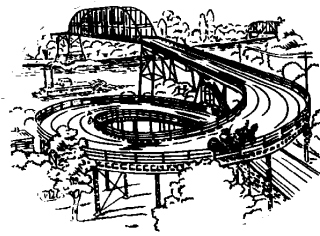


APPENDIX B

HASTINGS AREA ROADWAY SYSTEM STUDY

CSAH 47 SUB-AREA SCOPING STUDY TECHNICAL MEMORANDUM



Hastings on the Mississippi

**BMI PROJECT NO. T42.21579
AUGUST 2007**



BOLTON & MENK, INC.
Consulting Engineers & Surveyors

EXECUTIVE SUMMARY

This technical memorandum assesses the potential for accommodating future traffic on CSAH 46/47 between the Vermillion River bridge west of Pine Street to TH 61. The existing traffic volumes (10,700 ADT on CSAH 46/47) are near the capacity for the existing roadway. Projected traffic volumes (18,100 ADT) would exceed the acceptable capacity of the roadway.

Expansion potential of the existing roadway is limited and challenging due to the limited right-of-way, existing homes and buildings, and the adjacent Vermillion River.

The preferred alternative should be implemented in conjunction with land use changes and continued expansion of the City of Hastings in this area. The road network identified in the preferred alternative will serve the expansion area and reduce traffic pressure on this section of CSAH 47.

Improvements to CSAH 46/47 should be considered that would convert the roadway to an urban section and include construction of sidewalks, consolidation of accesses, and addition of turn lanes at select intersections. This would help the roadway serve as a minor arterial, as well as provide safety and utility for all road users including regional and local traffic, pedestrians, and bicycles.

1. Introduction

1.1 Purpose: To assess the potential for accommodating future traffic on CSAH 46/47 west of TH 61 in Hastings. This technical memorandum focuses on the section between the Vermillion River bridge west of Pine Street to TH 61.

1.2 Background: CSAH 46/47 is a minor arterial County highway connecting central Dakota County to Hastings. On the west side of Hastings, CSAH 47 branches to the southwest running diagonally toward Northfield. CSAH 46 continues westerly providing direct connections to TH 52 at Coates and through Rosemount, Lakeville, Apple Valley, and Burnsville.

Historically, CSAH 47 served as the main connecting roadway to the southwest providing access to TH 52 in Hampton and continuing to Northfield. CSAH 48 (160th Street) continued west connecting to TH 52 in Coates. This section of CSAH 48 was renamed to CSAH 46 following completion of the connection in Rosemount to CSAH 46 in Apple Valley, Burnsville, and Lakeville.

2. Existing Conditions

CSAH 46/47 is a 2-lane rural design highway with narrow shoulders in this segment. The average daily traffic volume (ADT) reported in 2005 was 10,700 and the roadway has a speed limit of 35 MPH. CSAH 46/47 is a through highway with the cross streets stopping. There is a traffic signal at the intersection with TH 61. The current peak hour traffic is near capacity levels for this roadway. The crossing roadway traffic volumes are as follows:

- TH 61 - 32,500 ADT (2006)
- Pine Street - 3,000 ADT (2005)
- Local Streets (Oak, Maple, Walnut, Ashland, Eddy) – 200 to 300 ADT (2002 ADT calculated from the 2002 Westwood Neighborhood Study)

The roadway section is constrained by proximity to the Vermillion River on the south side of the roadway and the existing residential developments on the north side. Land uses, intersections and intersection spacing, land use encroachment limitations, and proximity to the Vermillion River are identified in this study as challenging obstacles to accommodating the traffic demands on CSAH 46/47 (see attached Issues Map). The following issues are identified as capacity limitations to the existing roadway:

2.1 TH 61 Intersection. TH 61 is a Principal Arterial Highway serving as a major transportation corridor from the Twin Cities to southeast Minnesota. The TH 61 Mississippi River crossing at Hastings is the only crossing of the Mississippi River between South St. Paul and Red Wing. The intersection of TH 61 and CSAH 46/47 is controlled with a traffic signal. The traffic handling capacity of CSAH 46/47 is largely limited to the available proportion of the signal cycle to serve CSAH 46/47 and the number of traffic lanes approaching the signal.

2.2 TH 61 Vermillion River Bridge. The south TH 61 approach to the intersection with CSAH 46/47 is over the Vermillion River. The existing bridge has short left turn lanes to intersections on both sides of the river. The short left turn lanes and high through traffic volumes on TH 61 place capacity limitations on the intersection reducing available 'green time' for the CSAH 46/47 portions of the signal cycle.

2.3 21st Street Intersection Area. 21st Street intersects CSAH 46/47 as a gravel street with a sharp skew. The intersection area also provides access to businesses in the northwest corner of TH 61 and CSAH 46/47. The combined business driveway and 21st Street area result in a continuous open area along the north side of CSAH 46/47 from the TH 61 corner to approximately 200' west of TH 61. The 21st Street intersection and property use along the CSAH 46/47 approach to the TH 61 traffic signal introduce unusual and confusing access within the normal queue waiting area at the signal.

2.4 Intersection Spacing. CSAH 46/47 is $\frac{3}{4}$ mile long between the Vermillion River crossing west of Pine Street and TH 61. There are eight public street intersections and nine individual driveways to adjacent property in this section. Good operating minor arterial road systems are developed with $\frac{1}{4}$ mile intersection spacing without direct property access.

2.5 Proximity to Vermillion River. CSAH 46/47 is north of and adjacent to the Vermillion River from the intersection with TH 61 to the bridge over the river west of Pine Street. The roadway is separated from the river westerly of this crossing for 1- $\frac{1}{2}$ miles (CSAH 46 again crosses the Vermillion River west of General Sieben Drive). Preservation of the river and related floodplain limit the opportunity for road widening.

2.6 Public Road Right-of-Way. From the intersection with Pine Street to TH 61, right-of-way for CSAH 46/47 is limited to 66' (except for a small area on the north side of the roadway at Ashland Street where the north half of the roadway is platted with additional right-of-way.) For much of this area, CSAH 46/47 is constructed toward the northerly edge of the available right-of-way leaving as much separation from the river as possible.

2.7 City Park Land. The City currently is developing parkland uses along the river. A small parking area has been developed across from Pine Street and public facilities are provided east of Maple Street. The City's long range plans include expansion of park facilities along the Vermillion River.

2.8 Buildings and Homes. There are two homes and a business on the riverside of CSAH 46/47 across from Maple Street. The river moves away from the edge of the roadway for a short stretch in this area. Throughout the roadway section, buildings and homes are constructed close to the roadway.

2.9 Pedestrian and Bicycle Accommodation. CSAH 46/47 between the Vermillion River Bridge and TH 61 does not presently have separate provisions for accommodating pedestrian and bicycle activity. There is an off roadway trail west and south of the Vermillion River. This trail is part of the Hastings trail system and crosses under TH 61 at the Vermillion River bridge. Neighborhood pedestrian and bicycle activity north of the river must currently travel to the existing trail system west of Pine Street or travel on CSAH 46/47. The roadway width east of Pine Street is narrow and not pedestrian friendly. At the present time, pedestrian and bicycle traffic must mix with the traffic.

2.10 Roadway Capacity. The current highway lane configuration at the intersections limit peak hour capacity to current volume levels. The opportunity for capacity improvements to accommodate forecasted volume levels is somewhat limited due to the constraints indicated above. The existing roadway is designed and placed in the right-of-way due to the physical limitations of the river and neighborhood.

2.11 Intersection Operations. Several existing intersections along CSAH 46 and CSAH 46/47 between General Sieben Drive and TH 61 were counted during the peak hours in 2007. A planning-level analysis of these intersections was performed using the software tools HC+ and Synchro to determine current level of service (LOS) and delay experienced by motorists. The study results are shown in **Table 1** below:

Table 1 Intersection Operation

Intersection	Approach	AM LOS/Sec. Delay	PM LOS/Sec. Delay
General Sieben Drive	SB	B/13.4	C/22.7
CSAH 47	NB	B/12.3	C/22.7
Pleasant Drive	SB	C/17.8	E/36.8
Pine Street	SB	C/15.8	C/21.7
TH 61		B/11.2	D/35.4

Note: NB = Northbound, SB = Southbound

Stop controlled intersections are analyzed giving the LOS and delay to the stopped approach. Signal controlled intersections are analyzed giving the average intersection LOS and delay for all traffic movements. The delay levels in determining LOS also differ somewhat between stop controlled intersection and signal controlled intersections. This difference recognizes motorists' acceptance of higher peak period delay at traffic signal controlled intersections compared to stop signs.

For intersection analysis, in developed areas, LOS levels of D and better are considered acceptable peak hour conditions. LOS levels E and F are considered undesirable and result in driver frustration. The Pleasant Drive intersection currently experiences PM delay exceeding acceptable peak period levels and the TH 61 intersection is approaching capacity levels with storage lane failures. The analysis of the TH 61 intersection indicates that the northbound left turn lane does not accommodate the volume at times and that the eastbound lanes will back traffic beyond the right turn lane.

It is also noted that the intersections on CSAH 46/47 between Pine Street and Pleasant Drive (31st Street, Riverwood Drive, and Village Trail) were not counted in this study. The traffic levels measured in this study indicate that traffic at these intersections may experience difficulties making left turns onto CSAH 46/47 during the peak hours.

3. Future Roadway Vision

The Dakota County 2025 Transportation Plan lists the 2025 traffic forecast for this roadway at 18,100 ADT. This traffic volume would not be accommodated with acceptable levels of service during the peak hours. Congestion levels will become noticeable for longer peak time periods as the traffic volume increases. As the traffic increases, the intersections will experience higher difficulties accessing the roadway and local residents and motorists could be anticipated to express their displeasure to City and County representatives with the goal of reducing their difficulties. These negative traffic effects will continually expand along with the growth in the area.

3.1 Preferred Alternative. The preferred alternative includes the development of a supporting collector and minor arterial roadway system and realignment of existing CSAH 47 that will accommodate the traffic anticipated to accompany expansion of the City. The minor arterial roadways to be developed include:

- Realignment of CSAH 47 to Jacob Avenue and extending to TH 55
- Development of 170th Street between Jacob Avenue and TH 316

The collector roadways to be developed include:

- Extension of General Sieben Drive to Joan Avenue (CR 89)
- Extension of Pleasant Drive to Tuttle Drive
- Extension of Village Trail to Kendel Avenue
- Extension of Century Drive to Knox Path
- Extension of 36th Street to General Sieben Drive
- Extension of Tuttle Drive to realigned CSAH 47 (Jacob Avenue)

3.2 Effect of Preferred Alternative. The preferred roadway network alternative will provide supporting roadway systems that give traffic choices to reach their destinations. The result would be that traffic on the existing alignment of CSAH 46/47 would balance at motorists'-acceptable volume levels. The traffic modeling effort in this study indicates that approximately ¼ of the year 2025 traffic would divert away from the existing alignment to the street network shown in the preferred alternative.

3.3 Opportunity for Roadway Improvement. Considering the physical constraints on this section of CSAH 46/47 listed above, the following may be considered for implementation to improve overall operation:

3.3.1 TH 61 Intersection. 21st Street may be considered for removal between Eddy Street and CSAH 46/47. Options for revising the intersection would include revisions to the property access in the northwest corner of the intersection. The proximity to the Vermillion River substantially limits improvements to the south. Additional property will need to be acquired for widening the roadway to the north.

3.3.2 Intersection Spacing. In 2002, the City of Hastings studied the 'Westwood Neighborhood' and evaluated possible access alternatives. This effort resulted in identification of possible reduction of public street intersections along CSAH 46/47 east of Pine Street. At the present time, the public street intersections are closer to each other than the desirable ¼ mile spacing, and result in driver indecision and confusion regarding motorist's intentions. To improve traffic operations on CSAH 46/47, consideration should be given to removing Oak Street and Walnut Street connections. Additionally, it would be desirable to review each property driveway on this section of roadway and realign or remove driveways as is possible.

3.3.3 Roadway Reconstruction. There may be some opportunity to reconstruct the section of CSAH 46/47 to a three-lane roadway with shoulders and sidewalks. This may require a project to construct an urban road section with curbs and gutters. This type of design permits filling in ditch sections to accommodate the wider road surface. A project to widen the roadway would have the positive benefit of accommodating the neighborhood traffic, pedestrian and bicycle activity, and give motorists improved impressions of the multimodal character of the area. The current roadway design gives the impression of a rural highway.

4. Recommendations/Conclusions

4.1 Summary of Sub Area Study Findings

The existing traffic volumes (10,700 ADT on CSAH 46/47) are near the capacity for the existing roadway. Projected traffic volumes (18,100 ADT) would exceed the acceptable capacity of the roadway.

Expansion potential of the existing roadway is limited and challenging due to the limited right-of-way, existing homes and buildings, and the adjacent Vermillion River.

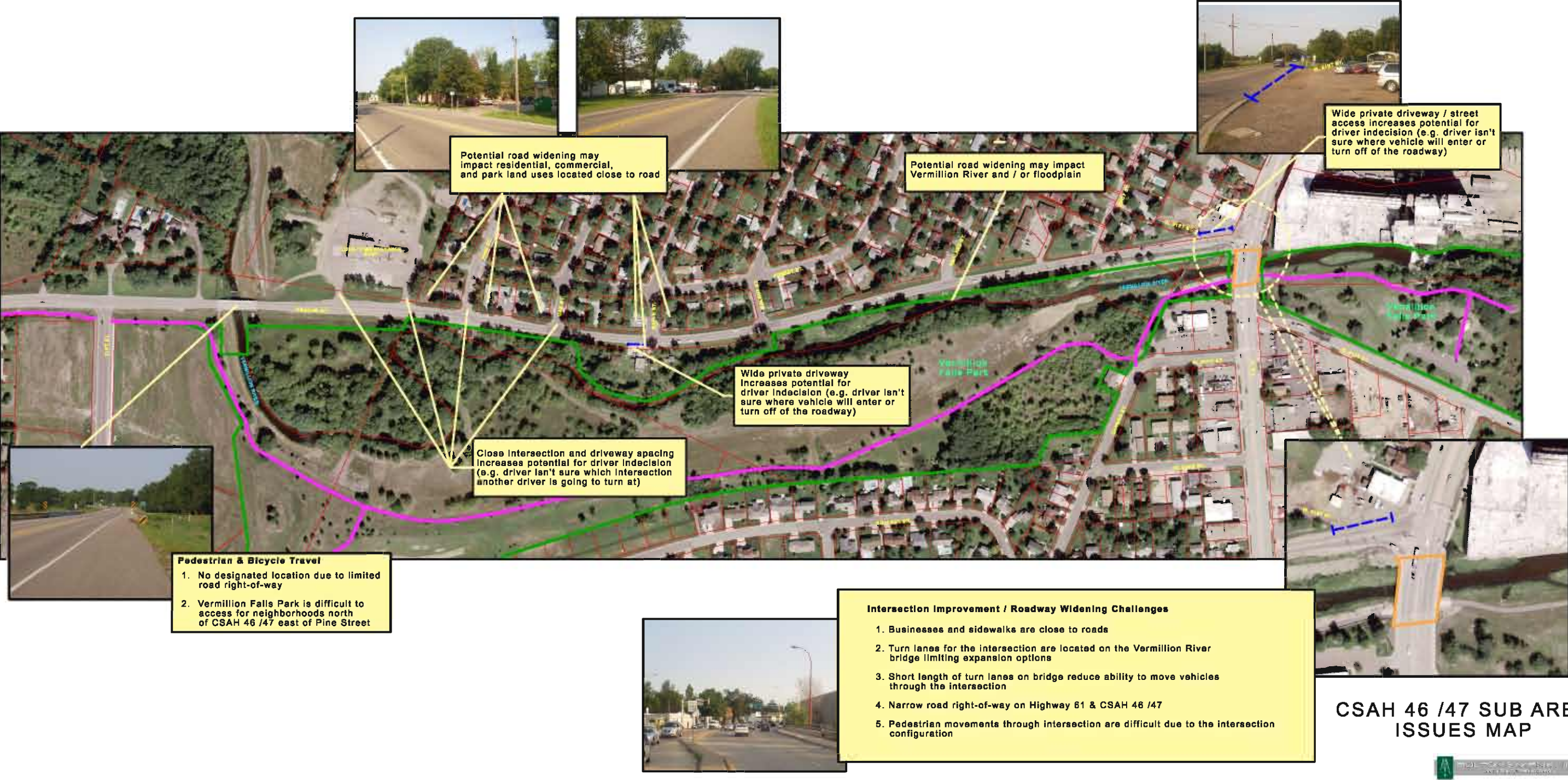
The preferred alternative will provide choices that should result in a reduction of the year 2025 traffic demand on CSAH 46/47 from the 18,100 ADT forecast in the Dakota County model to a volume of 13,900 ADT.

4.2 Sub Area Study Recommendations

The preferred alternative should be implemented in conjunction with continued expansion of the City of Hastings in this area. The road network identified in the preferred alternative will serve the expansion area and reduce traffic pressure on this section of CSAH 47.

The feasibility of improvements should be considered that would convert the roadway to an urban section, add shoulders, consolidate accesses, and add turn lanes at select intersections. This would help the roadway serve as a Minor Arterial as well as provide safety and utility for all road users including local traffic, pedestrians, and bicycles.

Hastings Area Roadway System Study CSAH 46 /47 Sub Area Issues Map



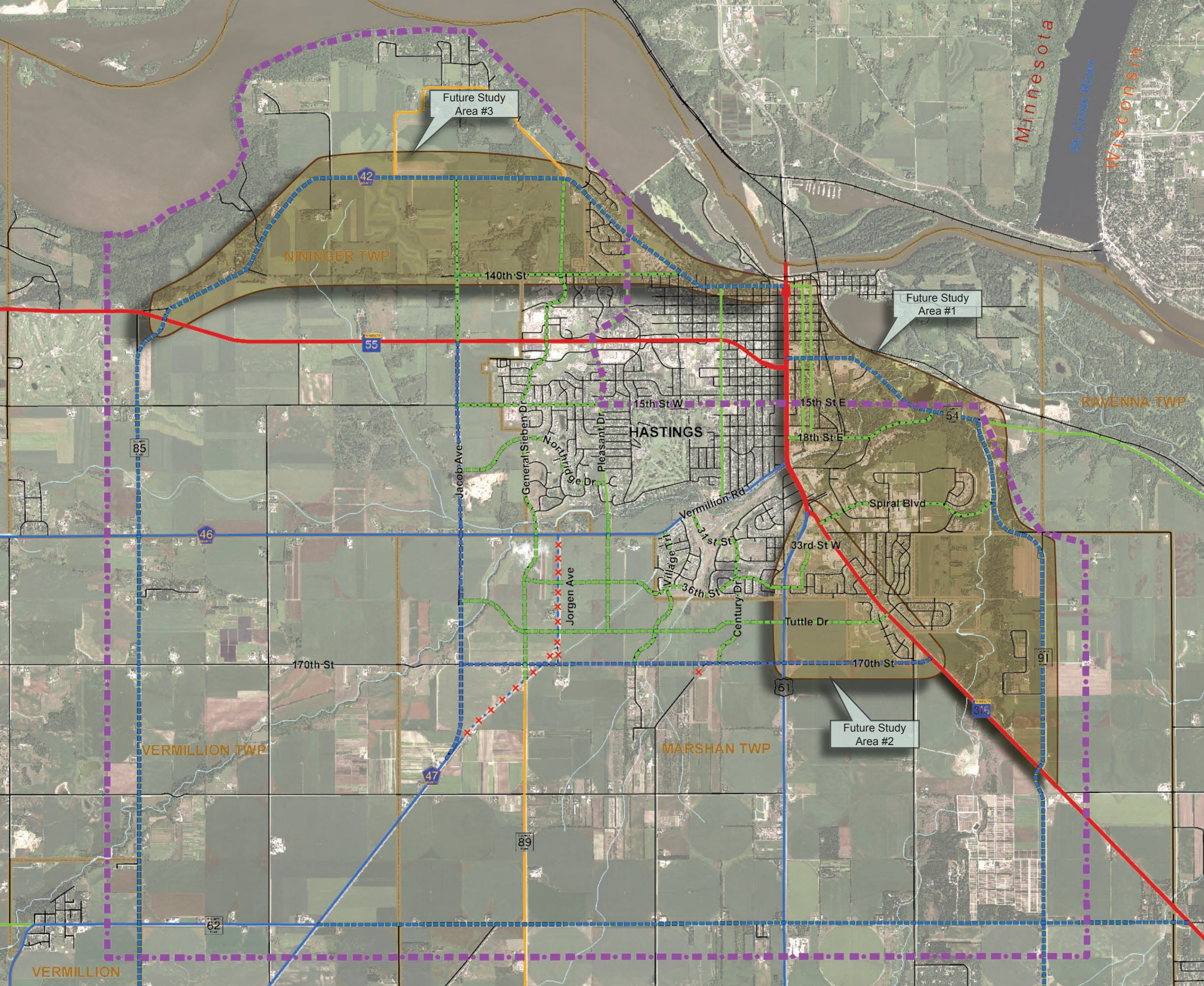
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HASTINGS AREA ROADWAY SYSTEM STUDY

PREFERRED ROADWAY NETWORK ALTERNATIVE

FIGURE 5
2008



Legend

Alignment Alternative

- ▬▬▬ Proposed Minor Arterial
- ▬▬▬ Proposed Major Collector

- x Road Closure

Roadway Functional Classification

- ▬ Principal Arterial
- ▬ Minor Arterial
- ▬ Major Collector
- ▬ Minor Collector
- ▬ Local

- Railroad
- Rivers & Streams
- Study Focus Area
- City/Township Boundary

Future Study Areas

Hwy. 61/Hwy 316: More Detailed Study Needed to Determine the Principal Arterial Route (Hwy. 316 or Hwy. 61/170th Street/Hwy. 316). Other Planned Roadway Corridors Will Not be Affected by the Outcome of the Future Study.

North & East

Minor Arterials: More Detailed Study Needed to Identify Corridor Alignment.

