

# TH 23 Access Management Study New London to Paynesville

Prepared For:  
Minnesota Department of Transportation – District 8

Prepared By:  
Short Elliot Hendrickson Inc.



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## Table of Contents

I. Introduction .....	1
A. Purpose of Study.....	1
B. What is Access Management?.....	1
C. Access Management & TH 23 from New London to Paynesville.....	1
II. Roadway Characteristics .....	2
A. Study Area Limits .....	2
B. Traffic Volumes .....	2
C. Crash History.....	3
III. Access Management Analysis .....	5
A. Access Management Category .....	5
B. Category 2A Guidelines.....	5
C. Existing Access Conditions .....	6
D. Compliance with Access Management Guidelines.....	7
Primary Intersection Access Management Compliance .....	7
Secondary Intersection Access Management Compliance .....	7
Driveway Access Management Compliance .....	8
Field Access Management Compliance .....	9
IV. Summary and Conclusion .....	9

## List of Tables

Table 1: Historical AADT Demands, 2002-2012 .....	2
Table 2: Forecast AADT Demands, 2020 & 2040 .....	3
Table 3: 10-Year Intersection Crash History, 2004-2013 .....	4
Table 4: 10-Year Segment Crash History, 2004-2013 .....	4
Table 5: Recommended Street Spacing for Access Category 2A .....	6
Table 6: Spacing between Adjacent Driveways .....	6
Table 7: Study Area Access Points by Type and Segment.....	7

## List of Figures

Figure 1: Effects of Access Point Density on Crash Rate (Source: MnDOT).....	1
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# I. Introduction

## A. Purpose of Study

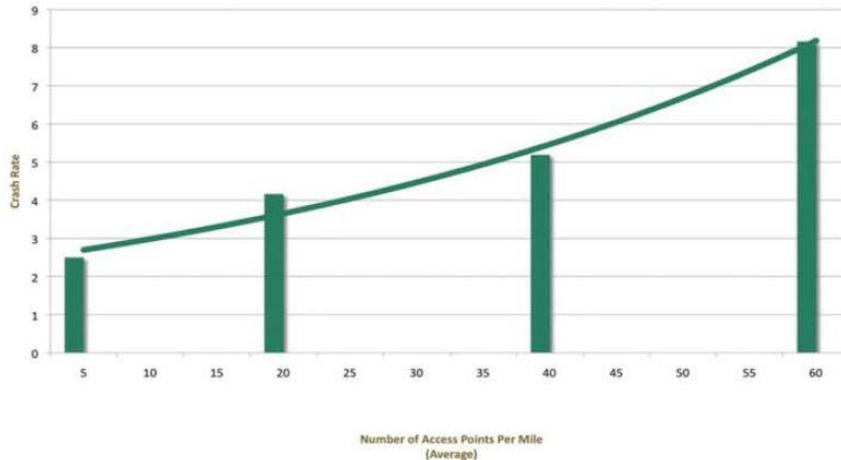
The objective of the TH 23 Access Study is to provide an assessment of existing roadway characteristics and access conditions that guides potential access strategies for the proposed two-lane to four-lane conversion of the TH 23 corridor between New London and Paynesville. This study area is included within MnDOT's Corridors of Commerce program. This report is based on the MnDOT Access Management Manual and collected roadway information and will assist in the design process of the study area's two-lane to four-lane conversion.

## B. What is Access Management?

Access management is a planning, design, and implementation tool for providing access to land developments, while simultaneously preserving the safety, capacity and operation of a roadway. The ability of people and goods to move safely and efficiently is essential to economic development and a primary objective of MnDOT's Corridors of Commerce program.

Research from all levels and government and academic institutions has consistently shown that crash rates increase as the number of access points along a roadway increase. MnDOT demonstrates this relationship in Figure 1 below.

Figure 1: Effects of Access Point Density on Crash Rate (Source: MnDOT<sup>1</sup>)



However, suitable access to residential, commercial and industrial property is also important and a key component of a community's economic vitality. The purpose for applying access management strategies along this portion of TH 23 is to better maintain mobility and safety, while also providing the access necessary to support local land uses and economic conditions.

## C. Access Management & TH 23 from New London to Paynesville

MnDOT develops access management guidelines based upon an access category classification system. The segment of TH 23 from New London to Paynesville is identified as a 2A corridor, or a Rural Medium-

<sup>1</sup> MnDOT, Highway 10 Access Planning Study, 2013.

<http://www.dot.state.mn.us/metro/projects/hwy10study/pdfs/boards.pdf>

Priority Interregional Corridor. The 2A classification forms the foundation for analysis within this report. See Section III for additional information about the 2A classification. Current access conditions and access management guidelines will be considered within the context of the proposed two-lane to four-lane conversion.

## II. Roadway Characteristics

### A. Study Area Limits

The study segment of TH 23 extends approximately 7.4 miles from CR 31/187<sup>th</sup> Avenue NE to CR 6/CR 143/190<sup>th</sup> Street NE. Within the study corridor, TH 23 is currently a two-lane undivided highway.

### B. Traffic Volumes

2012 average annual daily traffic (AADT) volumes through the study area range from 6,200 in the segment’s western portion (TH 9 to CR 2) to 5,900 in the segment’s eastern portion (CR 2 to CR 20). County roads with access to TH 23 within the study segment have AADT volumes ranging between 55 and 850. See Table 1 below for additional information about historical AADT volumes on TH 23 and relevant county roads.

Table 1: Historical AADT Demands, 2002-2012

Route	Description	2002	2004	2006	2008	2010	2012
TH 23	South of TH 9; South of New London	7,900	7,000	9,500	8,600	9,200	9,800
TH 23*	TH 9 to CR 2; East of New London	5,200	5,600	5,900	6,200	6,000	6,200
TH 23*	CR 2 to CR 20; West of Paynesville	4,950	4,800	5,000	5,900	6,100	5,900
TH 23**	East of CR 20; East of Paynesville	7,000	7,200	7,200	7,300	8,700	9,200
CR 31	West of TH 23	760		920		850	
CR 31	East of TH 23	530		560		600	
CR 135	North of TH 23	45		55		55	
CR 2	North of TH 23	415		390		400	
CR 2	South of TH 23	400		450		460	
CR 106	South of TH 23	145		125		125	
CR 6	North of TH 23	260		285		315	
CR 6	South of TH 23	65		55		55	

\*TH23 Project Study Segments.

\*\*This segment of TH 23 goes into downtown Paynesville and would be changed by the new bypass.

Forecasted AADT demands were obtained through a regression analysis of historical AADT data. Based on an estimated timeline for the proposed TH improvements, forecasted 2040 AADT demands are approximately 10,200 vehicles per day in the segment’s western portion and 9,400 vehicles per day in the eastern portion, amounting to a 2.1% and 2.3% growth rate, respectively. Forecasted traffic volumes are below the capacity of the proposed 4-lane roadway. The highest forecast demand on county roads connecting to TH 23 is approximately 1,070 vehicles per day on CR 31 east of TH 23, below capacity of a typical 2-lane facility. See Table 2 below for additional information about forecast AADT demands.

Table 2: Forecast AADT Demands, 2020 & 2040

Route	Description	2020 AADT	2040 AADT	Growth Rate**
TH 23	South of TH 9: South of New London	11,600	16,000	2.3%
TH 23*	TH 9 to CR 2; East of New London	7,300	10,200	2.3%
TH 23*	CR 2 to CR 20; West of Paynesville	6,900	9,400	2.1%
TH 23	East of CR 20; East of Paynesville	10,800	14,900	2.2%
CR 31	West of TH 23	920	1,050	0.8%
CR 31	East of TH 23	760	1,070	2.6%
CR 135	North of TH 23	60	80	1.5%
CR 2	North of TH 23	460	570	1.4%
CR 2	South of TH 23	590	850	2.8%
CR 106***	South of TH 23	130	145	0.5%
CR 6	North of TH 23	370	490	1.9%
CR 6***	South of TH 23	60	80	1.5%

\*TH23 Project Study Segments.

\*\*Linear growth rate from 2010/2012 existing AADT

\*\*\*Segments had negative growth rates; maximum historical AADT used for 2040.

### C. Crash History

A 10-year crash analysis was conducted for crashes occurring from January 1<sup>st</sup>, 2004 through December 31<sup>st</sup>, 2013. Crash and severity rates were calculated for all intersection and segment sections along the corridor. Rates were compared to MnDOT District 8 average rates for similar intersections and sections. A critical crash rate and severity rate was calculated for each intersection and segment. Critical rates are a statistical rate calculated for each individual intersection or segment based on the amount of vehicle exposure. If an intersection or segment crash rate is at or above the critical rate, there is a sustained crash problem and these locations are considered to be unsafe.

In summary, the entire two-lane section of TH 23 is above the District 8 average severity rate for segments. Segment crash rates are higher than the District 8 average west of CSAH 2/145<sup>th</sup> Street. No intersection along TH 23 is at or near the calculated critical rates and only one intersection at CSAH 2/160<sup>th</sup> Street is above the District 8 average crash and severity rates for similar intersections.

Table 3 below represents the 10-year crash history for all intersections that had at least a single crash. TH 23 and CSAH 2/160<sup>th</sup> Street is the only intersection that has a crash rate and severity rate higher than the district average rates. However, no intersection is at or above the critical rates. There were a total of 39 intersection crashes over the 10-year period.

Table 3: 10-Year Intersection Crash History, 2004-2013

TH 23 @	Fatal	A	B	C	N	Total	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate
CSAH 31 (199th St NE)	0	0	2	0	0	2	0.08	0.25	0.92	1.22
115th St NE (South Side)	0	0	1	2	0	3	0.13	0.31	0.93	1.24
115th St NE (North Side)	0	0	1	0	2	3	0.13	0.22	0.93	1.24
212th Ave	0	0	1	0	0	1	0.04	0.13	0.93	1.24
CR 135 (130th St NE)	0	0	1	0	0	1	0.04	0.13	0.93	1.24
CR 106 (225th Ave/141st St)	0	0	1	1	1	3	0.13	0.26	0.92	1.23
CSAH 2 (145th St)	0	1	0	1	5	7	0.30	0.47	0.92	1.22
232nd Ave	0	0	0	0	1	1	0.05	0.05	0.94	1.25
CSAH 2 (160th St)	0	0	2	3	6	11	0.49	0.80	0.93	1.24
240th Ave NE	0	0	1	1	1	3	0.14	0.28	0.94	1.25
175th St NE	0	0	1	1	0	2	0.09	0.23	0.94	1.25
CSAH 6/CR 143 (190th St)	0	0	0	0	2	2	0.09	0.09	0.93	1.24
									Above D8 Average Rate	Above Critical Rate

Table 4 below represents the 10-year crash history for the four different segments in the crash analysis. Segments between the major intersections are all above the District 8 average severity rates. The two segments west of CSAH 2 have severity rates that are higher than the calculated critical rates for each segment. There were a total of 51 segment crashes over the 10-year period.

There was a high percentage of rear end (25%) and run-off-road crashes (37%) along each segment. These could be attributed to the high number of access points along TH 23 and all traffic turning from the through lane, which is posted at 55 mph. Additional causes could include following too closely or distracted driving.

Table 4: 10-Year Segment Crash History, 2004-2013

From	To	Length (Miles)	Segment ADT	Fatal	A	B	C	N	Total	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate
4 to 2 Lane Transition	115th St NE (North Side)	1.65	6,200	0	0	4	8	3	15	0.40	0.83	0.54	0.68
115th St NE (North Side)	CSAH 2 (145th St)	2.22	6,200	0	0	5	6	5	16	0.32	0.64	0.51	0.64
CSAH 2 (145th St)	CSAH 2 (160th St)	1.10	5,900	0	0	2	1	3	6	0.25	0.46	0.61	0.76
CSAH 2 (160th St)	2 to 4 Lane Transition	2.34	5,900	0	1	2	4	7	14	0.28	0.50	0.51	0.64
									Above D8 Average Rate	Above Critical Rate			

## III. Access Management Analysis

### A. Access Management Category

MnDOT utilizes an access management classification system that separates roadways into primary access categories and subcategories, each having their unique guidelines. MnDOT's Access Management Manual notes this Access Category System "consists of seven primary categories and five subcategories. Primary categories are based on the functional classification of the highway and its strategic importance within the statewide highway system. The subcategories address the highway facility types and differing land use patterns surrounding the specific highway segment."<sup>2</sup> Importantly, the establishment of a specific access management category is a reflection of the long-term function of a roadway for 20 years into the future. It is not necessarily a reflection of existing surrounding land uses or roadway characteristics.

MnDOT has given the New London to Paynesville segment of TH 23 an access management category assignment of 2A, or a Rural Medium-Priority Interregional Corridor.

Category 2 or Medium-Priority Interregional Corridors are functionally classified as Principal Arterials that provide interstate and intrastate travel with an emphasis on mobility.<sup>3</sup> Subcategory A or rural corridors "extend through agricultural, open, or forested areas with limited development" and are "planned for long-term, low-density development, characterized by scattered, large-lot residential development and limited commercial or industrial use."<sup>4</sup>

### B. Category 2A Guidelines

MnDOT access management categories have different guidelines for appropriate spacing between primary intersections, secondary intersections, and driveways. In general, recommended public street spacing increases in distance as a location becomes more rural.

The MnDOT Access Management Manual guidelines for Category 2A roadways are outlined in Table 5 below. Recommended spacing between primary intersections is one mile. Recommended spacing between secondary intersections is 0.5 mile.

The Texas Transportation Institute (TTI) has developed recommended spacing for rural driveways. Spacing between adjacent driveways on 65 mph rural roadways, the speed limit for the proposed improvement, is recommended to be 645 feet between high-volume driveways. Due to data unavailability, low-volume driveway spacing guidance was not developed for posted speeds above 60 mph. See Table 6 for additional information.

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<sup>2</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 2, Page 2.

<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter2.pdf>

<sup>3</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 2, Page 6.

<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter2.pdf>

<sup>4</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 2, Page 10.

<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter2.pdf>

Table 5: Recommended Street Spacing for Access Category 2A

Category	Area or Facility Type	Typical Functional Class	Primary Full Movement Intersection	Secondary Intersection
2A	Rural	Principal Arterial	1 mile	½ mile

Source: MnDOT Access Management Manual, Chapter 3, Figure 3.1

Table 6: Spacing between Adjacent Driveways

Posted Speed Limit	Rural ((Types 1 & 2) Spacing between Adjacent Driveways (feet)	Rural & Urban/Urbanizing (Type 3) Spacing between Adjacent Driveways (feet)
40	-	305
45	50	360
50	75	425
55	100	495
60	100	570
65	-	645

Source: MnDOT Access Management Manual, Chapter 3, Figure 3.27

Rural areas introduce unique driveway access and allowance issues. MnDOT developed guidelines to help determine appropriate driveway access for different access categories. MnDOT provides the following guidance for Category 2A roadways<sup>5</sup>:

- If a property retains access rights but no reasonably convenient and suitable alternative access is available, a driveway is permitted.
- The driveway should be located and designed to minimize the impact on the safety and operations of the highway.
- All driveways (Types 1, 2 and 3) should be spaced in accordance with Figure 3.27 (in Chapter 3 of the MnDOT Access Management Manual).

MnDOT notes that “except where MnDOT has acquired access rights, abutting property owners are entitled to reasonably convenient and suitable access to the highway.”<sup>6</sup> It is important to note that the definition of “reasonably convenient and suitable access to the highway” can vary depending on the unique characteristics of both the subject roadway and adjacent land uses.

### C. Existing Access Conditions

To assess existing access conditions on TH 23 within the context of MnDOT access management guidelines, an inventory of access locations was conducted within the study area. Aerial photography was utilized from three different sources (highway layouts, Google Maps and Bing Maps) to identify various access types. Access types identified were public road/alley way, commercial/multiple residential, single family residential, and field access. A best judgment assessment was used to determine specific access types throughout the study segment.

<sup>5</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 3, Page 18.

<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter3.pdf>

<sup>6</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 3, Page 17.

<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter3.pdf>

Table 7 below summarizes the number of access locations by type and segment within the study area. Note that primary intersections are accounted for within the column titled “Roadway Segment by Primary Intersection” and do not appear within the “Total” column access point sums. Primary intersections include both 3-legged and 4-legged intersections.

Table 7: Study Area Access Points by Type and Segment

Roadway Segment by Primary Intersection	Length (mi.)	Secondary Intersection (Public Road/Alley Way)	Commercial/Multi-Family Res.	Single Family Res.	Field	Total
1. CR 31 to 199th Ave. NE	0.9	0	4	0	1	5
2. 199th Ave. NE to Long Lake watercourse	1	0	4	1	0	5
3. Long Lake watercourse to 130th St. NE	1.1	1	3	2	6	12
4. 130th St. NE to 145th St. NE	1.1	5	1	0	3	9
5. 145th St. NE to 160th St. NE	1.1	3	2	7	2	14
6. 160th St. NE to 175th St. NE	1.1	1	2	1	1	5
7. 175th St. NE to 190th St. NE	1	0	2	3	3	8
Total	7.3	10	18	14	16	58

#### D. Compliance with Access Management Guidelines

##### Primary Intersection Access Management Compliance

In general, retaining existing primary intersection spacing under the proposed improvement is compliant with access management guidelines. Spacing between primary intersections is approximately one mile, an artifact of the Public Land Survey System and township-range lines, and therefore within MnDOT Access Management Manual guidance of one mile spacing.

Segments 2 and 3 in Table 7 contain the Long Lake watercourse and dam. This area has unique roadway and natural features that warrant additional consideration of guidelines compliance.

##### Secondary Intersection Access Management Compliance

Guidelines recommend 0.5 mile secondary intersection spacing between primary intersections. The secondary intersection spacing of several segments is clustered around primary intersections, resulting in shorter spacing than the 0.5 mile recommended distance. Secondary intersection spacing within these segments varies between approximately 0.2 and 0.4 miles from a primary intersection. See individual segment notes below for additional details.

All secondary intersections, or non-primary intersections providing connections to other public roadways, are classified with low-conflict conditions under the MnDOT Access Management Manual’s Gap Analysis Procedure. Secondary intersections “may provide full movement if the analysis of future traffic conditions, per the Gap Analysis Procedure, indicates that a low-risk conflict condition can be maintained.”<sup>7</sup> As such, guidelines permit secondary intersections within the study area to remain full movement facilities unless roadway changes like increases traffic volumes trigger a high-risk condition.

*Segment 1:* Segment limits do not contain any secondary intersection access points.

*Segment 2:* Segment limits do not contain any secondary intersection access points. However, the split intersection of 115<sup>th</sup> Street NE straddles the Long Lake watercourse/dam and should be given consideration of median-related access impacts.

<sup>7</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 3, Page 3.  
<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter3.pdf>

*Segment 3:* This segment contains one secondary intersection access point located approximately 550 feet east of 115<sup>th</sup> Street NE. This spacing is not compliant with 0.5 mile spacing guidelines. In addition, the split intersection of 115<sup>th</sup> Street NE straddles the Long Lake watercourse/dam and should be given consideration of median-related access impacts.

*Segment 4:* There are five secondary intersection access points located within the segment limits. The 132<sup>nd</sup> Street NE access point is located approximately 350 feet east of 130<sup>th</sup> Street NE, significantly closer than recommended spacing. In addition, a secondary intersection with three access points (225<sup>th</sup> Avenue NE and 141<sup>st</sup> Street NE) are located approximately 0.25 mile from 145<sup>th</sup> Street NE.

*Segment 5:* There are three secondary intersection access points located within the segment limits. All three segments are located within an approximate 0.5 mile span TH 23 west of 160<sup>th</sup> Street NE, spacing non-compliant with access management guidelines.

*Segment 6:* This segment contains one secondary intersection access point approximately 0.4 miles west of 175<sup>th</sup> Street NE, a non-compliant distance with access management guidelines.

*Segment 7:* This segment does not contain any secondary intersection access points.

#### Driveway Access Management Compliance

The proposed conversion of the study segment from a two-lane to four-lane highway significantly changes access management throughout the corridor. The introduction of a median brings access management issues and turning movement restrictions to many existing access points on the corridor, particularly private driveways. The MnDOT Access Management Manual states that new median openings should not be provided to driveways<sup>8</sup>.

Per MnDOT guidelines, driveway access throughout the corridor should be consolidated when feasible, as this is the most conducive to safety and mobility. Alternative access through the local street network should be explored before direct access to the trunk highway system is granted or maintained. Compliance via frontage road access should also be considered, although cost restrictions need to be accounted for.

It is important to note that several issues must be considered with implementations of driveway consolidations and turning movement restrictions, including attention to “reasonably convenient and suitable access.” The MnDOT Access Management Manual notes “this distance should not exceed the recommended spacing of public intersections,” which for Category 2A roadways is one mile between primary intersections and 0.5 mile between secondary intersections. Many driveways within the study segment are within 0.5 mile of a secondary intersection and all driveways are within one mile of a primary intersection.

Driveways are generally compliant with the recommended 645 feet spacing guidance between adjacent high-volume driveways, with exceptions in areas near Long Lake and the community of Hawick. These areas should be given more consideration to comply with spacing guidance for location next to primary and secondary intersections. Specific driveway consolidations within the study area should be reviewed on a case-by-case basis.

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<sup>8</sup> MnDOT, MnDOT Access Management Manual, 2008. Chapter 3, Page 38.  
<http://www.dot.state.mn.us/accessmanagement/pdf/manualchapters/chapter3.pdf>

### Field Access Management Compliance

Field access points obtain identical treatment to other low-volume driveway access management guidelines. Within the study area, multiple field access points exist for single parcels of land. These multiple access points are candidates for access consolidation subject to the “reasonably convenient and suitable access” language previously discussed.

## IV. Summary and Conclusion

Considerations of access management within the study area should include:

- Secondary intersection spacing compliance with access management guidelines
- Median-related turning movement restrictions
- Maintenance of full-movement secondary intersections per Gap Analysis Procedure
- Consolidation of private driveways and field access where alternative access exists, particularly along segments adjacent to Long Lake and the community of Hawick.

Per MnDOT recommendation, initial design of the two-lane to four-lane conversion will follow primary intersection, secondary intersection, and driveway access guidance established within MnDOT’s Access Management Manual to the maximum extent possible. This includes one mile and 0.5 mile spacing recommendations for primary and secondary intersections, respectively. In addition, driveway access conditions will be reviewed for consolidation dependent on factors like redundant access points and reasonable and suitable alternative access.

This study represents an initial step in the planning process for improvements on TH 23 from New London to Paynesville. Situations might exist that preclude potential access management strategies from being implemented. Land ownership, geometric design standards, and alternative access issues are a sampling of factors that can ultimately influence access management decisions.