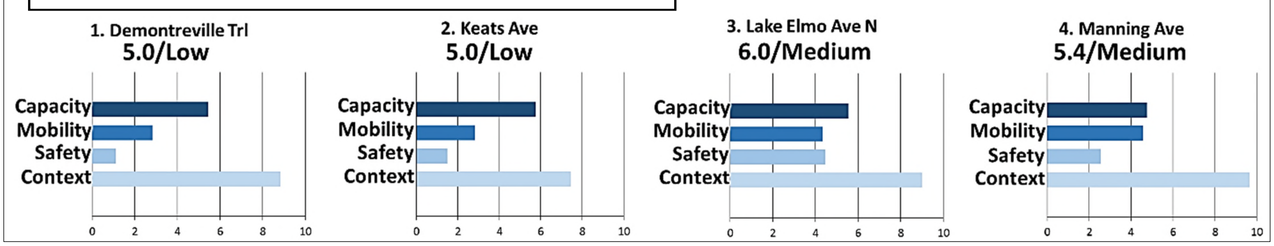
Corridor Context. Constrained Limited-Access Expressway with four at-grade intersections evaluated in the study (see ***Figure 33***). This corridor generally has four through lanes of mainline capacity and a median. The posted speed limit is 60-65 mph. The corridor is constrained by development, but includes wide setbacks and frontage roads. Other characteristics include:

- Intersection Spacing – The four intersections are spaced approximately 1.0 to 1.25 miles apart and Demontreville Trail is located about 1.75 miles east of I-694.
- Access – Roadway access is limited to right-in/right-out access, and private access roadways.
- Previous Planning for Interchanges? Yes. Grade separations have been proposed for these intersections in previous planning documents.

Intersection measures:
Capacity: Do peak-hour volumes exceed design?
Mobility: Are daily volumes and congestion high?
Safety: Are there many or severe crashes?
Context: Are plans and multi-modal factors supportive?

Note: A Washington County grade-separation project is now planned and funded for intersection 4.

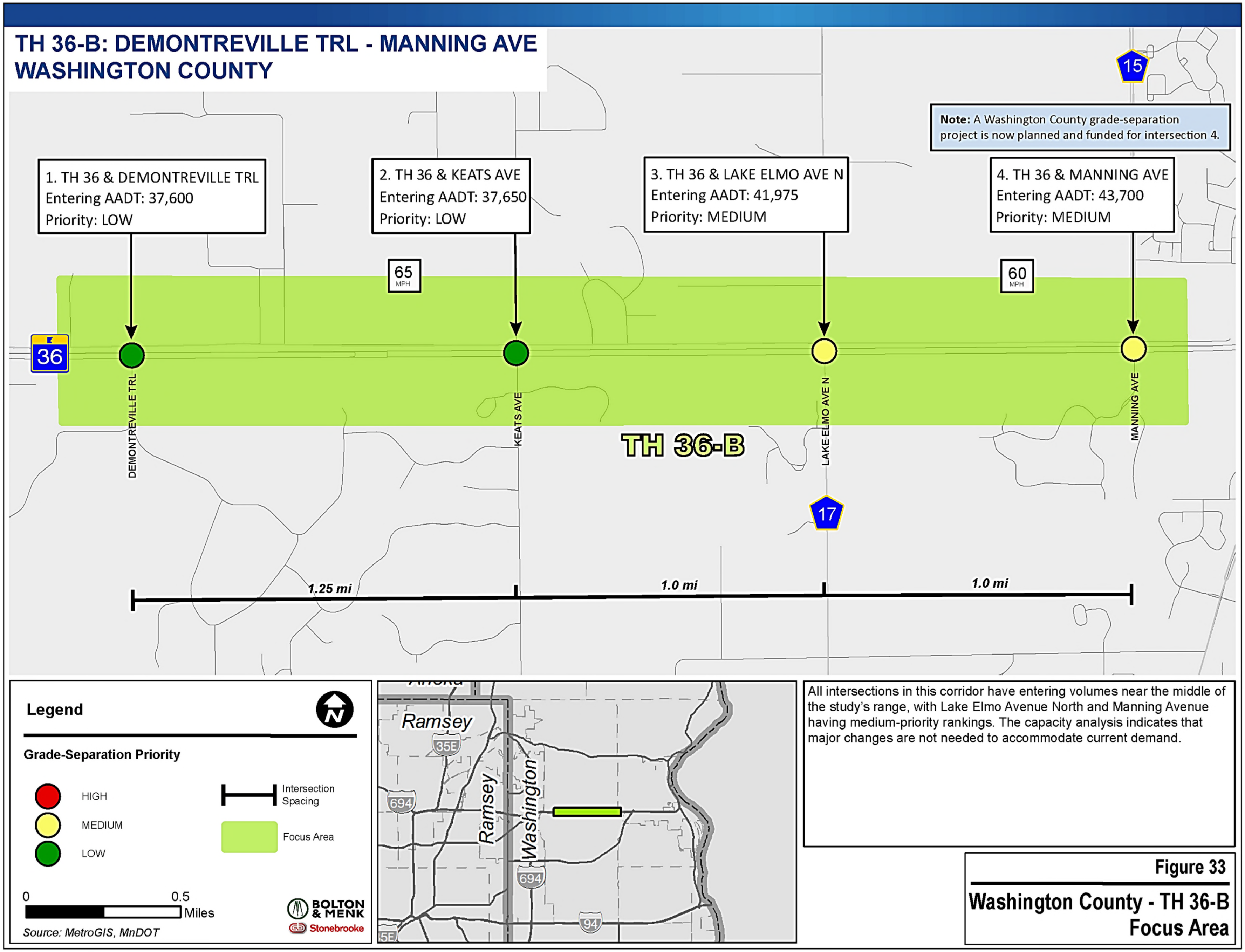
Intersection Scores and Grade-Separation Priorities



Capacity Analysis, Needs, and Opportunities. All intersections in this corridor have entering volumes near the middle of the study's range, with Lake Elmo Avenue North and Manning Avenue having medium-priority rankings. The capacity analysis indicates that major changes are not needed to accommodate current demand. However, the context for this area includes prior planning for new interchanges, the potential for growing demand as the St. Croix Bridge opens, and the history of TH 36 transitioning to a freeway.

Capacity Analysis Summary

		Existing Intersection	Expanded Intersection	Alternative At-Grade Intersection	Add PA Capacity	Hybrid Interchange	Full Interchange
TH 36-B							
1	Demontreville Trl.	☐	☐	☐	☐	☐	☐
2	Keats Ave.	☐	☐	☐	☐	☐	☐
3	Lake Elmo Ave. N	☐	☐	☐	☐	☐	☐
4	Manning Ave.	☐	☐	☐	☐	☐	☐
	Key	V/C ≥ 1.0		V/C > 0.85 & < 1.0		V/C ≤ 0.85	



All intersections in this corridor have entering volumes near the middle of the study's range, with Lake Elmo Avenue North and Manning Avenue having medium-priority rankings. The capacity analysis indicates that major changes are not needed to accommodate current demand.

Figure 33
Washington County - TH 36-B Focus Area

4.4 Study Limitations and Corridor Planning

As described in Section 3, the 91 Phase II intersections were analyzed and categorized into High, Medium, and Low priority for grade separation. The results were based on intersection capacity analyses (using the FHWA CAP-X Tool) and other criteria fitting into the three general categories of mobility, safety, and corridor context. This approach provided a regionally consistent means to compare intersections and determine the priorities for grade separation, as well as an opportunity to describe intersections by locations and corridors (the 26 Focus Areas). However, the methodology looked at characteristics of individual intersections and did not address the interactions of multiple intersections or other design complexities along corridors. The Study's results should not be considered similar to a detailed corridor traffic analysis, nor were the results intended to identify specific design solutions. Further safety, operational, and environmental studies will be required to develop improvement projects, along with a full and transparent public process. The subsections below provide general observations and cite examples to recognize how closely spaced intersections may interact and how corridor continuity and context can bring more complexity to future planning than implied by the priorities assigned to individual intersections. Unlike the basic results of this Study, these corridor planning factors should recognize how an intersection priority at one location may drive upstream and downstream issues and inform the full scope of corridor improvements.

Future corridor planning should recognize how an intersection priority and project at one location may drive upstream and downstream issues and inform the full scope of corridor improvements.

4.4.1 Closely Spaced Intersections

A detailed capacity analysis using microsimulation software would be required to better understand how closely spaced intersections interact, and thus what coordinated improvements may be justified. Advantages of the CAP-X Tool include its simplicity and cost effectiveness in assessing macroscopic and isolated capacity of existing conditions and numerous alterative intersection types. CAP-X is based in Microsoft Excel, with only volumes and number of lanes required for analysis. While this is efficient, the tool does not consider how closely spaced intersections may influence each other.

For example, Focus Area CH 42-B includes eight conventional intersections along CH 42 reflecting a mix of all three priorities, High, Medium, and Low. The Focus Area also includes four ramp intersections with both I-35W and I-35E. The results of the CAP-X analysis indicate that the only High Priority intersection for grade separation is at Nicollet Avenue. Five of the eight intersections, including Burnhaven Drive and Aldrich Avenue (west of Nicollet Avenue) were found to be Low Priority intersections. However, the limitations of this Study include no consideration of how overlapping intersection influence areas may impact operational performance. ***Figure 34*** (next page) shows an example of overlapping influence areas based on distances of 1,000 feet from CH 42 intersections. In its 2030 Comprehensive Plan, Dakota County notes that closely spaced intersections, with less than 1,000 feet of separation, can have difficulty fully accommodating tapers, turn lane storage, and weaving. Other agencies may have different definitions of "closely spaced" intersections, but the same principles will often apply.

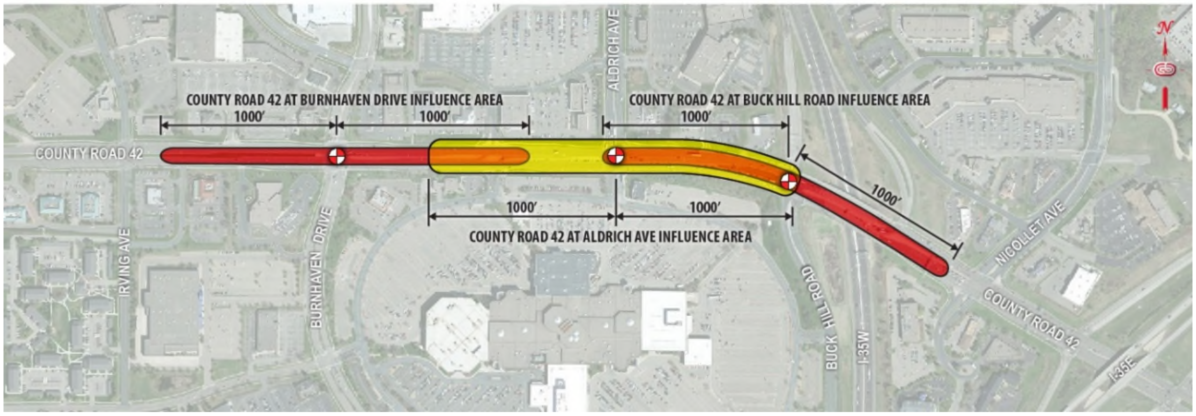


Figure 34. Example of Closely Spaced Intersections and Overlapping Intersection Influence Areas

4.4.2 Corridor Continuity and Spacing of Future Interchanges

A detailed operational and safety study will be required to fully define potential solutions and develop a preliminary design. As described above, this analysis should consider closely spaced intersections and what impact they have on each other. It should also consider what improvements are being contemplated at nearby and adjacent intersections. For example, the six intersections along Focus Area TH 252 are all identified as High Priority for potential grade separation. These intersections are spaced as closely as 0.3 miles, but not more than 0.7 miles apart. In the TPP, the Metropolitan Council established desired interchange spacing of not less than one mile in urban and suburban areas. If such a corridor were to become a freeway, it is reasonable to consider design concepts proposing consolidation of access and fewer than six interchanges. Access can also be served with frontage roads or other network improvements to serve all connections, maintain continuity, and yet increase the effective access spacing. Addressing such competing goals involves many complex geometric and operational issues that are far beyond this Study's focus on grade-separation priorities.

4.4.3 Corridor Context and Jurisdictional Issues

Issues related to corridor context must be more fully vetted as part of a detailed intersection or corridor study, or as part of formal project proposals and funding applications. The intersection priorities determined in this Study scored corridor context issues such as land use, prior planning activities, and freight, transit, and bicycle usage, among others. These weighted factors were developed and refined through work with the TSC and were considered at a high level. While a goal was to identify a representative list of corridor context issues that were applicable to all Phase II intersections and corridors, this Study does not address the unique contextual issues found in each and every Focus Area. Similar to the topics discussed above, the context in each intersection and corridor will be a major input to the process of developing the right types of design solutions.

At some locations, jurisdictional issues may also present challenges in project context. For example, some Focus Areas straddle boundaries between counties or cities, and some will present a variety of needs and funding opportunities or constraints, considering both local and regional perspectives. The next section of this report provides additional background and guidance on how this Study can be used by agencies in future transportation planning.

5 Role of the Study in Future Planning

The Study's key inputs for future planning will be to support local planning, the Transportation Policy Plan (TPP), the State Highway Investment Plan (MnSHIP), and related Council and MnDOT funding programs. The work will also help guide the right-sizing of proposed projects and provide background for other plans and for transportation policy initiatives. This section provides a baseline grounded in recent project development trends and expands on each of the above noted topics.

5.1 Intersection Conversion Background (Project Trends)

This Study concluded with 91 intersections considered possible candidates for grade-separation projects. Of those, 34 are High-Priority intersections. In order to ground the Study in relevant background, ***Table 3*** provides a review of past projects, to foresee the potential number of intersection conversions (new interchanges) in years ahead. This review was based on data compiled for such projects over approximately the last 10 years, plus committed projects through 2016 (year 11).[10]

Based on the Table 3 data and other inputs, the Study team shared the general observation that leadership and funding of new interchange projects has shifted from mostly MnDOT-led projects to mostly locally led projects over time (over the last 20 years or more). Observations based on Table 3 and input from the Study's TSC members include:

- The "pace" of major intersection conversion projects has been about one to two per year or 16 projects in 10 years (less than half of the 34 High-Priority intersections identified in this Study).
- The average project construction cost for one new interchange has been about $18 million.[11]
- Right-of-way costs can substantially increase overall project costs over construction estimates. This is evident in Table 3 when comparing the construction costs to the sum of funding sources needed for implementation (the needed funding often far exceeds the costs cited solely for construction).

5.2 Using the Study in Future Planning

The Focus Area details presented in Section 4 provide a basis for future planning, either for individual intersections or for corridors. However, as described in Section 4.4, many of the Focus Areas identified in this Study present possible complexities based on mixed intersection priorities, closely spaced intersections, and corridor context. The sections below conclude this Final Report by outlining how the Study may be used to support additional planning.

5.2.1 Incorporate Study Findings into Transportation Policy and Investment Plans

The Intersection Conversion Study identifies priorities for one category of TPP Regional Mobility Improvements: Highway Strategic Capacity Enhancements. The possible strategic capacity projects implied by intersection priorities may be included in both the Current and Increased Revenue Scenarios. More details will be determined throughout the TPP update process (starting in 2017 and concluding mid-2018), as well as related project-development and project-funding priorities. As the TPP process

[10] In reviewing relevant data, the study team found that details for past projects were most clear over the last 10 years. Trends and data prior to that 10-year timeframe were less clear and less consistent.

[11] Note, this figure (based on Table 3 data) is likely skewed low based on inflation and considering some costs and funding sources not captured in MnDOT data, especially local government costs.

Table 3 - Past and Programmed Intersection Conversions

2006 to 2016

Primary Roadway	Minor Roadway	Project # (SP#)	County	Lead Agency	Year Construction Began	Construction Costs (PPMS)	Funding Sources (STIP)
TH 169	TH 25-CSAH 64	7008-45	Scott	MnDOT	2006	$16,500,000	- $16.0 M - FHWA NHS - $4.9 M - Local
TH 52	CSAH 47	1906-48 19-647-16 1906-55	Dakota	MnDOT	2006 (grade separation) 2012 (ramps)	$10,900,000	- $4.8 M TH - $3.0 FHWA - $3.0 Other
TH 36	McKnight Rd	6211-81 151-090-01 151-101-02 151-248-13 151-010-02	Ramsey	City of North St. Paul	2006	$27,800,000	- $0.9 M Enhancement - $0.8 M Miscellaneous Fed. Funds - $6.6 M STP - $6.0 M NHS - $1.5 M TH - $3.3 M Local
TH 65	CSAH 14	0208-123	Anoka	Anoka County	2007	$16,500,000	- $9.6 M FHWA NHS - $2.4 M TH - $12.0 M Local
TH 169	CSAH 109 (85th Ave)/CSAH 81 (Bottineau Blvd)	2750-57	Hennepin	MnDOT	2008	$50,000,000	- $35.9 M FHWA NHS - $6.5 M STP - $6.5M Bond Funds - $9.0 M TH - $7.5 M Local
TH 7	Wooddale	2706-222 163-280-020	Hennepin	City of St Louis Park	2009	$11,600,000	- $5.7 M Federal Funds (unspecified) - $3.5 M ARRA
CSAH 42	CSAH 17	070-617-023	Scott	Scott County	2011	$4,900,000	Partial Interchange - $1.8 M HSIP - $1.6 M SMSC Contribution
TH 13	CSAH 101	070-596-003 7001-103	Scott	Scott County	2011	$18,400,000	Partial Interchange - $7.8 M STP - $2 M Local - $1.1 M TH - $5.0 M ARRA
TH 10	CSAH 96	062-596-003S 062-596-003UG	Ramsey	Ramsey County	2012	$12,200,000	- $2.0 M HSIP - $5.6 M STP - $4.6 M Local
TH 7	Louisiana Ave	2706-226 163-010-038	Hennepin	City of St Louis Park	2012	$22,300,000	- $7.6 M STP - $6.3 M Local - $4.5 M TED
TH 13	CSAH 5	1901-148 019-605-028	Dakota	Dakota County	2013	$27,500,000	- $7.1 M - STP - $12.9 M Local - $4 M Chapter 152 Interchange Bonds - $12 M Chapter 36 Bonds - $1 M Safety/Capacity - $0.6 M Municipal Agreement - $0.8 M TH - $0.25 M Federal Appropriations
TH 169	CSAH 39 (93rd Ave)	2750-75	Hennepin	MnDOT	2013	$8,100,000	- $6.0 M TH / Interchange Bonds - $6.0 M Local
TH 36	English St	6211-90 138-101-018	Washington	City of Maplewood	2013	$17,800,000	- $7.3 M STP - $1.8 M TED - $1.0 M Private Investors
TH 36	CSAH 29 (Hilton Trl)	8204-55	Washington	MnDOT	2013	$14,000,000	- $8.9 M STP - $2.2 M TH - $0.5 M Local
TH 101	CSAH 144 (141st Ave)	238-010-003 2738-28 2738-29	Hennepin	City of Rogers	2014	$14,600,000	- $7.7 M STP - $0.9 M Local - $9.2 M 2011 SAM - $0.2 M TH - $0.9 M NHPP
TH 169	CSAH 69	7005-97	Scott	Scott County	2014	$10,900,000	- $10.9 M SAM
TH 10	CSAH 83 (Armstrong Blvd)	0202-95	Anoka	Anoka County	2016	$29,800,000	- $10.2 M CTIB - $10.0 M TIGER grant - $10.0 M CIMS - $8.0 M LRIP - $1.1 M BNSF RR - $1.56 M HPP - $5.6 M Local
TH 52	CSAH 86	1905-39	Dakota	Dakota County	2016	$8,300,000	- $0.4 M Municipal Agreement - $1.0 M Safety / Capacity - $0.4 M WRE - $3.4 M TH
CSAH 42	TH 52	019-642-059	Dakota	Dakota County	2017	$10,400,000	- $7.3 M STP - $3.1 M Local
TH 169	TH 41	070-596-013	Scott	Scott County	2019	$22,700,000	- $7.6 M STP - $10.0 M TED - $5.1 M Local
TH 36	Hadley Ave	082-596-005	Washington	Washington County	2019	$12,000,000	- $7.6 M STP - $3.4 M TED

Findings: 18 conversions from 2006 - 2016

Project Leads

- 44% of the projects are led by County
- 28% of the projects are led by City
- 28% of the projects are led by MnDOT

Investment

- Region builds 1.6 conversions per year (on non-freeway PA's)
- Investing $30 million / year, averaging $18 million per project

Funding

- 61% of the projects have funds from the Regional Solicitation
- 72% of the projects have funds obtained from a competitive solicitation

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begins, the High-Priority intersections identified herein are among the region's candidate locations for capacity improvement projects.

The MnDOT MnSHIP will also reference this Study in setting priorities for Metro-area projects and funding. In the past, the Met Council's TPP and MnSHIP priorities have been similar and this is expected to continue.

As noted in Section 1 (Introduction), Phase 4 of the Congestion Management Safety Plan (CMSP) is underway and will also be referenced in the TPP. With an emphasis on cost-effective projects, the CMSP will provide another level of guidance for intersection projects. The CMSP framework, which helps to identify lower-cost/high-benefit projects, might especially help to guide planning for some of the Medium- and Low-Priority intersections.

The TPP's Appendix F, *Highway Interchange Request Criteria and Review Procedure*, has also been reviewed and edited as a part of this Study. The Study's TSC members were consulted about the potential updates which will be reviewed in detail and finalized during the TPP update in 2017-2018. The revised guidance will recognize the inputs to be provided by this Study's intersection conversion priorities and are proposed to add an initial high-level review to efficiently confirm if an interchange (grade separation) is the right type of solution. The second level of review would then be similar to the existing guidance, which requires additional detailed traffic engineering and design studies.

The TPP's Appendix F, Highway Interchange Request Criteria and Review Procedure, has also been reviewed and edited as a part of this Study. Updates will be finalized during the TPP update in 2017-2018.

5.2.2 Support Project Funding Decisions

The Council's semi-annual Regional Solicitation and MnDOT programs, such as the Transportation Economic Development (TED) program and the Safety and Mobility (SaM) Interchange Program, fund numerous highway mobility projects. The Council and MnDOT intend to use the intersection priorities in this Study and related information as inputs on selection of projects for funding.

5.2.3 Provide a Reference for Local Planning

The Study may provide guidance for local transportation and corridor planning. For example, it could be referenced to support transportation planning and project strategies used by counties and cities in local transportation or comprehensive plans. Updates to such plans are another part of the region's current comprehensive and TPP planning cycle (2017-2018), and Council staff will conduct outreach to promote references to this Study's intersection priorities. There are many other examples of related locally driven planning initiatives – for example access management and right-of-way preservation. Specifically, actions taken based on the Right-of-Way Acquisition Loan Fund (RALF) could reference priorities in this Study.[12] Conversely, the Study itself could be leveraged by MnDOT and the Metropolitan Council to

[12] See: https://metrocouncil.org/transportation/planning-2/transit-plans,-studies-reports/highways-roads/right-of-way-acquisition-loan-fund.aspx

establish priorities and guide the proactive use of the RALF program for potential interchange projects or other proposed capacity expansions.

5.2.4 Guide the Right-Sizing of Proposed Projects

The "right-sizing" of projects proposed for funding and implementation is a fundamental objective for future planning in reference to this Study. ***Figure 35*** illustrates generally how the Study's intersection priorities are proposed for review in project funding evaluations and decisions. The priorities will be considered when principal arterial intersections evaluated in Phase II are seeking competitive funds such as federal funds through the semi-annual Regional Solicitation. For those cases, the Study's intersection priorities will bring a measurable weight into project funding decisions—especially when new interchanges or other grade-separated designs are proposed. Still, most project funding criteria will be unchanged, with reviews based on program intent, other technical justifications, and sound project planning.

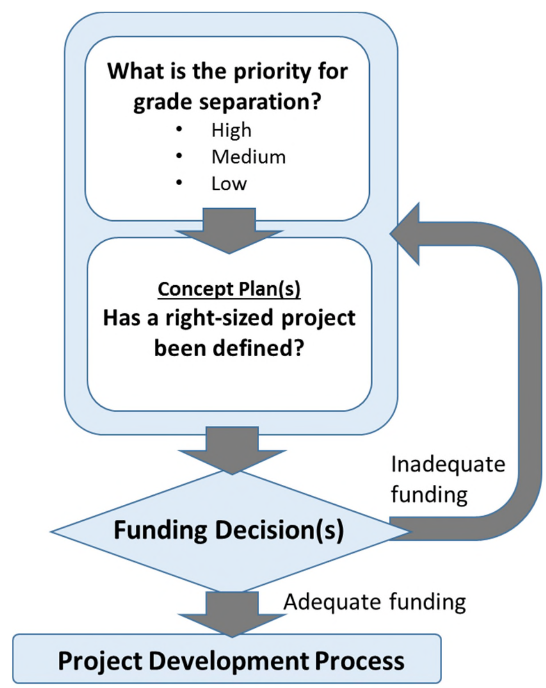

Figure 35. Study's Input to Funding Decisions

The investment philosophy shown in ***Figure 36*** is consistent with the 2040 TPP and is supported by both the Council and MnDOT Metro District. This diagram recommends that development of intersection improvement design alternatives consider a progression of investment decisions along with the technical data and context at the intersection and throughout the corridor. This progression should shift from at-grade lower-cost designs to, where supported, designs that propose to substantially increase principal arterial capacity. The sequence shown recognizes project decision-making could result in smaller investments that prove to be interim solutions over time; however, this can allow user benefits to accumulate sooner than benefits of much larger projects that take longer to implement.

The history of Twin Cities non-freeway system conversion to interchanges and freeways suggests major projects need considerable funds and time and to materialize (one to two interchanges per year as noted in Section 5.1). The recommended progression in project decision-making is intended to guide right-sizing so that more projects and benefits can become reality sooner.

The recommended progression in project decision-making is intended to guide right-sizing so that more projects and benefits can become reality sooner.

The development of right-sized projects is consistent with the 2040 TPP regional investment philosophy (Figure 36 above). The philosophy generally states, "Expansion needs far exceed fiscal realities. Since the region cannot build its way out of congestion, it needs to be strategic when making investments to ensure the right-sizing of projects." This statement is consistent with the Study's intersection priorities, which place the highest priority on intersections with greater congestion. Other highway issues, including safety, speed, and system connectivity, are also considered; but lower-cost high-benefit projects may prove effective to address such issues. High levels of

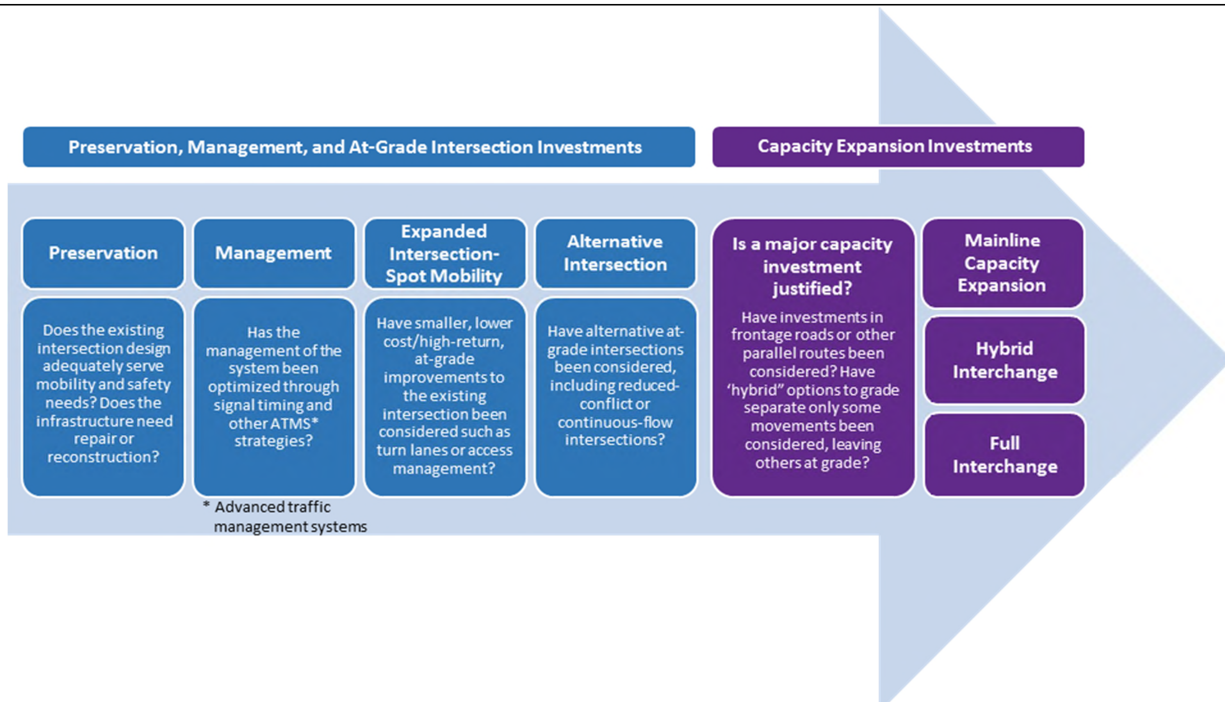

Figure 36. Progression of Intersection Investment Decisions

congestion, with the related user costs, often require more costly investments in new capacity to mitigate–including conversions of intersections into interchanges. This Study is part of the region's emphasis on improved targeting for transportation investments.

The Study did not develop site-specific design concepts; however, the guidance here illustrates the appropriate decision-making framework with reference to the assigned grade-separation priorities. Additional guidance is provided in ***Attachment 4***, *Intersection Solution Sets and Cost Ranges*. The attachment provides more detail on potential intersection solutions, including computed and observed cost ranges for both unconstrained and constrained settings. The intent of this guidance is to help project teams align locally and regionally driven investments on non-freeway principal arterials.

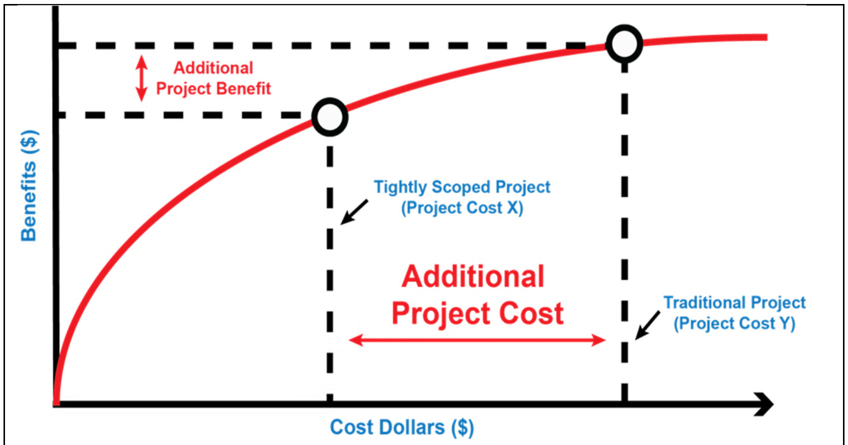

Figure 37. Concept of a Lower-Cost/High-Benefit Project

In evaluating right-sizing, the target timeframe for projects, and estimated benefits over time, should be considered. This is highlighted by ***Figure 37***, which illustrates the concept of a lower-cost/high-benefit project. The element of time adds additional complexity for project development, when the benefits and costs of projects over time are estimated. Therefore, the criteria and analyses that will confirm a right-sized project may be complex and will be determined through project-specific efforts.

5.2.5 Provide a Transportation Policy Reference

The transportation planning framework in this Study provides high-level guidance for possible legislative priorities, whether from a highway system perspective (broad state and regional needs) or from an individual project funding perspective as outlined above (the Study's Focus Areas). Staff representing the Metropolitan Council, MnDOT, and other agencies should find opportunities to present the Study's background and results to support legislative topics, whether programmatic or project-specific. For example, county and local staff/representatives should find the information in this report can be "sampled" to answer questions and support communications about project planning and funding priorities.

5.3 Updating the Study's Analysis and Intersection Priorities

The Study emphasized current needs, but also recognized the potential for growth and change. The technical team for the Study implemented a repeatable process that can be periodically updated in whole or in part. After discussing the frequency of such updates with the Study's Steering Committee, the Metropolitan Council and MnDOT project management team recommended that intersection priorities be updated every 4 to 8 years (with reference to the 4-year TPP update cycle).