

**TRAFFIC STUDY  
FOR**

**US 65**

From the US 65 / St. Thomas Avenue Intersection  
To the US 65 / Prospect Avenue Intersection

ALBERT LEA, MINNESOTA

Prepared for:  
MNDOT  
2020

***whks***

engineers + planners + land surveyors

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# Project Description

This traffic memorandum has been prepared for the US 65 intersections with St. Thomas Avenue, Columbus Avenue, St. Peter Avenue, Ulstad Avenue, Fenton Avenue, Morningside Road and Prospect Avenue in the City of Albert Lea, Freeborn County, Minnesota. The purpose of this study is to discuss safety impacts of proposed geometrics at these intersections for 2022 (Completion year). The existing traffic (2020) and crash data was also analyzed as part of this study. Improvements at the intersection of Garfield Ave were evaluated in a previous ICE Report, lane configuration and signal phasing revisions were recommended and were included in this report. No additional revisions were analyzed at this intersection.

Currently, the area surrounding the intersections is commercial and residential. The analyzed intersections are approximately 3000 feet west of the US 65 interchange with Interstate 35.

## Location

The intersections are located in the City of Albert Lea, Minnesota. The study area lies in the central region of Freeborn County. See Figure 1.



FIGURE 1 – Location Map

## Existing Intersection Characteristics

US 65 is an east-west route classified as a minor arterial. The road is divided with two lanes in each direction.

All the sideroads consist of two-lane approaches with no auxiliary turn lanes, except for Garfield Avenue, which does have eastbound and westbound left turn lanes.

There are eastbound and westbound left turn lanes on US 65 at the Garfield Avenue, Fenton Avenue, Morningside Road and Prospect Avenue intersections.

The speed limit on US 65 through the study area is 30 mph west of Morningside Road and 45 mph east of Morningside Road.

## Crash Data

There were 87 crashes through the study area from 2010 to 2020. A breakdown of crash types and frequency by intersection can be found below in Table 2.

Intersection	Type of Crash						Property Damage Crashes	Injury Crashes	Total Crashes
	Right Angle	Rear End	Fixed Object	Out of Control Vehicle	Head On	Other			
St. Thomas Ave.	5	3	1	0	0	0	8	1	9
Columbus Ave.	3	1	0	0	0	0	1	3	4
St. Peter Ave.	2	1	0	0	0	0	2	1	3
Ulstad Ave.	4	2	2	0	0	0	4	4	8
Fenton Ave.	5	0	0	0	0	0	3	2	5
Morningside Rd.	11	3	1	4	1	1	16	5	21
Prospect Ave.	33	4	0	0	0	0	19	18	37
<b>Total</b>	<b>63</b>	<b>10</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>53</b>	<b>34</b>	<b>87</b>

Table 1 – Crash Data

The most common types of crash at each intersection are right angle (63) and rear end (10) crashes. Right angle crashes appear to be from vehicles on the side street trying to either cross US 65 or turn left/right onto US 65. Right angle crashes are classified as a severe crash type.

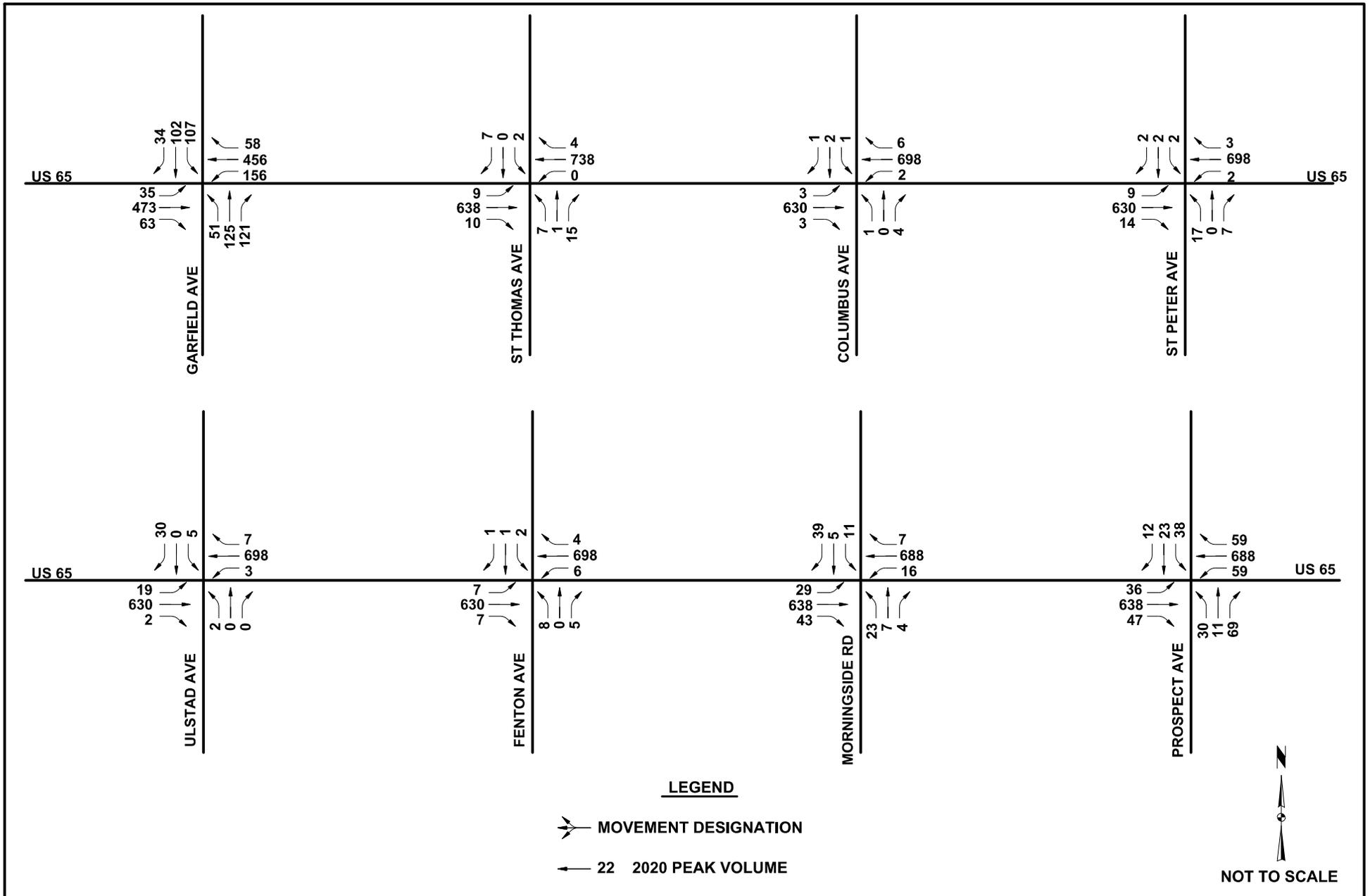
## Traffic Volumes

Directional intersection traffic volumes were obtained from intersection traffic counts performed in 2020. Traffic counts were performed from 6 AM to 9 AM and 3 PM to 7 PM.

PM traffic volumes are substantially higher than the AM traffic volumes. The remainder of the study analyzes PM traffic volumes.

See Figure 2 for a summary of the 2020 volumes for each intersection traffic movement.





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EXISTING P.M. PEAK HOURLY VOLUMES



ALBERT LEA, MN

FIGURE 2

# Intersection Analyses

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## Proposed Intersection Layout

The proposed modifications aim to improve safety for all roadway users including motorists, pedestrians and cyclists.

Garfield Avenue will have an upgraded traffic signal system, and the northbound/southbound lane will be re-configured to include a separate left turn lane and shared through-right turn lane.

The raised median running along US 65 will be extended through the intersection of St. Thomas Avenue to eliminate thru traffic crossing US 65, in addition to eliminating left turns from both NB and SB St. Thomas Avenue onto US 65. Access will be reduced to Right-In-Right-Out turns along both the North and South halves of the intersection.

Columbus Avenue would be reduced to a  $\frac{3}{4}$  access intersection, eliminating thru traffic crossing US 65 and NB/SB traffic turning left onto US 65, but would allow EB/WB traffic turning left onto Columbus Avenue. This layout would also allow Right-In-Right-Out access along both the North and South halves of the intersection. Dedicated left turn lanes would also be added to both EB and WB US 65.

The raised median running along US 65 will be extended through the intersection of St. Peter Avenue to eliminate thru traffic crossing US 65, in addition to eliminating left turns from both NB and SB St. Peter Avenue onto US 65. Access will be reduced to Right-In-Right-Out turns along both the North and South halves of the intersection.

Ulstad Avenue would remain a full access intersection for both US 65 and Ulstad Avenue traffic. Dedicated left turn lanes would be added to the EB and WB lanes along US 65.

Fenton Avenue would be reduced to Right-In-Right-Out access at the intersection, eliminating the existing median allowing thru traffic to cross US 65, in addition to eliminating left turns from both NB and SB Fenton Avenue onto US 65. A separate median U-turn lane will also be added to the west of Fenton Avenue to allow SB traffic from Fenton Avenue and Morningside Road access to EB US 65. Both the east and west entrances to the frontage road between Ulstad Avenue and Fenton Avenue will remain in place, with an additional left turn lane added at the west entrance. This will allow traffic from both EB and WB US 65 direct access to businesses along the frontage road.

Morningside Road would be reduced to a  $\frac{3}{4}$  access intersection, eliminating thru traffic crossing US 65 and NB/SB traffic turning left onto US 65, but would allow EB/WB traffic turning left onto Morningside Road. This layout would also allow Right-In-Right-Out access along both the North and South halves of the intersection. The south half of the intersection and median would also be moved to re-align with the north half of the intersection. A separate median U-turn lane will also be added to the east of Morningside Road to allow NB traffic from Fenton Ave. and Morningside Rd. access to WB US 65.

Prospect Avenue would be reduced to Right-In-Right-Out access at the intersection, eliminating the existing median allowing thru traffic to cross US 65, in addition to eliminating left turns from both NB and SB Prospect Avenue onto US 65. A separate median U-turn lane will be added to the east and

intersection. A separate median U-turn lane will be added to the east and west of the existing intersection, allowing traffic from EB and WB US 65 to access both halves of Prospect Avenue.

Pedestrian and bicycle traffic will also have access along the corridor by constructing a 6 foot sidewalk along US 65 to the north from Garfield Avenue to the west frontage road entrance between Ulstad Avenue. and Fenton Avenue, and a 10 foot shared use path to the south from Garfield to Prospect Avenue. Non-motorized users are provided with means to travel along the corridor with physical separation from the motorized users, reducing or eliminating potential conflict points with vehicles, and decreasing potential crashes involving pedestrians as a result.

See Figures 3 through 4 for the proposed layout diagram.



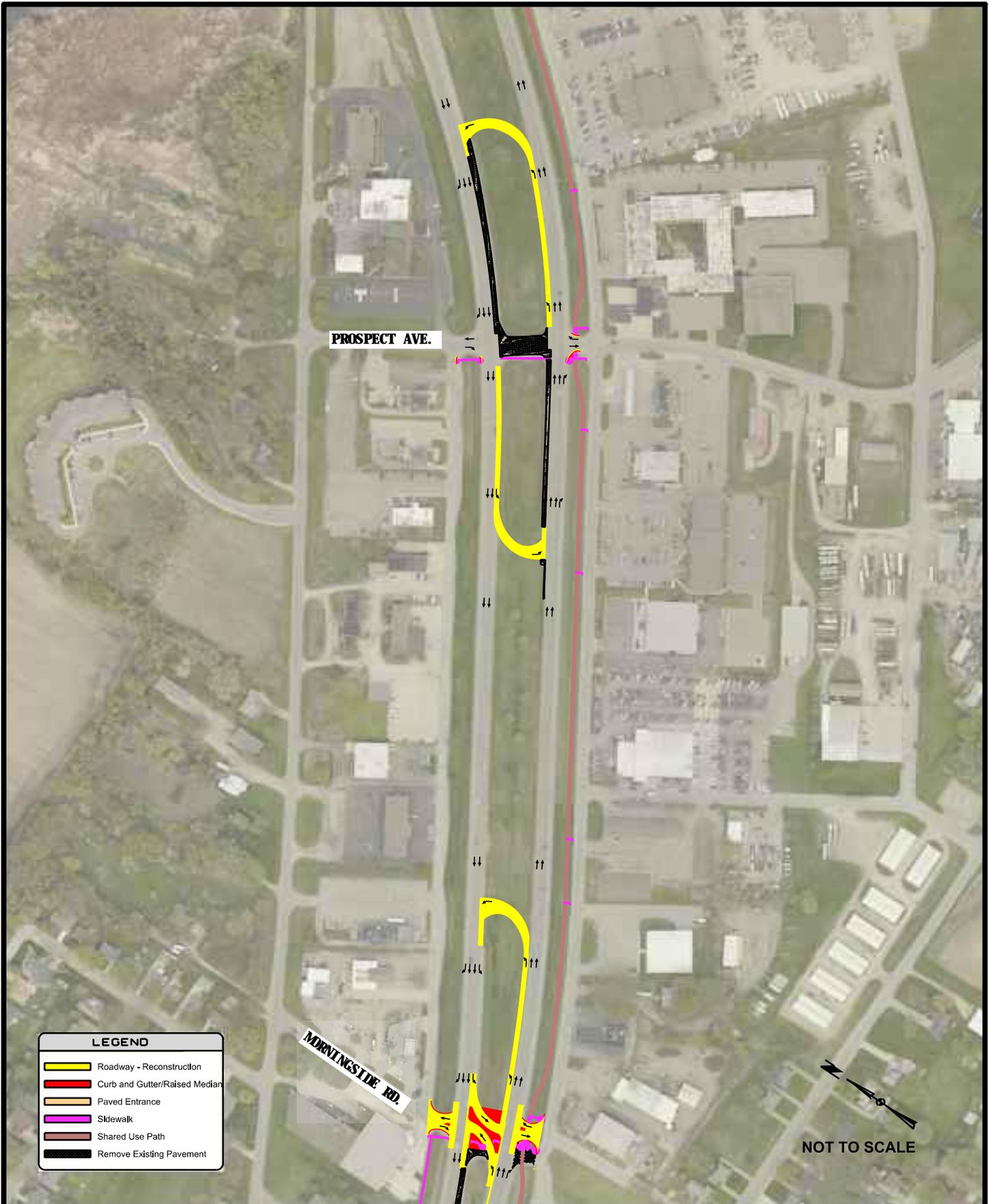
TRAFFIC STUDY  
US 65

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PROPOSED INTERSECTION LAYOUT  
ST. THOMAS AVE TO FENTON AVE

FIGURE 3





LEGEND	
	Roadway - Reconstruction
	Curb and Gutter/Raised Median
	Paved Entrance
	Sidewalk
	Shared Use Path
	Remove Existing Pavement

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PROPOSED INTERSECTION LAYOUT  
FENTON AVE TO PROSPECT AVE

FIGURE 4

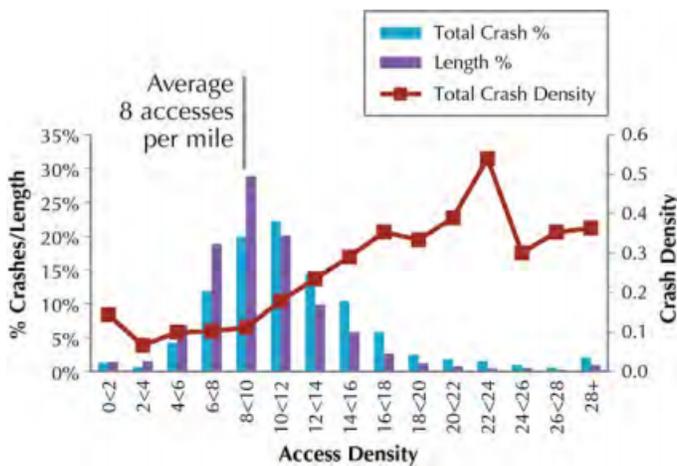


# Safety Analyses

This analysis will discuss two important methods to help reduce the amount of vehicle crashes and increase traffic safety. This corridor was broken down into two sub-sections for analysis; the low speed section from Garfield Avenue to Ulstad Avenue, and the higher speed Fenton Avenue to Prospect Avenue.

## Access Management

The analysis of intersections and driveways along a roadway have a direct effect on driver safety. A higher number of access points on a segment of road provides more opportunities for vehicles attempting to cross or turn onto that road, which can result in more crashes. Reducing the number of access point along a roadway is a proven method to reduce crashes. MnDOT has conducted multiple studies showing that the crash rate along a portion of roadway is directly related to the number of access points along the roadway. Figures 3 and 4, taken from two specific studies, show this relationship graphically.



Minnesota County Road Safety Plans,  
Data 2007-2011

"Rural" refers to a non-municipal  
area and cities with a population  
less than 5,000.

Figure 3 – MnDOT Traffic Safety Fundamentals Handbook - 2015

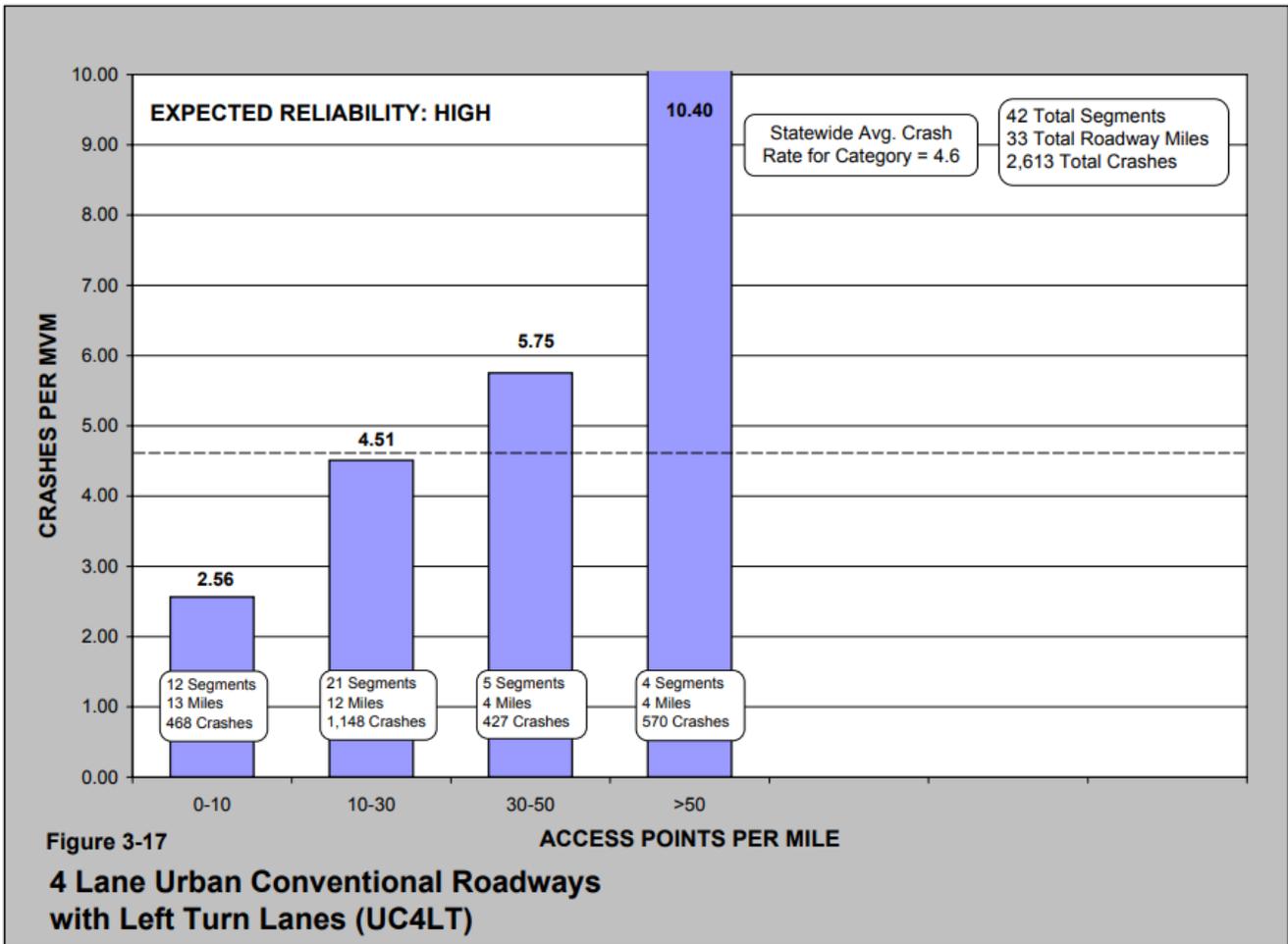


Figure 4 – MnDOT Report 1998-27 “Statistical Relationship Between Vehicular Crashes and Highway Access” - 1998

MnDOT’s Access Management Manual breaks roadways into categories based on the facility type and functional class of road. MnDOT’s Statewide Planning Unit classifies the stretch of US 65 from St. Thomas Avenue to Prospect Avenue as category 5B, or an urban, minor arterial road. These types of roads should function both as mobility and access roadways, with a primary focus on mobility, or carrying traffic through the corridor. The proposed layout described earlier in this report aims to meet the mobility function along US 65, while still maintaining a reasonable amount of access points to adjacent businesses for its users. Figure 5 from the Access Management Manual shows the intersection spacing requirements for category 5 roads.

**Figure 3.2 – Summary of Recommended Street Spacing for Non-IRCs**

Category	Area or Facility Type	Typical Functional Class	Public Street Spacing		Signal Spacing
			Primary Full-Movement Intersection	Secondary Intersection	
<b>4 Principal Arterials in the Twin Cities Metropolitan Area and Primary Regional Trade Centers (Non-IRCs)</b>					
<b>4AF</b>	Non-Interstate Freeway	Principal Arterials	Interchange Access Only (see Section 3.2.7 for interim spacing)		Interim
<b>4A</b>	Rural		1 mile	1/2 mile	See Section 3.2.5
<b>4B</b>	Urban/Urbanizing		1/2 mile	1/4 mile	1/2 mile
<b>4C</b>	Urban Core		300-660 feet, dependent upon block length		1/4 mile
<b>5 Minor Arterials</b>					
<b>5A</b>	Rural		1/2 mile	1/4 mile	See Section 3.2.5
<b>5B</b>	Urban/Urbanizing	Minor Arterials	1/4 mile	1/8 mile	1/4 mile
<b>5C</b>	Urban Core		300-660 feet, dependent upon block length		1/4 mile
<b>6 Collectors</b>					
<b>6A</b>	Rural	Collectors	1/2 mile	1/4 mile	See Section 3.2.5
<b>6B</b>	Urban/Urbanizing		1/8 mile	Not Applicable	1/4 mile
<b>6C</b>	Urban Core		300-660 feet, dependent upon block length		1/8 mile
<b>7 Specific Area Access Management Plans</b>					
<b>7</b>	All	All	By adopted plan		

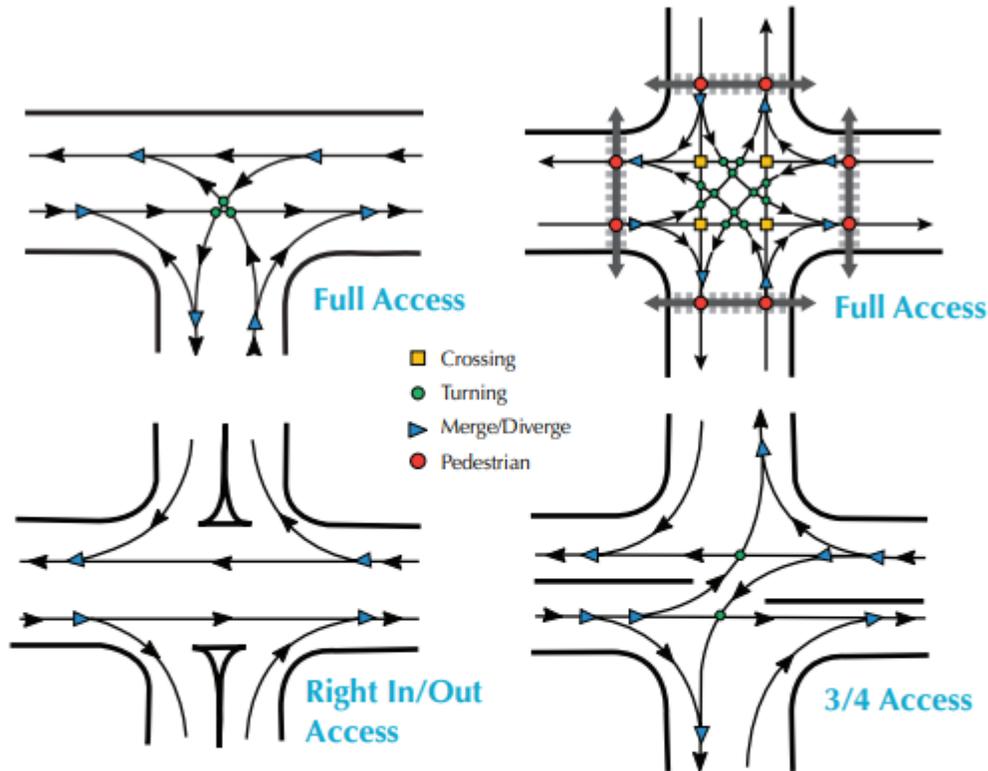
Figure 5 – MNDOT Access Management Manual, Chapter 3

Looking at the existing conditions from Garfield Avenue to Prospect Avenue, the best location for improvement occurs between St. Thomas Avenue and Ustad Avenue. Each intersection allows full movement, and is approximately 300 feet apart, closer than the recommended values listed in Figure 5. Full intersection movement could be confined to Garfield Avenue and Ulstad Avenue, meeting the 1/4 mile value. St. Thomas Avenue, Columbus Avenue, and St. Peter Avenue can be converted to a 3/4 access or Right-In-Right-Out access and act as a secondary Intersection.

There are existing frontage roads from Fenton Avenue to Prospect Avenue that funnel most business access points to a common intersection point at Fenton, Morningside, and Prospect respectively. The north frontage road between Ulstad Avenue and Fenton Avenue has an entrance at Fenton, and an additional Right-In-Right-Out entrance to the west. The latter entrance could be removed to reduce access points to US 65, while still providing access at Fenton Ave.

## Conflict Points

An important aspect in intersection design is the number of conflict points. Conflict points are locations where vehicle paths coincide, and are categorized as crossing, turning, and merging/diverging. Minnesota crash data has shown that reducing the number of conflict points at an intersection has been shown to reduce the amount of crashes that occur of an intersection. Figure 6 illustrates the differences in conflict points at various intersection types.



	■ Crossing	● Turning	▶ Merge/Diverge	Total	Typical Crash Rate (crashes per mil. entering vehicles)
Full Access +	4	12	16	32	0.7
Full Access T	0	3	6	9	0.4
3/4 Access	0	2	8	10	0.5
Right In/Out Access	0	0	4	4	0.2

2013 MnDOT Crash Data Toolkit

Figure 6 – MnDOT Traffic Safety Fundamentals Handbook - 2015

Figure 6 demonstrates that  $\frac{3}{4}$  Access and Right-In-Right-Out intersection layouts are particularly effective at eliminating crossing and turning conflict points, which attribute to right angle crashes. The crash rate for vehicles is also reduced with both layouts, with Right-In-Right-Out intersections showing a substantial drop in crash rate. Both types of conflict point reduction were used in the proposed layout, since right angle crashes were the predominate type of crash at each intersection from St. Thomas Avenue to Prospect Avenue.

Based on the traffic counts shown in Figure 2 from St. Thomas Avenue to Ulstad Avenue, all four intersections had very few to no through traffic, indicating that extending the median through any intersection would not have a big impact on traffic. Ulstad Avenue and St. Peter Avenue had the highest combined amount of side road and mainline left turn traffic, (29 veh/hr and 30 veh/hr respectively), while St. Thomas Avenue had 18 veh/hr. These three intersections would have the biggest impact if side road and mainline left turns were eliminated. The proposed layout utilized full access at Ulstad Avenue to meet the access management spacing discussed above. The proposed intersections of St. Thomas Avenue and St. Peter Avenue are re-configured as Right-In-Right-Out intersections, while Columbus Avenue is proposed as a  $\frac{3}{4}$  access intersection. This layout minimized the number of conflict points in the group, while allowing mainline left turn access at every other intersection. Traffic wanting to turn left at St. Thomas Avenue and St. Peter Avenue only need to drive to the next intersection to access a left turn lane.

The stretch of US 65 from Fenton Avenue to Prospect Avenue has a 45mph speed limit, so greater attention was given to eliminating crossing conflicts from each intersection. Morningside Road and Prospect Avenue both had high numbers of right angle crashes, so reducing conflict points at these intersections is very important to have the largest effect on crash reduction. Prospect Avenue and Morningside Road have high combined side road and mainline left turn traffic counts, at 163 and 79 veh/hr respectively, due to the amount of businesses on both sides of US 65. Fenton Avenue had minimal through traffic and left turn traffic, in addition to a small number of crashes compared to the other two intersections. The proposed intersections of Fenton Avenue and Morningside Road are re-configured as  $\frac{3}{4}$  access intersections, with a U-turn lane placed to the east and west of both intersections. This allows traffic entering US 65 from both intersections safer access to both EB and WB lanes of traffic, while allowing access to the businesses on both sides of US 65. The proposed intersection of Prospect Avenue is re-configured to Right-In-Right-Out access, with U-turn lanes placed to the east and west of the intersection due to the high number of crashes. It allows traffic safer access to both EB and WB lanes of US 65.

Tables 2 and 3 compare the number of conflict points from St. Thomas Avenue to Prospect Avenue for the existing and proposed intersection layouts.

		Existing Configuration							
		ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT	TOTAL
CONFLICTS	Crossing	8	8	8	8	8	8	8	56
	Turning	16	16	16	16	16	16	16	112
	Merging/Diverging	12	12	12	12	12	12	12	84
TOTAL		<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>36</b>	<b>252</b>

TABLE 2 – Conflict Points

		Proposed Configuration							
		ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT	TOTAL
CONFLICTS	Crossing	0	0	0	8	0	0	0	8
	Turning	0	4	0	16	4	4	0	28
	Merging/Diverging	4	8	4	12	12	12	8	60
TOTAL		<b>4</b>	<b>12</b>	<b>4</b>	<b>36</b>	<b>16</b>	<b>16</b>	<b>8</b>	<b>96</b>

TABLE 3 – Conflict Points

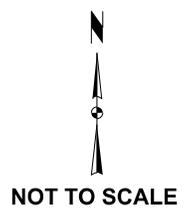
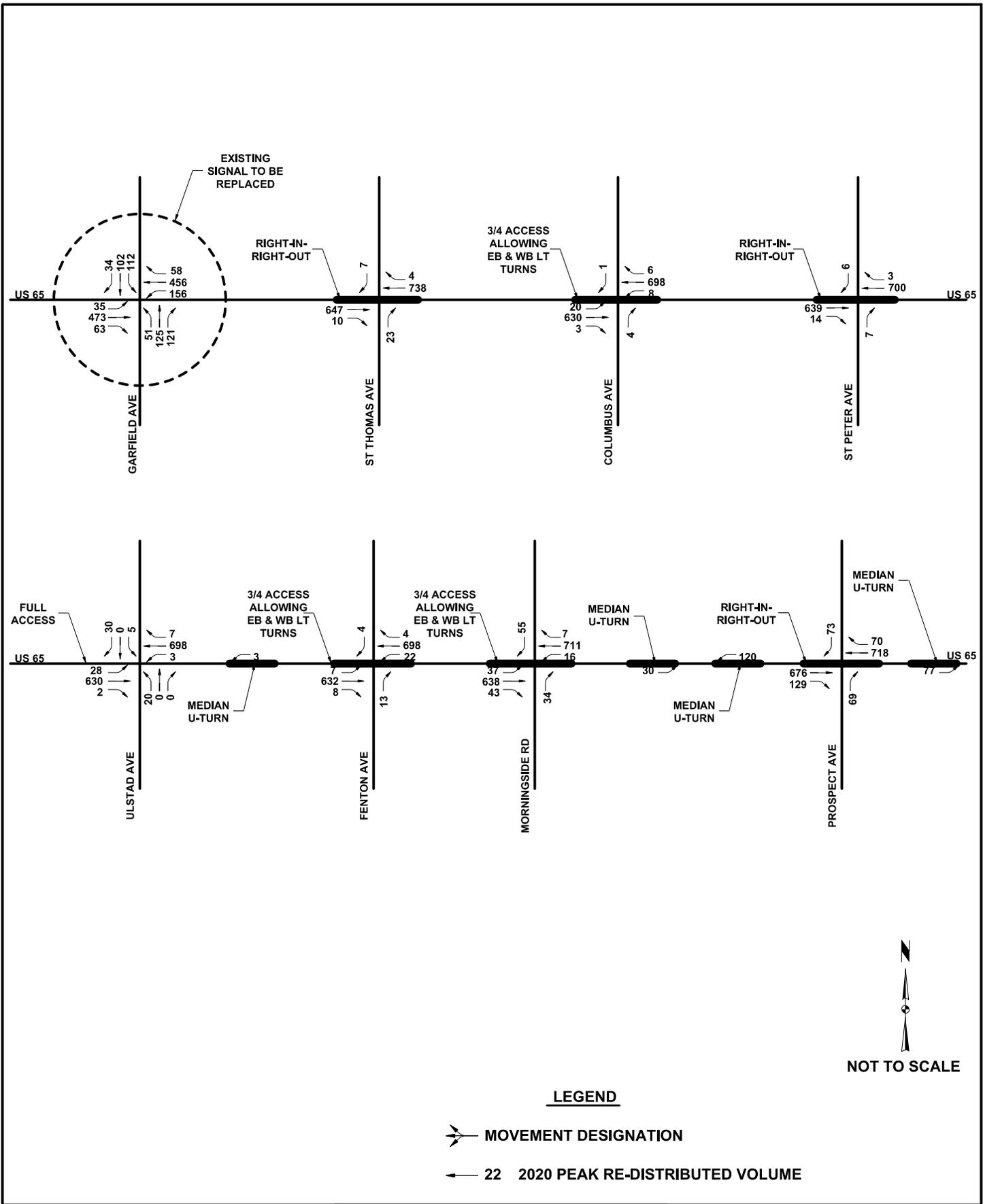
The proposed configuration reduces the number of conflicts by 62%, eliminating just under 2/3 of the original conflict points.

## Traffic Redistribution

Modifying the layout to most of the intersections along this corridor, will modify the amount of traffic each intersection in the proposed layout receives. Figure 7 shows the estimated redistribution of traffic to each intersection. Figure 8 shows the redistributed traffic volumes.







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**US 65**

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**PROPOSED LAYOUT**  
**RE-DISTRIBUTED**  
**P.M. PEAK HOURLY VOLUMES**

**FIGURE 8**



For the urban portion from Garfield Avenue to Ulstad Avenue, it is assumed that mainline left turn traffic will shift to the east or west and access the next available left turn lane at Garfield, Columbus, or Ulstad Avenue. Side Road left turn and through traffic will be split between Garfield Avenue and Ulstad Avenue. North side road traffic from Columbus Avenue and St. Thomas Avenue will re-distribute to Garfield Avenue, while north side road traffic from St. Peter Avenue will re-distribute to Ulstad Avenue by accessing the WB left turn lane at Columbus Avenue. The inverse will occur for south side road traffic, with Columbus and St. Peter traffic re-distributed to Ulstad Avenue, and St. Thomas traffic re-distributing to Garfield Avenue by accessing the EB left turn lane at Columbus Avenue.

For the rural portion from Fenton Avenue to Prospect Avenue, it is assumed that mainline left turn traffic will be maintained at each intersection except Prospect Avenue. Mainline left turn traffic at that intersection will be re-directed to the downstream median U-turn lane. Side road left turn and through traffic will also be re-located to the nearest downstream median U-turn lane at each intersection.

From the re-distributed traffic counts, each intersection was evaluated to determine if the change in traffic would warrant a traffic signal using Table 4C-1, Condition A from the MnMUTCD. Comparing the table to Figure 7, none of the intersections met the 150vph eight hour minor street volume necessary to require a traffic signal.

## Level of Service

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Level of Service (LOS) at intersections is primarily a function of peak hour turning movement volumes, intersection lane configuration, and traffic control. For intersection analysis, the HCM defines LOS in terms of the average control delay at the intersection in seconds per vehicle. Level of service is broken down into letter grades, with LOS A representing good operations and LOS F representing poor operations. LOS E is considered to be at capacity. MnDOT policy is that LOS D is acceptable in urban areas. Table 1 shows the level of service correlations to seconds of delay for signalized intersections and stop control (unsignalized) intersections.

LOS	Signalized Intersection Control Delay (seconds/vehicle)	Unsignalized Intersection Control Delay (seconds/vehicle)
A	≤ 10 sec.	≤ 10 sec.
B	10 - 20 sec.	10 - 15 sec.
C	20 - 35 sec.	15 - 25 sec.
D	35 - 55 sec.	25 - 35 sec.
E	55 - 80 sec.	35 - 50 sec.
F	> 80 sec.	> 50 sec.

TABLE 4 – Intersection LOS Criteria

Level of Service has been shown to have a direct relationship with traffic safety. The lower the level of service for a given intersection results in more congestion at the intersection, and a higher number of crashes due to congestion.

The Level of Service (LOS) for each intersection from Garfield Avenue to Prospect Avenue was analyzed for current traffic volumes and 20 year estimated traffic volumes using the procedures outlined in the *Highway Capacity Manual 6<sup>th</sup> Edition* (HCM), the intersections were modeled using Synchro Studio 11 with SimTraffic 11 and Sidra Intersection 8.0. 2040 traffic volumes were estimated using a compound growth factor of 1%. The results of the analysis using the existing intersection conditions and the proposed intersection layout conditions follow.

### 2020 Existing Conditions LOS

2020 Level of Service									
		GARFIELD	ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT
APPROACH	NB	D	C	B	D	D	C	E	C
	SB	F	C	D	D	B	D	C	C
	EB	C	A	A	A	A	A	A	A
	WB	C	A	A	A	A	A	A	A
Intersection LOS		D							

 Acceptable LOS

 Degrading LOS

 Failing LOS

TABLE 5 – 2020 LOS Summary

### 2040 Existing Conditions LOS

2040 Level of Service									
		GARFIELD	ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT
APPROACH	NB	E	D	C	E	E	D	F	E
	SB	F	C	E	E	C	E	E	E
	EB	A	A	A	A	A	A	A	A
	WB	A	A	A	A	A	A	A	A
Intersection LOS		F							

 Acceptable LOS

 Degrading LOS

 Failing LOS

TABLE 6 – 2040 LOS Summary

## 2020 Proposed Layout Conditions LOS

2020 Level of Service									
		GARFIELD	ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT
APPROACH	NB	B	B	B	B	D	B	B	B
	SB	B	B	B	B	B	B	B	B
	EB	B	A	A	A	A	A	A	A
	WB	B	A	A	A	A	A	A	A
Intersection LOS		B							

Acceptable LOS
  Degrading LOS
  Failing LOS

TABLE 7 – 2020 LOS Summary

## 2040 Proposed Layout Conditions LOS

2040 Level of Service									
		GARFIELD	ST. THOMAS	COLUMBUS	ST. PETER	ULSTAD	FENTON	MORNINGSIDE	PROSPECT
APPROACH	NB	B	B	B	B	F	B	B	B
	SB	B	B	B	B	C	B	B	B
	EB	B	A	A	A	A	A	A	A
	WB	B	A	A	A	A	A	A	A
Intersection LOS		B							

Acceptable LOS
  Degrading LOS
  Failing LOS

TABLE 8 – 2040 LOS Summary

Tables 5-8 demonstrate the improved LOS for each approach at each intersection using the proposed intersection layout, with each intersection meeting acceptable LOS grades for 2020 traffic. The most drastic increase in LOS is shown with side road grades using the 2040 design year traffic volumes. Only 1 approach at Ulstad Avenue does not meet an acceptable LOS grade with the proposed layout, compared to the 11 approaches with the existing site conditions. This data demonstrates the long term safety benefits that the proposed layout will provide to users along US 65.

## Conclusion

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Based on the safety analysis performed for the intersections from St. Thomas Ave. to Prospect Ave., the proposed layout shown in Figures 3 and 4 will provide benefits to drivers and pedestrians by decreasing the number of access points along the corridor, providing adequate spacing between access points, and by decreasing the number of conflict points vehicles can encounter at each intersection. Such measures will result in a reduction of crashes, particularly right angle crashes, and provide a safer roadway.

## References

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